Tennessee Valley Authority, Post Office Box 2000, Decatur, Alabama 35609-2000

Brian O'Grady
Vice President, Browns Ferry Nuclear Plant

September 14, 2005

10 CFR 54

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop: OWFN P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of	)	Docket Nos. 50-259
Tennessee Valley Authority	)	50-260
		50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 1, 2, AND 3 - LICENSE RENEWAL APPLICATION - RESULTS OF REVIEW OF SAFETY EVALUATION REPORT (SER) WITH OPEN ITEMS RELATED TO LICENSE RENEWAL OF BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 (TAC NOS. MC1704, MC1705, AND MC1706)

By letter dated December 31, 2003, TVA submitted, for NRC review, an application pursuant to 10 CFR 54, to renew the operating licenses for the Browns Ferry Nuclear Plant, Units 1, 2, and 3. An August 9, 2005, letter from Pao-Tsin Kuo (NRC) to Karl W. Singer (TVA) transmitted the "Safety Evaluation Report With Open Items related to the License Renewal of the BFN, Units 1, 2, and 3," hereinafter referred to as the Safety Evaluation Report (SER). This letter requested TVA to "… review the enclosed SER, verify its accuracy, and provide comments to the NRC staff by September 9, 2005. …" On September 6, 2005, the NRC staff concurred

A105

with TVA submitting comments by September 14, 2005 (30 days after the pdf version of the SER was available for TVA's use.)...."

TVA has completed its review of the SER. Also, during this review and in internal reviews performed in preparation for the September 19-23, 2005, NRC inspection of aging management programs, we identified several changes that are required to the LRA.

This letter contains the following two enclosures:

- Enclosure 1: LRA CHANGES - This enclosure provides changes which materially affect the content of the License Renewal Application.
- Enclosure 2: SER COMMENTS - This enclosure provides our comments on the SER. These comments are primarily editorial in nature.

If you have any questions regarding this information, please contact Ken Brune, Browns Ferry License Renewal Project Manager, at (423) 751-8421.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 14th day of September, 2005.

Sincerely,

Brian O'Grady

Enclosure:
cc: See page 3

Enclosure
cc (Enclosure):

State Health Officer
Alabama Department of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, Alabama 36130-3017

Chairman
Limestone County Commission
310 West Washington Street
Athens, Alabama 35611

(Via NRC Electronic Distribution)
Enclosure
cc (Enclosure):

U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303-8931

Mr. Stephen J. Cahill, Branch Chief
U.S. Nuclear Regulatory Commission
Region II
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, Georgia 30303-8931

NRC Senior Resident Inspector
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, Alabama 35611-6970

NRC Unit 1 Restart Senior Resident Inspector
Browns Ferry Nuclear Plant
10833 Shaw Road
Athens, Alabama 35611-6970

cc: continued page 4

cc: (Enclosure)

Margaret Chernoff, Project Manager
U.S. Nuclear Regulatory Commission
(MS 08G9)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

Eva A. Brown, Project Manager
U.S. Nuclear Regulatory Commission
(MS 08G9)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

Yoira K. Diaz-Sanabria, Project Manager
U.S. Nuclear Regulatory Commission
(MS 011F1)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

Ramachandran Subbaratnam, Project Manager
U.S. Nuclear Regulatory Commission
(MS 011F1)
One White Flint, North
11555 Rockville Pike
Rockville, Maryland 20852-2739

ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA)

LRA CHANGES

(SEE ATTACHED)

ENCLOSURE 1

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA)

LRA CHANGES

By letter dated December 31, 2003, TVA submitted, for NRC review, an application pursuant to 10 CFR 54, to renew the operating licenses for the Browns Ferry Nuclear Plant, Units 1, 2, and 3. An August 9, 2005, letter from Pao-Tsin Kuo (NRC) to Karl W. Singer (TVA) transmitted the "Safety Evaluation Report With Open Items related to the License Renewal of the BFN, Units 1, 2, and 3," hereinafter referred to as the Safety Evaluation Report (SER). This letter requested TVA to "review the enclosed SER, verify its accuracy, and provide comments to the NRC staff …"

This enclosure provides LRA changes which materially affect the content of the License Renewal Application.

HIGH PRESSURE COOLANT INJECTION SYSTEM (073)

In LRA Section 2.3.2.3, High Pressure Coolant Injection System (073), in the listing of system intended functions, the seventh bullet should have defined MSIV as "Main Steam Isolation Valve" instead of "Main Steam Injection Valve." To correct this, replace the seventh bullet under the HPCI System intended functions with the following:

- Establish Main Steam Isolation Valve (MSIV) leakage pathway to condenser (**F.1**)

TRANSMISSION CONDUCTORS

Based on further review of BFN switchyard components and to accurately reflect transmission conductor materials (AAC vs. ACSR) and associated AMR results, changes to LRA Section 3.6.2.3.4 are required.

In LRA Section 3.6.2.3.4, replace the paragraph under *BFN Evaluation* on LRA page 3.6-10 with the following:

The portions of transmission conductors within the scope of license renewal for BFN are All Aluminum Conductors (AAC). AAC conductors, unlike ACSR, are not as susceptible to environmental influences, such as SO_2 concentration in air. When aluminum corrodes, it forms a protective oxide layer which protects the underlying material from further corrosion. When the steel core of ACSR corrodes due to losing its galvanized coating, it will continually corrode causing a decrease in ultimate strength.

The two types of AAC conductors used at BFN are Orchid, 636 mcm, and Coreopsis, 1590 mcm, which have an ASTM rated strength of 11,100 lbs. and 27,000 lbs. respectively. The maximum load permitted by TVA design is 3000 lbs. for Orchid and 6000 lbs. for Coreopsis which results in a margin of 73% and 77% of the rated strength. Using the same percent decrease in ultimate strength of 33% from the Ontario Hydroelectric test, the AAC conductors at BFN would undergo a loss of rated strength of 3663 lbs. for Orchid and 8910 lbs. for Coreopsis. The new rated strength/margin of rated strength would be 7437 lbs./40% and 18090 lbs./44 % for Orchid and Coreopsis, respectively. The ultimate strengths are well above TVA's maximum design load and the NESC margin of ultimate load, 6660 lbs. for Orchid and 16200 lbs. for Coreopsis, for the original conductors. Although corrosion of aluminum is minimal, a decrease in ultimate strength due to corrosion similar to the ACSR conductor tested by Ontario Hydroelectric shows that the AAC conductors at BFN will continue to perform their intended functions for the period of extended operation.

TVA Transmission/Power Supply personnel perform normal maintenance activities on all portions of the switchyards, including transmission conductors. These maintenance activities have not revealed any aging effects/mechanisms associated with transmission lines to date. In conclusion, there are no applicable aging effects that could cause loss of the intended function of the transmission conductors. Therefore, loss of conductor strength due to corrosion of transmission conductors is not an aging effect requiring management for the period of extended operation.

BOILING WATER REACTOR PENETRATIONS PROGRAM

Revisions are needed to Sections A.1.11 and B.2.1.11 to clarify that the BWRVIP guidelines are augmented examinations which are not part of the ASME Section XI program.

In LRA Section A.1.11, replace the second sentence in part (a) with the following:

Inspection and flaw evaluation is conducted in accordance with the ASME B&PV Code Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program and the augmented exam recommendations of the BWRVIP-27 and BWRVIP-49 guidelines.

In LRA Section B.2.1.11, replace the second sentence in part (a) with the following:

Inspection and flaw evaluation is conducted in accordance with the ASME B&PV Code Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program (B.2.1.4 and A.1.4) and the augmented exam recommendations of the BWRVIP-27 and BWRVIP-49 guidelines.

FUEL OIL CHEMISTRY PROGRAM

Based on information obtained during the Aging Management Program implementation process, an additional exception to GALL AMP XI.M30, Fuel Oil Chemistry Program is taken; additionally, the program scope has changed. LRA Sections A.1.24 and B.2.1.27, Fuel Oil Chemistry Program, should be revised as described below.

Replace LRA Section A.1.24 with the following (Note that the revision to this LRA section was the removal of the third sentence "If required, a biocide is added to the fuel oil storage tanks during each new fuel delivery."):

The Fuel Oil Chemistry Program relies on a combination of surveillance and maintenance procedures. Monitoring and controlling fuel oil contamination maintains the fuel oil quality. Exposure to fuel oil contaminants such as water and microbiological organisms is minimized by fuel oil sampling and analysis, including analysis of new fuel before its introduction into the storage tanks. Sampling and testing of diesel fuel oil is in accordance with American Society for Testing Materials Standards D 1796, D 2276, and D 4057.

In LRA Section B.2.1.27, replace Program Description with the following Program Description. Note that the revised portions of the Program Description are in italics and underlined:

Program Description

The Fuel Oil Chemistry Program includes:

(a) Surveillance and maintenance procedures to mitigate corrosion - Fuel oil quality is maintained by monitoring and controlling fuel oil contamination in accordance with the guidelines of the American Society for Testing Materials (ASTM) Standards D 1796, D 2276, and D 4057. Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by periodic draining *<u>of water</u>* or cleaning of tanks and by verifying the quality of new oil before its introduction into the storage tanks. Procedures require performance of fuel oil tank bottom and multi-level sampling on a quarterly basis to detect and remove water and sediment from each tank. In addition, each 7-day diesel oil supply tank is cleaned and inspected at intervals of approximately 10 years.

(b) Measures to verify the effectiveness of the AMP and confirm the absence of an aging effect - A one-time inspection in accordance with the One-Time Inspection Program (B.2.1.29) will be performed prior to entering the period of extended operation and will consist of thickness measurements of the 7-day diesel oil supply tanks *<u>and diesel driven fire pump fuel oil tank bottom surfaces</u>*.

In LRA Section B.2.1.27, add the following Exception to NUREG-1801:

Exception to NUREG-1801

This exception to NUREG-1801 is that neither biocides, stabilizers, nor corrosion inhibitors are added to diesel fuel oil at BFN. Water, when detected, is removed from the Diesel Generator 7-Day Fuel Oil Tanks, Diesel Generator Fuel Oil Day Tanks, and the Diesel Driven Fire Pump Fuel Oil Tank. Based on a review of operating experience, removal of water when detected has been effective in mitigating corrosion inside of these tanks.

Program Element Affected:

Element 2 - Preventive Actions

"The quality of fuel oil is maintained by additions of biocides to minimize biological activity, stabilizers to prevent biological breakdown of the diesel fuel, and corrosion inhibitors to mitigate corrosion. Periodic cleaning of a tank allows removal of sediments, and periodic draining of water collected at the bottom of a tank minimizes the amount of water and the length of contact time. Accordingly, these measures are effective in mitigating corrosion inside diesel fuel oil tanks. Coatings, if used, prevent or mitigate corrosion by protecting the internal surfaces of the tank from contact with water and microbiological organisms."

BFN Evaluation

On a quarterly basis, the Diesel Generator 7-Day Fuel Oil Tanks and the Diesel Driven Fire Pump Fuel Oil Tank are tested for water and sediments. Water, if detected, is removed from these tanks. On a monthly basis, or when a Diesel Generator is ran for more than one hour, Diesel Generator Fuel Oil Day Tanks are tested for water and drained as necessary if water is detected. Based on a review of operating experience, these actions are effective in mitigating corrosion inside of Diesel Generator 7-Day Fuel Oil Tanks, Diesel Generator Fuel Oil Day Tanks, and the Diesel Driven Fire Pump Fuel Oil Tank.

SYSTEM MONITORING PROGRAM

During the Aging Management Program implementation process, the frequency for visual inspections and issuing System Health Reports is being revised from quarterly to a frequency that reflects plant procedural requirements. Plant procedures require that system walkdowns be periodic such that all portions of the system are walked down during a fuel cycle with portions inaccessible during normal operation being walked down during outages and System Heath Reports will be issued based on system performance.

In LRA Section B.2.1.39, Element 4, replace the BFN Description and Evaluation with the following:

BFN Description and Evaluation

The System Monitoring Program includes visual inspections to identify material condition (i.e., loss of material, corrosion etc.) of surfaces of systems and components to detect aging effects prior to the loss of their intended function. The system visual inspections provide data collection on systems and components for monitoring and trending. Visual inspections are performed during periodic system walkdowns which are conducted to cover all accessible parts of the system over the period of a fuel cycle. System components that are inaccessible during normal operation are inspected to the extent possible during outages.

In LRA Section B.2.1.39, Element 5, replace the BFN Description and Evaluation with the following:

BFN Description and Evaluation

The inspected systems and components are monitored, trended, and documented by the use of the System Health Reports, the Corrective Action Program, and the Corrective Maintenance program. Corrective Action and Corrective Maintenance program documents are tracked, trended, and scheduled to ensure actions are taken in a timely manner to correct or mitigate any effects of aging deficiencies identified.

In LRA Section B.2.1.39, Element 10, replace the BFN Description and Evaluation with the following:

BFN Description and Evaluation

The System Monitoring Program produces System Health Reports which provide review of systems and components operating experience. This includes corrective actions that have been taken and resulted in enhancements to systems and components. The System Monitoring Program and System Health Reports have identified age related degradation and material conditions of systems and components. The effectiveness of the corrective actions have been evaluated and documented in the System Health Reports.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA)

SER COMMENTS

(SEE ATTACHED)

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA)

SER COMMENTS

By letter dated December 31, 2003, TVA submitted, for NRC review, an application pursuant to 10 CFR 54, to renew the operating licenses for the Browns Ferry Nuclear Plant, Units 1, 2, and 3. An August 9, 2005, letter from Pao-Tsin Kuo (NRC) to Karl W. Singer (TVA) transmitted the "Safety Evaluation Report With Open Items related to the License Renewal of the BFN, Units 1, 2, and 3," hereinafter referred to as the Safety Evaluation Report (SER). This letter requested TVA to "review the enclosed SER, verify its accuracy, and provide comments to the NRC staff …"

This enclosure provides our comments on the SER. The comments are primarily editorial in nature.

SECTION 1

INTRODUCTION AND GENERAL DISCUSSION

1.1 Introduction

This document is a safety evaluation report (SER) on the application for license renewal (LR) for the Browns Ferry Nuclear Plant (BFN), as filed by Tennessee Valley Authority (TVA or the applicant). By letter dated December 31, 2003, TVA submitted its application to the U.S. Nuclear Regulatory Commission (NRC or the Commission) for renewal of the BFN operating licenses for an additional 20 years. The NRC staff (the staff) prepared this report, which summarizes the results of its safety review of the renewal application for compliance with the requirements of Title 10, Part 54, of the *Code of Federal Regulations*, (10 CFR Part 54), "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." The NRC license renewal project managers for the BFN license renewal review are Ram Subbaratnam and Yoira Diaz-Sanabria. Mr. Subbaratnam can be contacted by telephone at 301-415-1478 or by electronic mail at rxs2@nrc.gov; Ms Diaz-Sanabria can be contacted by telephone at 301-415-1594 or by electronic mail at yks@nrc.gov. Alternatively, written correspondence may be sent to the following address:

License Renewal and Environmental Impacts Program
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Attention: Ram Subbaratnam, or Yoira Diaz-Sanabria, Mail Stop 0-11-F1

In its December 31, 2003, submittal letter, the applicant requested renewal of the operating licenses issued under Section 104b (Operating License Nos. DPR-33, DPR-52, and DPR-68) of the Atomic Energy Act of 1954, as amended, for BFN Units 1, 2, and 3 for a period of 20 years beyond the current license expiration dates of midnight December 20, 2013, for Unit 1; midnight June 28, 2014, for Unit 2; and midnight July 2, 2016 for Unit 3. The BFN units are located on the north shore of Wheeler Reservoir in Limestone County, Alabama, at Tennessee River Mile (TRM) 294. The site is approximately 30 miles west of Huntsville, Alabama; it is also 10 miles northwest of Decatur, Alabama and 10 miles southwest of Athens, Alabama. The NRC issued the construction permits for Unit 1 on May 10, 1967; for Unit 2 on May 10, 1967; and for Unit 3 on July 31, 1968. The staff issued the operating licenses for Unit 1 on December 20, 1973; for July 2,
June 28, Unit 2 on ~~August 2,~~ 1974; and for Unit 3 on ~~August 18,~~ 1976. All of the units consist of a Mark 1 boiling water reactor (BWR) with a nuclear steam supply system supplied by General Electric Corporation. The balance of each of the plants was originally designed and constructed by TVA. Unit 1 licensed power output is 3293 megawatt thermal (MWt), with a gross electrical output of approximately 1100 megawatt electric (MWe). Units 2 and 3 licensed power output is 3458 MWt, with a gross electrical output of approximately 1155 MWe. The updated final safety analysis report (UFSAR) contains details concerning the plant and the site. The units operated from the original licensing until 1985 when they were voluntarily shut down by the applicant to address management and technical issues. The applicant then implemented a comprehensive nuclear performance plan to correct the deficiencies that led to the shutdown. This plan included changes in management, programs, processes and procedures, as well as extensive equipment refurbishment, replacement, and modifications. Unit 2 was subsequently restarted in 1991, and

Unit 3 followed in 1995. In the early 1990s, the applicant decided to defer restart of Unit 1. Unit 1 is currently in a shutdown status.

The license renewal process consists of two concurrent reviews - a technical review of safety issues and an environmental review. The NRC regulations found in 10 CFR Parts 54 and 51, respectively, set forth the requirements against which license renewal applications are reviewed. The safety review for the BFN license renewal is based on the applicant's license renewal application (LRA) and on the responses to the staff's requests for additional information (RAIs). The applicant supplemented and clarified its responses to the LRA and RAIs in audits, meetings, and docketed correspondence. Unless otherwise noted, the staff reviewed and considered information submitted through June 15, 2005. The staff reviewed the information received after that date on a case-by-case basis, depending on the stage of the safety review and the volume and complexity of the information. The public may view the LRA and all pertinent information and materials, including the UFSAR mentioned above, at the NRC Public Document Room, located in One White Flint North, 11555 Rockville Pike (first floor), Rockville, MD 20852-2738 (301-415-4737/800-397-4209), and at the Athens-Limestone Public Library, 405 South Street East, Athens, AL, 35611. In addition, the public may find the BFN Units 1, 2, and 3 LRA, as well as materials related to the license renewal review, on the NRC website at www.nrc.gov.

This SER summarizes the results of the staff's safety review of the BFN LRA and describes the technical details considered in evaluating the safety aspects of the units' proposed operation for an additional 20 years beyond the term of the current operating licenses. The staff reviewed the LRA in accordance with NRC regulations and the guidance provided in NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants" (SRP-LR), dated July 2001.

SER Sections 2 through 4 address the staff's review and evaluation of license renewal issues that it has considered during the review of the application. Section 5 is reserved for the report of the Advisory Committee on Reactor Safeguards (ACRS). The conclusions of this report are in Section 6.

SER Appendix A is a table that identifies the applicant's commitments associated with the renewal of the operating licenses. Appendix B provides a chronology of the principal correspondence between the NRC and the applicant related to the review of the application. Appendix C is a list of principal contributors to the SER. Appendix D is a bibliography of the references used in support of the review.

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In accordance with 10 CFR Part 51, the staff prepared a draft plant-specific supplement to the Generic Environmental Impact Statement (GEIS). This supplement discusses the environmental considerations related to renewing the licenses for BFN Units 1, 2, and 3. The staff issued draft Supplement 21 to NUREG-1437 "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Browns Ferry Nuclear Plant, Units 1, 2, and 3 ~~"Final Report,"~~ on December 1, 2004. The final ~~supplement~~ report was issued on June 23, 2005.

Draft Report for Comment"

1.2 License Renewal Background

Pursuant to the Atomic Energy Act of 1954, as amended, and NRC regulations, operating licenses for commercial power reactors are issued for 40 years. These licenses can be renewed

NRC LR Website for BFN lists date as December 3, 2004

are relied on to demonstrate compliance with the NRC's regulations for fire protection (FP), environmental qualification (EQ), pressurized thermal shock (PTS), anticipated transient without scram (ATWS), and station blackout (SBO).

Pursuant to 10 CFR 54.21(a), an applicant for a renewed license must review all SSCs that are within the scope of the Rule to identify SCs that are subject to an aging management review (AMR). Those SCs that are subject to an AMR perform an intended function without moving parts or without a change in configuration or properties, and are not subject to replacement based on qualified life or specified time period. As required by 10 CFR 54.21(a), an applicant for a renewed license must demonstrate that the effects of aging will be managed in such a way that the intended function, or functions, of those SCs will be maintained, consistent with the current licensing basis (CLB), for the period of extended operation; however, active equipment is considered to be adequately monitored and maintained by existing programs. In other words, the detrimental effects of aging that may affect active equipment are more readily detectable and can be identified and corrected through routine surveillance, performance monitoring, and maintenance activities. The surveillance and maintenance activities programs for active equipment, as well as other aspects of maintaining the plant design and licensing basis, are required throughout the period of extended operation.

Pursuant to 10 CFR 54.21(d), each LRA is required to include a supplement to the FSAR (final safety analysis report) or UFSAR. This supplement must contain a summary description of the applicant's programs and activities for managing the effects of aging and the evaluation of time-limited aging analyses (TLAAs) for the period of extended operation.

License renewal also requires the identification and updating of the TLAAs. During the design phase for a plant, certain assumptions are made about the length of time the plant can operate. These assumptions are incorporated into design calculations for several of the plant's SSCs. In accordance with 10 CFR 54.21(c)(1), the applicant must either show that these calculations will remain valid for the period of extended operation, project the analyses to the end of the period of extended operation, or demonstrate that the effects of aging on these SSCs can be adequately managed for the period of extended operation.

In 2001, the NRC developed and issued Regulatory Guide (RG) 1.188, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses". This RG endorses Nuclear Energy Institute (NEI) 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule," which was issued in March 2001, by the NEI. NEI 95-10 details an acceptable method of implementing the license renewal rule. The staff also used the SRP-LR to review this application. delete

In the LRA, BFN fully utilizes the process defined in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," issued in July 2001. The GALL Report provides the staff with a summary of staff-approved aging management programs (AMPs) for the aging of many SCs that are subject to an AMR. If an applicant commits to implementing these staff-approved AMPs, the time, effort, and resources used to review an applicant's LRA can be greatly reduced, thereby improving the efficiency and effectiveness of the license renewal review process. The GALL Report summarizes the aging management evaluations, programs, and activities credited for managing aging for most of the SCs used throughout the industry. The report also serves as a reference for both applicants and staff reviewers to quickly identify those AMPs and activities that the staff determined can provide adequate aging management during

restart Unit 1 in 2007. The element unique to Unit 1 is that restart activities include modifying the Unit 1 licensing basis to make it consistent with the CLB of Units 2 and 3. During the meetings with the staff during 2003, it was agreed the applicant would identify in the LRA the Unit 1 differences that will be eliminated when restart activities are completed. To highlight these differences, information not yet applicable to Unit 1 was marked with bolded border. This annotation methodology is consistent with previous multi-plant LRAs submitted to the staff. LRA Appendix F describes each of these differences, its effect on the application, the schedule for resolution, and provides references to application sections affected. This enables the applicant to submit an LRA based on the CLB for all three units, as well as to identify Unit 1 restart activities relevant to the LRA. The changes are being implemented as part of Unit 1 restart activities consistent with the changes made previously to Units 2 and 3. Thus, the applicant states that the BFN units are essentially identical, and the application is not unit-specific with regard to AMPs or the AMRs.

10 CFR 54.19(a) requires a license renewal applicant to submit general information. The applicant provided this general information in LRA Section 1, which it submitted by letter dated December 31, 2003. The staff reviewed LRA Section 1 and found that the applicant had submitted the information required by 10 CFR 54.19(a).

In 10 CFR 54.19(b), the NRC requires that each LRA include "conforming changes to the standard indemnity agreement, 10 CFR 140.92, Appendix B, to account for the expiration term of the proposed renewed license." The applicant stated the following in the LRA regarding this issue:

This statement was not contained in the LRA.

> The current indemnity agreement for the units does not contain a specific expiration term for the operating licenses. Therefore, conforming changes to account for the expiration terms of the proposed renewed licenses are not necessary, unless the license numbers are changed upon issuance of the renewed licenses.

The staff intends to maintain the original license numbers upon issuance of the renewed licenses if approved. Therefore, conforming changes to the indemnity agreement do not need to be made, and the requirements of 10 CFR 54.19(b) have been met.

In 10 CFR 54.21, the NRC requires that each LRA must contain: (a) an IPA, (b) a description of any CLB changes that occurred during the staff review of the LRA, (c) an evaluation of TLAAs, and (d) an FSAR or a UFSAR supplement. Sections 3 and 4 and Appendix B to the LRA address the license renewal requirements of 10 CFR 54.21(a), (b), and (c). LRA Appendix A contains the license renewal requirements of 10 CFR 54.21(d).

In 10 CFR 54.21(b), the NRC requires that each year following submission of the LRA, and at least three months before the scheduled completion of the staff's review, the applicant must submit an amendment to the renewal application that identifies any changes to the CLB of the facility that materially affect the contents of the LRA, including the UFSAR supplement. The applicant submitted an update to the LRA by letter dated January 31, 2005, which summarized the changes to the CLB that have occurred during the staff's review of the LRA. This submission satisfies the requirements of 10 CFR 54.21(b) and is still under staff review.

In accordance with 10 CFR 54.22, an applicant's LRA must include changes or additions to the technical specifications (TSs) that are necessary to manage the effects of aging during the

ISG Issue (Approved ISG No.)	Purpose	SER Section
SBO Scoping **(ISG-2)**	The license renewal rule 10 CFR 54.4(a)(3) includes 10 CFR 50.63(a)(1)—SBO. The SBO rule requires that a plant must withstand and recover from an SBO event. The recovery time for offsite power is much faster than that of EDGs. The offsite power system should be included within the scope of license renewal.	2.1.3
Concrete AMP **(ISG-3)**	Lessons learned from the GALL demonstration project indicated that GALL is not clear on whether concrete requires an AMP.	3.5.2.2.~~1~~ 8

OI-4.7.7: (Section 4.7.7 - Stress Relaxation of the Core Plate Hold-Down Bolts)

In LRA Section 4.7.7, the loss of preload of the core plate hold-down bolts due to thermal and irradiation effects was evaluated in accordance with the requirements of 10 CFR 54.21(c)(1)(ii). For the 40-year lifetime, the BWRVIP-25 concluded that all core plate hold-down bolts will maintain some preload throughout the life of the plant. For the period of extended operation, the expected loss of preload was assumed to be 20 percent, which bounds the original BWRVIP analysis that was prepared to bound the majority of plants, including BFN units after operating for 20 additional years. With a loss of 20 percent in preload, the core plate will maintain sufficient preload to prevent sliding under both normal and accident conditions. Based on this assumption, the applicant concluded that the loss of preload is acceptable for the period of extended operation.

In RAI 4.7.7-1, the staff requested the applicant to demonstrate how the BWRVIP-25 analysis can be applied to the BFN units based on the configuration and the geometry of core plate hold-down bolts and the reactor environment (temperature and neutron fluence) assumed in the original report. The staff requested from the vendor plant-specific calculation that will validate the assumption as stated above.

This evaluation is still ongoing and is not yet resolved. **This is open item (OI) 4.7.7-1.**

1.6 Summary of Confirmatory Items

As a result of the staff's review of the LRA for BFN, including additional information and clarifications submitted to the staff through June 15, 2005, the staff identified the following confirmatory items (CIs). An issue is considered confirmatory if the staff and the applicant have reached a satisfactory resolution, but the resolution has not yet been formally submitted to the staff. Each CI has been assigned a unique identifying number. The items identified in this section have been properly closed by the technical staff.

CI-3.0-3 LP: (Section 3.0 - LayUp Program)

Unit 1 is currently on an administrative hold and kept in a layup status since its voluntary shutdown in March 1985. The applicant intends to restart Unit 1 in 2007 and has since completed Unit 1 wide refurbishment and replacement of piping and components as necessary, the details of which are elaborated in SER Section 3.7. Some of the original plant piping has been left in place and has not been refurbished.

add dash restart

The staff was not satisfied with the aging management of the un-refurbished and left-in-place piping and components if a one-time inspection or a ~~start~~ inspection does not identify any degradation at the time of restart. The staff argued that where layup programs were effective, one-time or other startup inspections performed during the extended outage when the system was and continues to be in a benign environment may not be adequate to detect degradation in the future when the system is returned to service and exposed to a different and potentially more aggressive environment. The applicant should explain how a one-time inspection or startup inspections performed during the Unit 1 extended outage are effective in detecting such future degradation, particularly in crevices. Alternatively, the applicant could commit to appropriate future periodic inspections in targeted locations for the aging effect. For portions of Unit 1 systems that have not been replaced, the applicant has not provided information to

a follow up to RAI B.2.1.33-1, the applicant also agreed to include the inspector's qualification in accordance with the requirements of ASME Code Section XI Subsection IWF and not per the BFN Structures Monitoring Program. The applicant agreed to provide this in a docketed correspondence. This is CI-B.2.1.36.

1.7 Summary of Proposed License Conditions

As a result of the staff's review of the LRA, including subsequent information and clarifications provided by the applicant, the staff identified four proposed license conditions.

The first license condition requires the applicant to include the UFSAR supplement required by 10 CFR 54.21(d) in the next UFSAR update, as required by 10 CFR 50.71(e), following the issuance of the renewed licenses.

The second license condition requires the future activities identified in the FSAR supplement to be completed prior to entering the period of extended operation.

The third license condition requires all capsules in the reactor vessel that are removed and tested meet the requirements of ASTM E 185-82 to the extent practicable for the configuration of the specimens in the capsule. Any changes to the capsule withdrawal schedule, including spare capsules, must be approved by the staff prior to implementation. All capsules placed in storage must be maintained for future insertion. Any changes to storage requirements must be approved by the staff, as required by 10 CFR Part 50, Appendix H.

delete period

The fourth license condition is satisfactory completion of the thirteen Unit 1 restart commitments that are discussed in LRA Appendix F (see SER Section 2.6). Successful completion of these restart activities provides a necessary regulatory framework for review of the LRA and is a staff assumption fundamental throughout the staff safety review. When completed, the CLB of Unit 1 will be consistent with the CLB of Units 2 and 3. Completion of these activities is a condition to be met prior to power operations of Unit 1.

Application of the Scoping Criteria in 10 CFR 54.4(a)(2). In LRA Section 2.1.2.2, "10 CFR 54.4(a)(2) - Nonsafety-Related Affecting Safety-Related," the applicant discussed the methodology used to identify SSCs meeting the 10 CFR 54.4(a)(2) NSR license scoping criteria. Specifically, the applicant considered the following SSCs to be in the scope of 10 CFR 54.4(a)(2):

- SCs, such as pipe whip restraints, that provide protection to SR SSCs to be in the scope of 10 CFR 54.4(a)(1) rather than 10 CFR 54.4(a)(2) SSCs
- Liquid-filled NSR SSCs directly connected to SR SSCs
- NSR SSCs that are not directly connected to SR structures such as, reactor buildings, primary containment structures
- NSR air/gas and heating, ventilation, and air conditioning (HVAC) systems that could prevent the satisfactory accomplishment of an SR function

In LRA Section 2.1.2.2, the applicant described the methods and rationale used to scope each of the above categories of NSR SSCs in the LRA. The applicant's review encompassed the DBEs considered in these documents. The NSR SSCs already included within the scope of license renewal for 10 CFR 54.4(a)(3) were not identified for inclusion under 10 CFR 54.4(a)(2).

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Application of the Scoping Criteria in 10 CFR 54.4(a)(3). In LRA Sections 2.1.2.3, "10 CFR 54.4 (a)(3) - The Five Regulated Events," and 2.1.3.4, "Specific Scoping Documents for Regulated Events," the applicant discussed the methodology used to identify SSCs credited in performing a function that demonstrates compliance with regulations for fire protection, environmental qualification (EQ), anticipated transient without scram (ATWS), and station blackout (SBO) pursuant to 10 CFR 54.4(a)(3) license renewal scoping criteria. The applicant did not address pressurized thermal shock because Browns Ferry units are boiling water type reactors to which this criterion does not apply.

2.1.2.1.2 Documentation Sources Used for Scoping and Screening

In LRA Section 2.1.3, "Documentation Sources Used for Scoping and Screening," the applicant listed sources that were used as input during the license renewal scoping and screening process:

- updated final safety analysis report (UFSAR)
- safe shutdown analysis (SSA) calculation
- Maintenance Rule documentation
- CLB and design-basis documents (design criteria documents and calculations) (qualitative assessments and analyses, quantitative computations)) delete
- controlled plant component database (also known as enterprise maintenance planning and control (EMPAC))
- site drawings

The applicant stated that these sources were used to identify the functions performed by plant systems and structures. These functions were then compared to the scoping criteria in 10 CFR 54.4(a)(1)-(3) to determine if the associated plant system or structure performed a

license renewal intended function. These sources were also used to develop the list of structures and components subject to an AMR.

2.1.2.1.3 Plant and System Level Scoping

and structures

In LRA Section 2.1.4, "Scoping Methodology," the applicant stated that the scoping methodologies used to identify mechanical, electrical, and instrumentation and control (I&C) systems were described under the respective disciplines. In general, the applicant created a list of systems and structures from the EMPAC, site drawings, and the structures' design documents, UFSAR, Maintenance Rule documents, and other plant design documents. The methodologies for individual disciplines are discussed below.

Mechanical Component Scoping. In LRA Section 2.1.4.1, the applicant described the scoping methodology for components within SR and NSR mechanical systems. For every mechanical system, the applicant applied the following scoping process: (1) identify system intended functions, (2) determine system evaluation boundary, and (3) create license renewal drawings. The applicant used information from the SSA calculation, the UFSAR, and other applicable documents to identify those systems that perform intended functions as defined in 10 CFR 54.4(a)(1).

A summary was prepared for each system that listed the identified system intended functions and the 10 CFR 54.4 criteria that caused the system to be within the scope of license renewal. Those systems for which no functions were identified as satisfying any of the three scoping criteria were classified as systems outside the scope of license renewal, and no further evaluation was performed. After identifying the system intended functions, the applicant established the system evaluation boundary, which identifies the portions of the system that are required to perform an intended function. Included in the evaluation boundary are the passive, long-lived components needed for the system to perform its intended functions. The components within the system evaluation boundary were reviewed according to the criteria of 10 CFR 54.4(a) used during evaluation of the system.

Electrical and Instrumentation and Control System Component Scoping. In LRA Section 2.1.4.2, the applicant described the scoping methodology for components in SR and NSR electrical and I&C systems. Specifically, the applicant selected the electrical and I&C components from the EMPAC list and evaluated them against the 10 CFR 54.4(a) criteria. The applicant reviewed NEI 95-10, and BFN documents such as plant drawings and EMPAC to determine the complete set of electrical commodities installed at BFN. These electrical commodities were included in the license renewal scope for evaluation using the spaces approach. The spaces approach identified the electrical and I&C commodity groups that are installed in the plant and the limiting environmental conditions for each group. The only exception to the spaces approach was in the SBO offsite power restoration methodology. The applicant used the conventional system evaluation methodology (i.e., mechanical system scoping) to identify the system intended functions and subsequent SCs within the scope of license renewal. As part of this review, the applicant reviewed the SSA calculation, UFSAR descriptions, Maintenance Rule documents, CLB, and design-basis documents to determine the system's safety classification level, and to identify the system intended functions.

Structural Component Scoping. In LRA Section 2.1.4.3, the applicant described the scoping methodology for components within SR and NSR structures. Specifically, the applicant stated

that the list of structures used for scoping was developed from the review of design drawings, design criteria document, and Maintenance Rule documentation, which include items such as free-standing buildings and structures, primary containment shell, tank foundations, manholes, tunnels, duct banks, and earthen structures. The applicant relied on the design criteria document for structures and the UFSAR to identify the safety classification of structures and structural components.

For review purposes, seismic Class I structures and structural components were considered SR. Structure functions were evaluated against the 10 CFR 54.4(a) criteria ~~in~~ and structure~~s~~ ~~where~~ intended functions were identified. The structure interfaces were examined and, in those instances where a failure of a structure could prevent a satisfactory accomplishment of any SR intended function or adversely impact other SR structures, that structure was identified and included within the scope of license renewal. The applicant reviewed detailed structural drawings for structures determined to be within the scope of license renewal to identify structural components. For structures within the scope of license renewal, all structural components required to support the intended functions were identified as within the scope of license renewal.

2.1.2.2 Screening Methodology

In LRA Section 2.1.5, "Screening Methodology," the applicant described the process of identifying the structures and components that are subject to an AMR. The applicant stated that, in accordance with 10 CFR 54.21(a)(1)(i), the screening process used the industry guidance contained in NEI-95-10, Revision 3, Appendix B, "Typical Structure, Component and Commodity Groupings and Active/Passive Determinations for the Integrated Plant Assessment," to identify SSCs from items within the scope of license renewal that require AMR. The identified SSCs were then sorted into groups that (1) perform an intended function, as described in 10 CFR 54.4, without moving parts or without a change in configuration or properties; and (2) those that are not subject to replacement based on a qualified life or specified time period. Components were then evaluated to determine which were long-lived. Components were considered long-lived unless specific plant documentation indicates the component is replaced at intervals of less than forty years.

2.1.2.2.1 Mechanical Component Screening

In LRA Section 2.1.5.1, the applicant described the component screening for mechanical systems as a continuation of the component scoping activity. The applicant evaluated each component within the scope of license renewal to determine if it has a passive function. If a component has a passive function that supports a system intended function, and if the component was determined to be long-lived, then the component was considered subject to an AMR. The applicant reviewed maintenance procedures, records, and vendor recommendations to determine if a component is long- or short-lived.

2.1.2.2.2 Structural Component Screening

In LRA Section 2.1.5.3, the applicant described the methodology used to screen the structural components within the scope of license renewal. The screening methodology classified in-scope structural components as passive consistent with the guidance found in NEI 95-10, Appendix B. In-scope structural components such as elastomers, which are subject to

In addition, the staff conducted a scoping and screening methodology audit at the Tennessee Valley Authority (TVA) corporate offices in Chattanooga, TN, from June 7 to 10, 2004. The focus of the audit was to ensure that the applicant had developed and implemented adequate guidance to conduct the scoping and screening of SSCs in accordance with the methodologies described in the application and the requirements of the Rule. The staff reviewed implementation procedures and engineering reports which describe the scoping and screening methodology implemented by the applicant. In addition, the staff conducted detailed discussions with the applicant on the implementation and control of the license renewal program and reviewed administrative control documentation and selected design documentation used by the applicant during the scoping and screening process. The staff further reviewed a sample of system scoping and screening results reports for the residual heat removal service water (RHRSW) system and the emergency equipment cooling water (EECW) system to ensure that the methodology outlined in the technical evaluations was appropriately implemented and the results were consistent with the CLB.

2.1.3.1 Scoping Methodology

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The scoping evaluations for the Browns Ferry Nuclear LRA were performed by the applicant's license renewal project personnel. The staff conducted detailed discussions with the applicant's license renewal project ~~management~~ personnel and reviewed documentation pertinent to the scoping process. The staff assessed whether the scoping methodology outlined in the LRA and implementation procedures was appropriately implemented and whether the scoping results were consistent with CLB requirements.

2.1.3.1.1 Implementation Procedures and Documentation Sources Used for Scoping and Screening

The staff reviewed the applicant's scoping and screening implementation procedures to verify that the process used to identify structures and components subject to an AMR was consistent with the LRA and SRP-LR and that the applicant had appropriately implemented the procedural guidance. Additionally, the staff reviewed the scope of CLB documentation sources used to support the LRA development and the process used by the applicant to ensure that CLB commitments has been appropriately considered during the scoping and screening process.

Scoping and Screening Implementation Procedures. The staff reviewed the following TVA scoping and screening methodology implementation procedures and engineering documents:

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O-TI-346	Maintenance Rule Performance Indicator Monitoring, Trending, and Reporting
O-TI-455	Mechanical Technical Evaluations For License Renewal, Revision 2
O-TI-456	Electrical Technical Evaluations For License Renewal
O-TI-457	Civil Technical Evaluations For License Renewal
0-TI-458	License Renewal Time Limited Aging Analyses, Revision 1
NEDP-21	Technical Evaluations for License Renewal, Revision 2
NEDP-4	Q-list and UNID Control, Revision 7

their areas of responsibility. The staff found that the applicant's license renewal training records were considered quality-related records and that these records were accurate, comprehensive, and complete.

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Conclusion. The results from the scoping and screening audit indicate that the applicant considered the information in the CLB for Units 2 and 3 in developing the scoping and screening methodology. The CLB documentation review methodology was capable of identifying the intended functions of the SSCs in a manner consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21. In addition, the applicant applied appropriate quality controls during the development of the application and adequately trained the applicable personnel. The staff concluded that the applicant had considered all relevant information during the preparation of the scoping and screening methodologies.

2.1.3.1.2 Application of the Scoping Criteria in 10 CFR 54.4(a)

The staff evaluated the application of the scoping criteria for the methodology for scoping SR- and NSR-related SSCs and SSCs relied upon to demonstrate compliance with regulated events pursuant to 10 CFR 54.4(a). The results of the staff's evaluation are described below.

Application of the Scoping Criteria in 10 CFR 54.4(a)(1). Pursuant to 10 CFR 54.4(a)(1), the applicant must consider all SR SSCs that are relied upon to remain functional during and following DBEs to ensure the following functions: (1) maintain the integrity of the reactor coolant pressure boundary, (2) maintain the ability to shut down the reactor and maintain it in a safe shutdown condition, or (3) maintain the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 10 CFR 50.67(b)(2) or 10 CFR 100.11.

During the scoping and screening methodology audit, the staff questioned how non-accident DBEs, particularly DBEs that may not be described in the UFSAR, were considered during scoping. The applicant responded by identifying the DBEs applicable to BFN, including external hazards such as fire, earthquakes, flooding, wind and missiles, and high-energy line breaks. Additional DBEs were evaluated in the SSA calculation that was used by the applicant as a primary source for the purposes of identifying SSCs within the scope of license renewal. The SSA calculation was reviewed by the staff and discussed with the applicant. The staff found that the report contained a concise and detailed evaluation of approximately 35 events, and included appropriate CLB documentation references to support the review. The staff concluded that the applicant considered a scope of DBEs that was consistent with the guidance contained in the SRP-LR.

In addition, the staff evaluated the guidance documents governing the applicant's evaluation of SR SSCs: specifically, BFN standard department procedures; Nuclear Engineering Design Procedure (NEDP)-5, "Design Document Reviews," Revision 2; NEDP-21, "Technical Evaluations for License Renewal," Revision 2; and license renewal instruction series 0-TI-455, ~~475.~~ Guidance was established for the preparation, review, verification, and approval of the scoping evaluations to assure the adequacy of the results of the scoping process. During the scoping and screening audit the staff reviewed the guidance and discussed the scoping approach with the applicant. Specifically, the staff reviewed a sample of the license renewal scoping results for the residual heat removal (RHR) system to provide additional assurance that the applicant adequately implemented its SR scoping methodology. The system scoping sheet

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the secondary containment must be identified and evaluated for aging effects as part of the current license renewal activities. As a result, the applicant performed a supplemental review of the SSCs associated with the secondary containment piping to identify those that are necessary to maintain the structural integrity of the secondary containment. This supplemental review was provided to the staff in a letter from the applicant, dated May 31, 2005. Specifically, the applicant described its supplemental review process, which included a review of plant drawings and piping system qualification documentation and performance of plant system walkdowns to identify the NSR piping, supports, and other components that are within the scope of license renewal for 10 CFR 54.4(a)(2) for secondary containment qualification. The results of this supplemental review identified several system boundary changes and identification of several new component types, materials, or environments that affected the AMR results. Details of the scoping results that expanded the boundaries of these systems and revisions to the AMR results are discussed in SER Sections 2.4 and 3.5, respectively.

2.3

Based on the applicant's supplemental evaluation of SSCs associated with the secondary containment, which included a review of plant system drawing, piping and support qualification documentation, and extensive plant system walkdowns, the staff determined that the applicant had performed an adequate analysis to identify certain additional piping, components, and structures to be included within the scope of license renewal. The staff concluded that the analysis and inclusion of additional SSC's within the scope of license renewal adequately addressed RAI 2.1-2A(1) and (2). Therefore the staff's concerns described in the RAI are resolved.

By letters dated September 3, 2004, October 18, 2004, January 31, 2005, and February 28, 2005, the applicant addressed RAI 2.1-2A(3) as follows:

The applicant indicated that during the restart of Units 2 and 3, and during the current restart process for Unit 1, the seismic Class I qualification documentation had been updated to ensure that the analyzed configuration reflected the as-built configuration. This documentation implements the CLB and provides the information necessary to determine the NSR piping and components that are necessary to maintain qualification of the connected SR piping and components. To ensure the license renewal boundaries are consistent with the CLB requirements, the applicant performed a review of the seismic Class I qualification documentation to identify the NSR piping, supports/equivalent anchors, and other components that are within the scope of license renewal for 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components.

This review included the verification of each seismic Class I boundary identified in the CLB. The seismic Class I boundaries could typically be included in one of the following categories:

- Base-mounted equipment (pump, heat exchanger, tank, etc.) – a rugged component that is designed to provide support for connected piping and impose no loads on the piping. The review assures that when base-mounted equipment implements a seismic Class I boundary, the piping from the boundary to the equipment, and the equipment itself, are included within the scope of license renewal.
- Pipe Anchor – a special pipe support, which resists all six degrees of freedom, that has been designed and installed on the piping. The review assures that when a pipe anchor

located in the SR-classified turbine building, although twelve SR main steam tunnel temperature switches are located in the main steam tunnel portion of the turbine building. In addition to the main steam lines, the main steam tunnel houses other NSR piping and components. The staff was unable to determine if the applicant demonstrated that the twelve temperature switches installed in the steam tunnel portion of the turbine building are adequately protected from age-related degradation of NSR SSCs.

The staff's review of LRA Section 2.1 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.1-2B. In RAI 2.1-2B, dated July 30, 2004, the staff requested the applicant to address whether the 12 temperature switches installed in the main steam tunnel portion of the turbine building are adequately protected from wetting or spraying from the failure of NSR SSC components due to age-related degradation.

In its responses, by letters dated September 3, 2004, and October 18, 2004, the applicant addressed RAI 2.1-2B.

The applicant indicated that a design change notice (DCN) will be developed that will qualify the circuits for wetting and spray from a moderate/low-energy line break. The DCN will replace the temperature switch connectors and will also seal conduits as required to ensure circuit integrity and to mitigate the consequences of a moderate/low-energy line break. The applicant indicated that identification of moderate/low-energy, liquid-filled piping systems located in the vicinity of the temperature switches was not necessary since the switches will be qualified for the environment that would result from a moderate/low-energy line break. The applicant indicated that the DCN will be implemented prior to the period of extended operation.

The staff reviewed the response to RAI 2.1-2B and determined that the applicant had indicated that a DCN would be issued to modify the temperature switches located within the main steam tunnel such that they would be qualified to perform in an environment resulting from a moderate/low-energy line break. Therefore, the staff concern described in RAI 2.1-2B is resolved.

NSR moderate/low-energy piping located in buildings or structures that contain SR equipment was generally included within the scope of license renewal in accordance with 10 CFR 54.4(a)(2). The exceptions to inclusion within scope were identified in the LRA as the turbine building (discussed above), intake pumping station, and the RHRSW, tunnel.

RAI 2.2.1-2C. In engineering report "10CFR54.4(a)(2) Scoping Methodology," the applicant discussed the basis for exclusion of moderate/low energy piping located within the intake pumping station and RHRSW tunnel. The report stated that active SR components located within the Intake Pumping Station were environmentally qualified and were normally exposed to outside weather conditions. In addition, the water from the NSR moderate/low energy pipe in the intake pumping station would not adversely affect the passive SR components (pipes or manual valves) since degradation would occur gradually over a period of time and system leakage would be detected prior to such degradation by plant personnel during activities such as operator rounds, routine radiation protection surveys or system engineer walkdowns. The same basis was applied to the potential effect of fluid from NSR SSCs on SR SSCs within the

tunnel
RHRSW (which only contain passive SR SSCs). In RAI 2.1-2C, by letter dated July 30, 2004, the staff requested that the applicant provide the additional information concerning the basis for the conclusion that failure of moderate/low energy fluid-filled NSR SSCs in the proximity of passive SR SSCs will not adversely affect the SR SSCs.

By letters dated September 3, 2004, and October 18, 2004, the applicant addressed RAI 2.1-2C as follows:

The applicant reviewed the NSR fluid piping systems contained in the RHRSW tunnel and determined that all piping systems are within the scope of license renewal, with the exception of the 24-inch raw cooling water discharge piping, which was subsequently included within the scope of license renewal. The applicant indicated that exposure duration was not used in the scoping process.

In addition, the applicant reviewed the effect of water spray from NSR systems at the Intake Pumping Station Structure. The applicant determined that the SR equipment located within the Intake Pumping structure was designed for a normal operating environment of outside air, which includes precipitation and operation in a wetted environment. The applicant revised their scoping methodology to address components located in the lower compartments of the intake pumping station, which are subject to submergence during the probable maximum flood. The applicant determined that all SR passive electrical components installed at the intake pumping station are located above probable maximum flood level and are designed to either be protected from the effects of a wetted environment or designed to perform their function in a wetted environment. The applicant indicated that exposure duration was not used in the scoping process.

The staff reviewed the response to RAI 2.1-2C and determined that the applicant had not taken credit for exposure duration to exclude any NSR piping located within the RHRSW tunnel from scoping consideration. The applicant had included all applicable NSR piping within the scope of license renewal for the RHRSW tunnel. In addition, the applicant had determined that SR components in the intake pumping station, that are located above the probable maximum flood level are either protected from the effects of a wetted environment or designed to perform their function in a wetted environment. The staff concluded that this adequately resolved RAI 2.1-2C.

Conclusion. On the basis of the additional information supplied by the applicant, including determining that certain additional SSCs which would be placed within the scope of license renewal based on analysis and additional review; determining that certain SSCs were qualified for the environment; identifying the basis for the definition and use of the first equivalent anchor; and reviewing the results of NRC inspection and audit activities; the staff concluded that the applicant had supplied sufficient information to demonstrate that all SSCs that meet the 10 CFR 54.4(a)(2) scoping requirements have been identified as being within the scope of license renewal.

Application of the Scoping Criteria in 10 CFR 54.4(a)(3). Section 54(a)(3) of 10 CFR requires, in part, that the applicant consider all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with NRC regulations for fire protection (10 CFR 50.48), EQ (10 CFR 50.49), ATWS (10 CFR 50.62), and SBO (10 CFR 50.63) to be within the scope of license renewal.

The applicant performed the initial scoping for regulated events by evaluating CLB information relevant to each regulated event to identify if the structure or system met the scoping criteria of 10 CFR 54.4(a)(3). For these events, the applicant developed an engineering report describing the relevant Rule requirements. A functional description of the implementation includes the process to identify the scoping boundaries associated with the systems credited, the intended functions applicable to the requirement, information on how to record the results of the evaluation in the license renewal database and appropriate MEL, a list of CLB information sources used for the analysis, and a list of systems and components determined to be within scope for the given regulated event.

- Fire Protection. The applicant provided a description of the scoping of SSCs required to demonstrate compliance with the fire protection requirements in 10 CFR 50.48. The applicant stated that the fire protection report, EMPAC, and the CLB had been reviewed to ensure that SSCs required to perform the necessary safe shutdown functions and to minimize the risk of radioactive releases to the environment during and following fires ~~are included~~ within the scope ~~the scope~~ of license renewal. In addition, the applicant stated that it considered the NRC's Interim Staff Guidance (ISG) related to scoping fire protection equipment, ISG-07, to determine if a system performs a function that demonstrates compliance with NRC's regulations. Specifically, the applicant verified that the EMPAC contains a designated field identifying components that are part of the fire protection program consistent with the CLB. The staff reviewed the process used by the applicant to identify those components and verified, through review of a selection of scoping results, that the EMPAC information was adequately incorporated into the license renewal evaluation.

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- Environmental Qualification. The applicant stated that BFN maintains documents containing detailed information related to environmental qualification of components at BFN. Additionally, EMPAC provides a list of components that are subject to an EQ program. The applicant reviewed these documents to prepare the list of in-scope items for the LRA. Specifically, EMPAC contains a designated field identifying components that are part of the EQ program. The staff reviewed the process used by the applicant to identify those components and verified, through review of a selection of scoping results, that EMPAC information was adequately incorporated into the license renewal evaluation.

- Anticipated Transient Without SCRAM. The applicant reviewed Section 7.19 of the UFSAR and used the quality-related classification field in EMPAC to identify components of the ATWS mitigation system required by 10 CFR 50.62. EMPAC is a controlled plant component database containing integrated design and maintenance record management information. The plant component database lists plant components at the level of detail for which discrete maintenance or modification activities are typically performed. Specifically, EMPAC contains a designated field identifying components that are credited for ATWS mitigation. The staff reviewed the process used by the applicant to identify those components and verified, through review of a selection of scoping results, that the EMPAC information had been adequately incorporated into the license renewal evaluation.

- Station Blackout. In an NRC letter dated April 1, 2002, the staff provided guidance on the scoping of equipment relied on to meet the requirements of the SBO rule, 10 CFR 50.63. In this letter, the staff noted that, consistent with the requirements specified in

At the system level, the scoping methodology used for electrical and I&C systems was identical to the mechanical system-level scoping. The SSA calculation, UFSAR descriptions, Maintenance Rule documents, and other design-basis documents were reviewed to determine an electrical system's safety classification and to identify the electrical system's intended functions. System-level functions were evaluated against the criteria of 10 CFR 54.4(a). This information was included in the license renewal database for inclusion in the LRA.

The applicant entered the information on the "System Scoping Results" data sheet for the specific system. The staff reviewed the scoping results for the RHR system and observed that the data sheet contained detailed information that identified each component and its parent system, component type, the scoping criteria that it was required to meet, and its associated AMR information.

2.1.3.1.4 Component Level Scoping

The applicant reviewed license renewal boundary drawings (LR BDS) in conjunction with physical layout drawings and component listings from EMPAC to determine the components within the scope of license renewal. Any component that was needed to fulfill any system intended function or determined to be an NSR component that could prevent satisfactory accomplishment of an SR function was considered to be within the scope of license renewal. The applicant evaluated the components either individually or in groups of like components and functions to ensure that all components were properly addressed. Electrical and I&C components of in-scope mechanical systems were classified as electrical and I&C commodities. Structural components of in-scope mechanical systems were classified as structural commodities. Structural commodities, such as cable trays and their supports, were classified as plant civil system commodities. Pressure boundary components of electrical penetrations were classified as civil commodities. Structural components of in-scope structures that are required to support the intended functions were generally evaluated as generic structural commodities, and not individual components.

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Mechanical Component Scoping. The staff reviewed OTI-455, "Mechanical Technical Evaluation for License Renewal," Revision 2, dated May 28, 2004. The applicant provided a technical description and overview of the process in Section 4.1, Mechanical Scoping and Screening, of OTI-455. Specifically, the applicant stated that systems and components are determined to be within the scope of license renewal if they have been evaluated to meet any of the scoping criteria.

The staff verified that mechanical system evaluation boundaries were established for each system within the scope of license renewal. These boundaries were determined by mapping the pressure boundary associated with system-level license renewal intended functions onto the system ~~piping and instrumentation diagrams (P&IDs)~~. Mechanical component types were loaded into a scoping and screening database and further review was performed to ensure that all component types were identified. A preparer and an independent reviewer performed a comprehensive evaluation of the boundary drawings to ensure the completeness and accuracy of the review results. Following identification of all system component types, the applicant used the license renewal boundary as an aid to evaluate each component against the scoping criteria of 10 CFR 54.4(a). System components meeting the criteria of 10 CFR 54.4(a) were classified as within the scope of license renewal.

flow and control drawings

The staff conducted detailed discussions with the applicant's license renewal project ~~management~~ personnel and reviewed documentation pertinent to the scoping process. The staff assessed whether the applicant had appropriately applied the scoping methodology outlined in the LRA and implementation procedures and whether the scoping results were consistent with CLB requirements.

flow and control drawings

The staff reviewed the process of scoping for the RHRSW and ECCW systems. The staff verified that the applicant had identified and highlighted system ~~P&IDs~~ to develop the system boundaries in accordance with the procedural guidance. The applicant was knowledgeable concerning the process and conventions for establishing boundaries as defined in the license renewal implementation procedures. Additionally, the staff verified that the applicant had independently verified the results in accordance with the governing procedures. Specifically, other personnel knowledgeable of the system had independently reviewed the marked-up drawings to ensure accurate identification of system intended functions. The staff performed additional cross-discipline verification and independent reviews of the resultant highlighted drawings before final approval of the scoping effort.

Conclusion. The staff determined that the applicant's methodology was consistent with the description provided in LRA Section 2.1.4 and that the guidance contained in SRP-LR Section 2.1 was adequately implemented. On the basis of the applicant's detailed scoping implementation procedures and a sampling review of mechanical components scoping results, the staff concluded that the applicant's methodology for identifying mechanical components within the scope of license renewal met the requirements of 10 CFR 54.4(a).

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Structural Component Scoping. The applicant performed its structural scoping in accordance with the detailed methodology defined in O-TI-457, "Civil Technical Evaluations for License Renewal," Revision 2. The scoping procedure was used to evaluate SSCs to identify their functions and determine which are intended functions required for compliance with one or more criteria of 10 CFR 54.4(a)(1)-(3). Initial identification of BFN structures was accomplished by reviewing ~~the plant structure drawings~~ BFN drawing 0-10E21-series ~~and~~ Maintenance Rule documentation, 0-TI-346. For each structure, the applicant further reviewed the drawings and plant databases to identify specific structural components and features. The structural component intended functions for SCs within the scope of license renewal were identified based on the guidance provided in Regulatory Guide (RG) 1.188, "Standard Format and Content for Applications to Renew Nuclear Power Plant Operating Licenses," NEI 95-10, and the SRP-LR. The procedure also described the source design documentation to be used for the evaluation of structures meeting the 10 CFR 54.4(a) criteria including the UFSAR, general design criteria (GDC) documents ~~Design of Civil Structures, topical reports for the 10 CFR 54.4(a)(2) evaluation and regulated events described in 10 CFR 50.54(a)(3), and the SSA~~. For civil structures, the evaluation boundaries were determined by developing a complete description of each structure with respect to the intended functions performed by the structure and its components. A license renewal database was created for use in compiling the structural scoping results. The database contained (1) a unique identification number for each structure, (2) a list of structural components or commodity types associated with the structure, (3) evaluation results for each of the 10 CFR 54.4(a)(1)-(3) criteria for the structure, (4) a description of structural intended functions and source reference information for the functions, and (5) a reference to pertinent license renewal drawings associated with each structure.

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and/or

and other appropriate documents

License renewal procedure 0-TI-457 was also used to define the evaluation boundaries and discipline interfaces for civil/mechanical and civil/electrical systems. With respect to the civil/mechanical interface, the procedure identified the following component types within mechanical systems that were evaluated as part of the civil review. These component types included: (1) piping system supports, (2) HVAC duct supports, (3) equipment supports and foundations, (4) bolting and fasteners for structural supports and mechanical fasteners that are required for mechanical closure of mechanical components, and (5) whip restraints and jet impingement shields.

With respect to the civil/electrical interface, the procedure identified the following component types within electrical systems that were evaluated as part of the civil review. These component types included: (1) cable trays and supports, (2) conduits and supports, (3) electrical cabinets, panels, racks, and other enclosures providing structural integrity, (4) instrument racks, panels, frames, and enclosures providing structural integrity, and (5) electrical and I&C penetrations providing structural support functions.

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The staff conducted detailed discussions with the applicant's license renewal project ~~management~~ personnel and reviewed documentation pertinent to the scoping process. The staff assessed whether the scoping methodology outlined in the LRA and implementation procedures were appropriately implemented and whether the scoping results were consistent with CLB requirements. The staff also reviewed several plant structural evaluation results for the reactor building and turbine building to verify proper implementation of the scoping process for structural components. The staff also compared a sample of structural components identified in the drawings to the structural list in the license renewal data base to ensure consistency. Based on these audit activities, the staff did not identify any discrepancies between the methodology documented and the implementation results.

Conclusion. The staff determined that the applicant's methodology for structural scoping was consistent with the description provided in LRA Section 2.1.4.3 and the guidance contained in the SRP-LR Section 2.1. Based on a review of information contained in the LRA, the applicant's detailed scoping implementation procedures, and a sampling review of structural component scoping results, the staff concluded that the applicant's methodology for identification of structural components within the scope of license renewal met the requirements of 10 CFR 54.4(a).

zero

Electrical and I&C Scoping. The staff reviewed 0-TI-456, "Electrical Technical Evaluations For License Renewal," which describes the electrical and I&C scoping and screening process and discussed the methodology and results with the applicant's cognizant engineers. With the exception of components in the SBO offsite power restoration flow path, plant electrical and I&C components were evaluated using a "spaces" approach. The spaces approach identifies the electrical and I&C commodity groups that are installed in the plant and the limiting environmental conditions for each group. The spaces approach then determines if any area environment is more severe than the limiting environment for the commodity group. If the area environment is more severe than a commodity group's limit, and if a component in the commodity group is actually located in the area, an AMR is required for that commodity group.

For this LRA, the applicant used a bounding spaces approach, as described in NEI 95-10. Electrical and I&C component types used plant-wide were identified without regard to the plant system they are in. The applicant used the listing provided by NEI 95-10, Appendix B as the

basis for this list. Electrical component types were identified from the plant controlled computer database, EMPAC. Then these component types were assembled into commodity groups such as breakers, switches, and cables using the NEI 95-10, Appendix B list as a starting point. The EMPAC database has a fine division of component titles based on component performance characteristics, so sub-commodity groups were formed to separate components into specific groups with common applications or materials. Thus under the commodity group, "circuit breakers," there may be a number of sub-commodity groups including all the circuit breakers identified in EMPAC as having common application, operating characteristics, fabrication materials, etc. The result is a detailed list by commodity and sub-commodity of all electrical and I&C components installed in the plant.

An exception to the spaces approach was the identification of electrical and I&C equipment needed for the SBO event offsite power restoration. Using the intended-function approach, the applicant developed license renewal drawings showing the basic electrical distribution paths for SBO offsite power restoration. Plant operating procedures were used to develop these SBO offsite power restoration license renewal drawings and to identify the components required to perform the function. The staff determined that the scoping and screening methodology used in 0-TI-456, "Electrical Technical Evaluations For License Renewal"; and described by the applicant's engineers during the audit provided adequate guidance, was consistent with the requirements of 10 CFR 54.4 for the scoping evaluation of electrical components.

Conclusion. The staff determined that the applicant's methodology for electrical and I&C scoping was consistent with the description provided in LRA Section 2.1.4.2 ~~2.1.5.2~~ and the guidance contained in the SRP-LR. Based on review of information contained in the LRA, the applicant's detailed scoping implementation procedures, and a sampling review of electrical component scoping results, the staff concluded that the applicant's methodology for identification of electrical and I&C components within the scope of license renewal met the requirements of 10 CFR 54.4(a).

2.1.3.2 Screening Methodology

The staff reviewed the screening methodology used by the applicant to determine if mechanical, structural, and electrical components within the scope of license renewal would be subject to further aging management evaluation. The applicant described the screening methodology in LRA Section 2.1.5. In general, the applicant's screening approach consisted of evaluations to determine which structures and components within the scope of LRA were passive and long-lived. Passive and long-lived structures and components were then subject to an AMR.

The staff evaluated the applicant's screening methodology against criteria contained in 10 CFR 54.21(a)(1) and 10 CFR 54.21(a)(2) using the review guidance contained in SRP-LR Section 2.1.3.2, "Screening." The staff evaluation of the applicant's screening approach for each of these disciplines is discussed below.

2.1.3.2.1 Mechanical Component Screening

The staff reviewed the methodology used by the applicant to determine if mechanical components within the scope of license renewal would be subject to further AMR. For mechanical components, the applicant applied a screening process to each mechanical system determined to be within the scope of license renewal in order to determine the types of

mechanical component commodities within the systems and the various materials and environments to be considered in the AMR. The applicant then established evaluation boundaries for the various plant mechanical systems in order to further identify individual mechanical components for review.

The listing of mechanical components was facilitated by combining these items into commodity groups from a review of each boundary drawing. The applicant placed these commodity groups into the license renewal database and evaluated them in accordance with the screening criteria described in 0-TI-455. The applicant provided the staff with a detailed discussion of the process and provided screening report information from the license renewal database that described the screening methodology, as well as a sample of the screening results reports for a selected group of SR and NSR systems. The staff determined that the screening methodology was consistent with the requirements of the Rule and that implementation of the methodology will identify SCs that meet the screening criteria of 10 CFR 54.21(a)(1).

During the audit, the staff reviewed the methodology used by the applicant to identify and list the mechanical components and commodities subject to an AMR, as well as the applicant's technical justification for this methodology. The staff discussed the methodology and results with the applicant's cognizant engineers and senior staff. The staff also examined the applicant's results from the implementation of this methodology by reviewing a sample of the mechanical systems identified as within the scope of license renewal. These systems included the RHRSW system and EECW system. The review included the evaluation boundaries and resultant in-scope components, the corresponding component-level intended functions, and the resulting list of mechanical components and commodity groups subject to an AMR.

The staff reviewed several summary screening reports, which list a breakdown of the mechanical components that are within the scope of license renewal. Each report lists several categories, including component type, component material, whether an AMR is required, and an extensive comment section. The staff also reviewed a sample of the mechanical drawing packages assembled by the applicant and discussed the process and results with the cognizant engineers who performed the review. The staff did not identify any discrepancies between the methodology documented and the implementation results.

Conclusion. The staff determined that the applicant's mechanical component screening methodology was consistent with the guidance contained in the SRP-LR and was capable of identifying those passive, long-lived components within the scope of license renewal that are subject to an AMR.

2.1.3.2.2 Structural Component Screening

The staff reviewed 0-TI-457, "Civil Technical Evaluations For License Renewal," which outlined the applicant's methodology to determine if SCs within the scope of license renewal would be subject t~~o further~~ AMR. The screening process applied to in-scope buildings and civil structures was designed to determine the structural elements and construction materials, as well as to determine the environments to which these buildings and civil structures will be exposed so that these factors could be considered in the AMR. Engineering document 0-TI-457 Section 6.3, "Structures Screening," describes the guidance for the structural screening process. For all structural component types with intended functions, the applicant then determines if the component type is long-lived. The applicant used existing plant program ~~descriptions and data,~~ delete

ah

delete

~~maintenance~~ procedures, and ~~additional~~ operating experience to determine if the component type was subject to replacement based on a qualified life or whether it was long-lived.

During the audit of the applicant's license renewal scoping and screening process, the staff reviewed the methodology used by the applicant to identify and list the structural components and structural commodities subject to an AMR as well as the applicant's technical justification for this methodology. The staff discussed the methodology and results with the applicant's cognizant engineers and senior staff. The applicant provided the staff with a detailed discussion of the process and provided technical reports that described the screening methodology as well as a sample of the screening results for a selected group of structures.

The staff also examined the applicant's results from the implementation of this methodology by reviewing a sample of the reactor building and turbine building plant structures identified as being within the scope of license renewal. The review included the evaluation boundaries and resultant in-scope components, the corresponding component-level intended functions, and the resulting list of structural components and structural commodity groups subject to an AMR.

Conclusion. The staff determined that the applicant's structural component screening methodology was consistent with the guidance contained in the SRP-LR and was capable of identifying those passive and long-lived components within the scope of license renewal that are subject to an AMR.

2.1.3.2.3 Electrical Component Screening.

The staff reviewed the applicant's procedure 0-TI-456, "Electrical Technical Evaluations For License Renewal," which provided guidance on the screening of electrical and I&C components. The applicant used a bounding spaces approach as described in NEI 95-10, Revision 3, to perform the electrical evaluation. The electrical and I&C component types were identified from EMPAC. These component types were assembled into commodity groups such as breakers, switches, and cables using the NEI 95-10, Appendix B, list and supplemented with site-specific information. The applicant then applied the screening criteria to determine those electrical commodities subject to an AMR.

The staff discussed the methodology and results with the applicant's cognizant engineers and senior staff. The staff also examined the applicant's results from the implementation of this methodology by reviewing several electrical and I&C commodity reports and samples from the license renewal database. The review verified that the applicant's staff had consistently applied the screening criteria to identify those electrical and I&C commodity groups subject to an AMR. The staff determined that the electrical screening process was consistent with criteria in 10 CFR 54.21(a)(1)(ii) and excluded those components or commodity groups that are subject to equipment qualification requirements. The staff did not identify any discrepancies between the methodology documented and the implementation results.

The staff also reviewed the applicant's approach to scoping and screening of electrical fuse holders. In license renewal ISG-5, "Identification and Treatment of Electrical Fuse Holders for License Renewal," dated March 10, 2003, the staff stated that, consistent with the requirements specified in 10 CFR 54.4(a), fuse holders (including fuse clips and fuse blocks) are considered to be passive electrical components. Fuse holders would be scoped, screened, and included in the AMR in the same manner as terminal blocks and other types of electrical connections that

are currently being treated in the process. This staff position applies only to fuse holders that are not part of a larger assembly, but support SR and NSR functions in which the failure of a fuse precludes a safety function from being accomplished (10 CFR Part 54.4(a)(1) and 10 CFR 54.4(a)(2)). As described in LRA Sections 2.1.8.5, and 3.6.2.3.1 ~~3.6.3.2.1,~~ the applicant developed a process for identifying and evaluating fuse holders as part of its license renewal evaluation. The process included using EMPAC to identify fuses in the plant and then to apply a series of evaluations and screening to identify a subset of the plant fuses which would potentially be susceptible to various effects of moisture or chemical contamination, thermal cycling, vibration, and mechanical stress. The applicant evaluated plant operating experience and determined that fatigue due to mechanical stress was an applicable aging effect/mechanism. The applicant then evaluated all remaining fuses to determine if any were susceptible to mechanical stress. The staff reviewed the applicant's process for identifying and evaluating the fuse holders and determined it was adequate.

Conclusion. The staff determined that the applicant's electrical and I&C screening methodology was consistent with the guidance contained in the SRP-LR and was capable of identifying passive, long-lived components within the scope of license renewal that are subject to an AMR.

2.1.4 Conclusion

The staff's review of the information presented in LRA Section 2.1, the supporting information in the scoping and screening implementation procedures and reports, the information presented during the scoping and screening methodology audit, and the applicant's responses to the staff's RAIs formed the basis of the staff's safety determination. The staff verified that the applicant's scoping and screening methodology was consistent with the requirements of the Rule and the staff's position on the treatment of NSR SSCs.

On the basis of this review, the staff concluded that there is reasonable assurance that the applicant's methodology for identifying the SSCs within the scope of license renewal and the structures and components requiring an AMR is consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1).

- off-gas system
- radioactive waste treatment system
- diesel generator starting air system

The applicant also added the following structures to the scope of license renewal:

- radwaste building
- service building

May 31, 2005

In response to a follow-up question of RAI 2.1-2A(1), described in SER Section 2.1, the applicant provided supplemental information on the implementation of the revised scoping methodology of NSR piping segments that support secondary containment penetrations qualified to seismic Class II pressure retention requirements.

As a result of the implementation of the scoping methodology changes, the applicant added the following mechanical systems that had additional piping or components added to the scope of license renewal:

The following mechanical systems only had systems boundary changes. No new component types, materials, or environments that affected either the scoping/screening or AMR results in the LRA were added.

- main steam system
- auxiliary boiler system
- raw cooling water system
- station drainage system
- high pressure coolant injection system
- residual heat removal system
- radioactive waste system
- fuel pool cooling and cleanup system
- radiation monitoring system

The following mechanical systems had systems boundary changes. For some of these systems, new component types were added that affected the scoping/screening results in the LRA. For all systems listed, new components, materials or environments that affected the AMR results in the LRA were added.

- condensate and demineralized water system
- feedwater system
- potable water system
- service air
- containment system

The remainder of the mechanical systems were not affected by this review.

The staff reviewed the selected systems and structures that the applicant had not identified as falling within the scope of license renewal to verify whether the systems and structures have any intended functions that would require their inclusion within the scope of license renewal in accordance with 10 CFR 54.4. The staff's review of the applicant's implementation was

procedures that are used for oil and grease replacement: QMDS NUMBER MOV-001 (performed every 54 months), QMDS NUMBER MOV-002 (performed every 54 months), QMDS NUMBER MOV-003 (performed every 54 months), QMDS NUMBER MOT-001 (perform oil samples every six months), QMDS NUMBER MOT-003 (performed at 24 and 36 month intervals), QMDS NUMBER PLN-003 (performed every 3 years), EPI-0-000-MOT-001 (preventive maintenance work orders are generated at various frequencies to add grease to motors), EPI-0-000- MOT-002 (preventive maintenance work orders are generated at various frequencies to add oil to motors), and MPI-0-000-LUB001 (preventive maintenance work orders are generated at various frequencies to add grease to equipment). In addition, some components lubricants are monitored and replaced based on oil analysis (predictive maintenance).

3. The review did not identify any cases where oil, grease, or in-scope filters were without proper plant procedures to exclude them as short lived.

In the initial response review, the staff was unable to find the applicant's response to RAI 2.3-2 acceptable. The applicant did not provide sufficient information to provide reasonable assurance that all oil, grease and component filters are either outside the scope of license renewal or are replaced based on a qualified life or specified time period. By letter dated May 18, 2005, the applicant revised its response to state that it has various maintenance procedures and work orders in place to assure that all filters for SR components are being monitored and replaced as required to assure that the equipment will perform its function.

Based on its review, the staff found the applicant's revised response acceptable. There is reasonable assurance that all filters for SR components are covered by procedures or work orders. Therefore, the staff's concerns described in RAI 2.3-2 are resolved.

RAI 2.3-3. LRA Section 2.1.7.2 states that insulation at BFN does not have an intended function associated with the scoping requirements of 10 CFR 54.4(a)(1) through (a)(3). However, there is insufficient information in the LRA and the UFSAR for the staff to determine if the statement is valid at such a generic level. Insulation may be required for a variety of reasons, e.g., systems efficiency, heat-load calculations, EQ purposes. etc. If the insulation is relied upon for EQ purposes, the passive, long-lived insulation should be within the scope of license renewal and subject to an AMR. The staff requested that the applicant provide a basis for not including any piping or equipment insulation within the scope of license renewal.

as modified by letter dated June 15, 2005

On March 22, 2005, the staff held a teleconference with the applicant to discuss the treatment of insulation. In its response, dated May 18, 2005, the applicant stated that all the mechanical piping and equipment insulation contained in the SR structures as well as some NSR structures have been added to the scope of license renewal, since they meet the criteria of 10 CFR 54.4(a)(2) and (a)(3). Piping and equipment insulation has the intended functions of insulate and integrity. The applicant stated that these intended functions will be added to LRA Table 2.0.1. The applicant also stated that piping and equipment insulation and insulation jacketing are component types that are subject to an AMR. LRA Table 2.1.7.2 will be added to reflect these two component types and their intended functions.

Based on its review, the staff found the applicant's response to RAI 2.3-3 acceptable. The applicant placed all piping and equipment insulation that is within SR and some NSR structures

within the scope of license renewal and the insulation is subject to an AMR. Therefore, the staff's concern described in RAI 2.3-3 is resolved.

The staff reviewed LRA Section 2.3 and the applicant's responses to the RAIs and performed a plant audit. Based on this review, the staff found that the applicant's methodology for scoping and screening was well documented in an auditable and retrievable form at the plant site. The staff also found that the results of the audit on the system and the regulated event confirmed that there were no omissions of any components subject to an AMR for the audited systems. In the LRA Section 2.3 tables, the staff found that the results are consistent with the methodology and are acceptable. With the additional information obtained from ~~the site and pending formal written~~ responses to RAIs 2.3-2 and 2.3-3, the staff concluded that the applicant, while using a different methodology from that described in the review guidance of the SRP-LR, provided scoping and screening results and components subject to an AMR with no omissions. For other in-scope systems that were not audited at the plant site, the staff issued RAIs related to components that could be subject to an AMR based on its review of the LRA, UFSAR, and site documentation.

In RAIs 2.1-2A(1) and (2) (described in SER Section 2.1) of the July 30, 2004 letter, the staff requested that the applicant describe the criteria used to determine that the integrity of in-scope piping functions (in the reactor building) is preserved if a potential age-related degradation failure occurred on the attached NSR piping (in the turbine building), given that the NSR piping is not in scope and piping is not anchored, and 2) explain how it determined that the SR piping (in the reactor building) is supported so that it would remain functional if a potential age-related degradation occurred on the NSR piping (in the turbine building) attached to it. In its response dated, October 18, 2004, the applicant committed to review the CLB requirements and identify the piping, supports and other components outside secondary containment required to maintain the structural integrity of the secondary containment. The applicant committed to performing this review prior to the period of extended operation. The deferral of this issue until prior to the period of extended operation is unacceptable. Therefore, the applicant performed the review, the results of which are documented in a letter dated May 31, 2005. The following mechanical systems only had systems boundary changes (i.e., no new component types, materials, or environments were added) that affected either the scoping/screening or AMR review results in the LRA:

- main steam system
- auxiliary boiler system
- raw cooling water system
- station drainage system
- high pressure coolant injection system
- residual heat removal system
- radioactive waste system
- fuel pool cooling and cleanup system
- radiation monitoring system

The following mechanical systems had systems boundary changes; however, for some of these systems, new component types were added that affected the scoping/screening results in the LRA. For all systems listed, new components, materials, or environments were added that affected the AMR review results in the LRA:

- off-gas system
- radioactive waste treatment system
- diesel generator starting air system

The effect of these changes are evaluated and discussed in the corresponding sections of the SER.

2.3.1 Reactor Coolant Systems

In LRA Section 2.3.1, the applicant identified the structures and components of the reactor coolant systems (RCSs) that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the RCSs in the following sections of the LRA:

- 2.3.1.1 reactor vessel
- 2.3.1.2 reactor vessel internals
- 2.3.1.3 reactor vessel vents and drains system
- 2.3.1.4 reactor recirculation system

The corresponding SER subsections, 2.3.1.1 - 2.3.1.4, present the staff's review findings.

2.3.1.1 Reactor Vessel

2.3.1.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.1.1, the applicant described the reactor vessel. The reactor vessel provides a container for the reactor core and the primary coolant in which the core is submerged. Each unit has a separate reactor vessel. The reactor vessel is a pressure vessel with the geometry of a vertically-aligned cylinder capped with hemispherical heads of welded construction. The cylindrical shell and bottom hemispherical head of the reactor vessel are fabricated from low-alloy carbon steel plate that is clad on the interior with weld overlay. The cylindrical shell is clad with stainless steel and the bottom hemispherical head is clad with Inconel. The vessel top head is not clad and is secured to the reactor vessel by studs and nuts. The vessel flanges are sealed by two concentric metallic seal-rings that are designed for no detectable leakage through the inner or outer seal at any operating condition.

The reactor vessel contains SR components that are relied upon to remain functional during, and following, DBEs to ensure the following intended functions:

- forms part of the reactor coolant pressure boundary
- provides physical support for the reactor core and the reactor vessel internals
- ensures a floodable volume and coolant distribution to mitigate accidents
- provides pressure boundary
- provides structural support

In LRA Table 2.3.1.1, the applicant identified the following reactor vessel component types that are within the scope of license renewal and subject to an AMR: attachments and welds, closure studs and nuts, heads, flanges, shell, nozzle safe ends, nozzles, other external attachments,

Need to Add discussion on RAI's 2.3.4.4-1 and 2.3.4.4-2 in this Section

and
penetrations, refueling bellows support skirt, stabilizer bracket, support skirt, and attachment welds. delete comma

2.3.1.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.1.1 and the UFSAR Section 4.2, 7.8, and Appendices J, K, and L using the evaluation methodology described in SER Section 2.3. The staff conducted its review on the reactor vessel in accordance with the guidance described In SRP-LR Section 2.3, "Scoping and Screening Results - Mechanical Systems."

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.1.1.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the reactor vessel components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the reactor vessel components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.1.2 Reactor Vessel Internals

2.3.1.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.1.2, the applicant described the reactor vessel internals. The reactor vessel internals are unique to each unit and provide partitions between regions within the reactor vessel in order to provide proper coolant distribution, thereby allowing power operation without fuel damage due to inadequate cooling. The reactor vessel internals also provide positioning and support for the fuel assemblies, control rods, in-core flux monitors, and other components to assure that control rod movement is not impaired. In addition, the reactor vessel internals provide a floodable volume so that the core can be adequately cooled if there is an external reactor vessel breach in the nuclear system process barrier.

The reactor vessel internals consist of the following components:

- core shroud
- shroud head and steam separator assembly
- core support
- top guide
- fuel support pieces

The applicant described the supporting structures and components of the ESF in the following sections of the LRA:

- 2.3.2.1 containment systems
- 2.3.2.2 standby gas treatment system
- 2.3.2.3 high pressure coolant injection system
- 2.3.2.4 residual heat removal system
- 2.3.2.5 core spray system
- 2.3.2.6 containment inerting system
- 2.3.2.7 containment atmosphere dilution system

The corresponding SER subsections, 2.3.2.1 – 2.3.2.7, present the staff's review findings with respect to the ESF for BFN.

2.3.2.1 Containment System

2.3.2.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.1, the applicant described the containment system. The containment system includes the following subsystems: the primary containment and primary containment isolation system, the secondary containment, and the reactor building ventilation system. The scoping and screening results for the primary containment isolation valves for the various processes are presented within their respective systems. The results of the scoping and screening evaluations for the other components within the containment system including valves, piping, penetrations, structural steel, that are essential for primary containment integrity, are presented in other sections of this SER.

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The primary containment system for each unit employs an independent pressure suppression that houses the reactor vessel, reactor coolant recirculation loops, and other branch connections of systems that form the RCPB. The Mark II containment is a pressure suppression system design, which consists of a drywell and a pressure suppression chamber that is alternatively referred to as the "torus" or "wetwell." The Mark II pressure suppression system also contains a connecting vent system between the drywell and the pressure suppression chamber, isolation valves, equipment for establishing and maintaining a pressure differential between the drywell and pressure suppression chamber, and other service equipment. Air that is transferred to the pressure suppression chamber pressurizes the chamber and is subsequently vented to the drywell to equalize the pressure between the two vessels, and it is necessary in the event of a process system piping failure within the drywell. Cooling systems are provided to remove heat from the drywell and the water from the pressure suppression chamber, thus cooling and controlling the pressure in the primary containment under accident conditions. In addition, valves and flowpaths are provided to control the internal and the torus/drywell differential pressure. If long-term, post-accident cooling capability is lost, resulting in a pressure increase that would jeopardize the structural integrity of the primary containment, a hardened wetwell vent to the plant stack can be opened to relieve the pressure increase.

The containment system also includes the secondary containment system. The secondary containment system provides an essentially leak-tight envelope for any radiation release from the primary containment during DBEs. The secondary containment system also provides a

primary envelope for radiation releases when the primary containment systems are open for refueling or maintenance.

This structure is divided into three reactor zones and a refueling zone. Each reactor zone houses the reactor, the primary containment, and the individual unit's ECCS. The structure also contains a spent fuel storage pool for each individual unit. The refueling zone allows continuous access to the three spent fuel storage pools and the reactor vessel for refueling and servicing.

The reactor building ventilation system is also included within the containment system. The reactor building is heated, cooled, and ventilated during normal and shutdown operations by a circulating air system. The reactor building ventilation system is shut down and isolated when a zone of secondary containment is isolated and connected to the standby gas treatment (SGT) system. The ventilation system has supply fans that provide makeup air that is filtered, heated by hot water coils for winter heating, and cooled by evaporative coolers for summer cooling. Air is exhausted from the reactor building by exhaust fans located on the building's roof. Air from each zone is monitored before release. The reactor building ventilation system also includes area cooling units for areas containing ECCS components.

N-Add

The containment system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the containment system could prevent the satisfactory accomplishment of an SR function. In addition, the containment system performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- provides a primary containment boundary
- provides a vacuum relief system (vacuum breaker valves) to prevent drywell or suppression chamber (torus) negative pressure from damaging the containment structure
- provides air-operated re-closure of the inboard reactor building to the torus vacuum breakers
- provides pressure suppression by cooling/condensation of the safety relief valves (SRVs) steam from boiler drains and vents system and reactor core isolation cooling (RCIC) system and high pressure coolant injection (HPCI) system turbine exhaust steam
- accepts HPCI and RCIC system pump minimum bypass flow
- provides a water supply to the RCIC system, HPCI system, core spray (CS) system, and RHR system pumps
- provides forced air cooling for the RHR system and the CS system pump motors
- provides a secondary containment boundary (passive functions)
- provides a pressure boundary of containment system components connected to the control air system that must maintain the pressure boundary in support of supplying containment atmosphere dilution (CAD) to the main steam safety relief valves (MSRVs)
- provides fire dampers that are required for unit operation
- provides debris protection

also stated that the RBVS contains an intake plenum that contains louvers with screens and that these components perform no license renewal function; therefore, these components are not within the scope of license renewal.

Based on the review, the staff found the applicant's response to RAI 2.3.2.1-1 acceptable. The applicant clarified that all applicable system components consisting of air cooling unit housings, dampers and damper housings, cooling coil housings, and valve bodies are within the scope of license renewal, and subject to an AMR for the RBVS and are ~~added as~~ "Component Types" in LRA Tables 2.3.2.1 and 3.2.2.1. Since the RBVS intake plenum with louvers and screens performs no license renewal function, these components are not within the scope of license renewal. Therefore, the staff's concern described in RAI 2.3.2.1-1 is resolved.

delete and add already included in

2.3.2.1.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the containment system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the containment system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.2 Standby Gas Treatment System

2.3.2.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.2, the applicant described the SGT system. The SGT system is shared between Units 1, 2, and 3. The SGT system consists of a suction duct system, three filter trains and blowers, and a discharge vent system. The common suction duct system takes suction from the normal ventilation exhaust duct of each of the three reactor zones and from the refueling zone that is independent of the normal ventilation system. Each filter train contains a moisture separator, a heater, a pre-filter, an upstream high-efficiency particulate air (HEPA) filter, a charcoal filter, and a downstream HEPA filter. These three filter trains and blowers are arranged in parallel. The three blowers share a common discharge header that discharges to the plant stack 600 feet in elevation. The filter trains and blowers are located in the SGT building. The SGT system is normally in standby operation and will start automatically, when required.

The SGT system contains SR components that are relied upon to remain functional during, and following, DBEs. In addition, the SGT system performs functions that support EQ.

The intended functions within the scope of license renewal include the following:

- maintains negative pressure in the secondary containment on the primary containment system group six isolation signal
- ~~maintains~~ filters airborne particulates and gases including those from the HPCI and CAD systems prior to discharge to the off-gas system

Need to Add Discussion on RAI's 2.1.2 A(1) + (2) in this Section

Need to Add Discussion on RAI 2.1-2, A.3 in this Section
Both these RAI'S have System 64 listed.

intake/exhaust structures with screens (SGT system exhausts to the reinforced concrete chimney (plant stack) as addressed in LRA Section 2.4.6.1).

In LRA Section 2.3.5, "Notes Associated with the Section 2.3 Tables," "Component Types" are revised to reflect these components and, therefore, are part of LRA Table 2.3.2.2, "Standby Gas Treatment System" and LRA Table 3.2.2.2, "Standby Gas Treatment System-Summary of Aging Management Evaluation."

Based on its review, the staff found the applicant's response to RAI 2.3.2.2-1 acceptable. The applicant clarified that all applicable system components consisting of fan housings, filter housing, damper housing, valve bodies, and all other applicable components of the system, including duct sealants, wall sealants, and pressure boundary sealants are within the scope of license renewal, and subject to an AMR for the SGT system and are added as "Component Types" in LRA Tables 2.3.2.1 and 3.2.2.1. Therefore, the staff's concern described in RAI 2.3.2.2-1 is resolved. delete and add already included in

change to 3.2.2.2

change to 2.3.2.2

2.3.2.2.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the SGT system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the SGT system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.3 High Pressure Coolant Injection System

2.3.2.3.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.3, the applicant described the HPCI system. The HPCI system, in conjunction with the other ECCSs, limits the peak fuel clad temperature, over the complete spectrum of possible break sizes in the RCPB, during design-basis accidents. The HPCI system also provides adequate core cooling for small breaks and depressurizes the reactor coolant systems to allow low-pressure coolant injection and core spray flow. In addition, the HPCI system provides reactor vessel make-up, pressure control, and decay heat removal during regulated events.

Each unit has an individual HPCI system and no components are shared; however, each unit's HPCI pump may take suction from any unit's condensate storage tank. The HPCI system consists of a single steam turbine-driven pump. The steam supply for the turbine comes from the MS system and exhausts to the suppression pool. The pump takes suction from the condensate storage tank, or the suppression pool, and discharges into the reactor vessel, through the feedwater (FW) system. A full-flow test line to the condensate storage tank is provided. During normal operation, the HPCI system is in standby. The HPCI system automatically starts if there is high pressure in the drywell or a low-water level in the reactor vessel.

N-Add

The HPCI system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the HPCI system could prevent the satisfactory accomplishment of an SR function. In addition, the HPCI system performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- provides an RCPB during HPCI system standby and operation
- provides a primary containment boundary during HPCI system standby and operation
- limits the loss of coolant through the HPCI system steam supply line break (passive, flow restrictor built into the steam line)
- provides a secondary containment boundary
- establishes a main steam safety injection valve (MSIV) leakage pathway to the condenser
- provides coolant to the reactor vessel until it can be manually run in the condensate storage tank to condensate storage tank recirculation mode for pressure relief and decay heat
- provides debris protection
- provides for flow distribution
- restricts flow
- provides for heat transfer
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.2.3, the applicant identified the following HPCI system component types that are within the scope of license renewal and subject to an AMR: bolting, condenser, expansion joint, fittings, RCPB fittings, flexible connectors, gland seal blower, heat exchangers, piping, RCPB piping, pumps, restricting orifice, RCPB restricting orifice, strainers, tanks, traps, tubing, turbines, valves, and RCPB valves.

2.3.2.3.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.3 and UFSAR Sections 5.2.3, 5.3, 6.3, 6.4.1, and 7.4 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any

passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.2.3.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the HPCI system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the HPCI system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.4 Residual Heat Removal System

2.3.2.4.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.4, the applicant described the RHR system. Each unit has two RHR system loops and each loop has two RHR pumps and two RHR heat exchangers. The pump suction header and the heat exchanger discharge header of one loop in Unit 1 and one loop in Unit 2 can be cross-connected. A similar cross-connection is provided between Unit 2 and Unit 3.

The RHR system provides a number of functions that are manually initiated. The RHR system provides shutdown cooling during normal operations and regulated events. The RHR system, in conjunction with the other ECCSs, also provides core flooding to limit the peak fuel clad temperatures over the complete spectrum of possible break sizes in the RCPB during design-basis accidents.

Provisions are provided within the RHR system, for both makeup and reject, to maintain the suppression pool level within the required limits. Cross-connections with the fuel pool cooling system allow the RHR heat exchangers to supplement heat removal and provide a permanent source of makeup water for the spent fuel pool.

(N)-Add

The RHR contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the RHR could prevent the satisfactory accomplishment of an SR function. In addition, the RHR performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- provides suppression pool water cooling to maintain the suppression pool water temperature below limits to assure that pump net positive suction head (NPSH) requirements are met and that complete condensation of blowdown steam from a design-basis LOCA can be expected
- provides spray to drywell and torus for containment cooling and lowering of containment pressure under post-accident conditions

Need to Add Discussion on RAI 2.1-2A(1) and 2.1.2A(2) in this Section

- provides a secondary containment boundary and a pressure boundary interface with the condensate ring header
- provides RCPB
- provides RHR system piping flow path for transmission of condensate and demineralized water system water supply to HPCI system piping upstream of HPCI system pump
- provides RHR system piping flow path from the HPCI system pump minimum flow coolant to the main RHR system heat exchangers
- provides debris protection
- provides for flow distribution
- restricts flow
- provides for heat transfer
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.2.4, the applicant identified the following RHR system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, RCPB fittings, heat exchangers, piping, RCPB piping, pumps, restricting orifice, strainers, tubing, valves, and RCPB valves.

2.3.2.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.4 and UFSAR Sections 3.3, 4.1, 4.8, 5.2.3, 5.3, 6.4.4, 7.3, 7.4, 7.18, 9.2, 10.5, 10.9, 10.10, 10.17, F7.9, F7.15, and F7.16 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.2.4.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the RHR system components that are within the scope of license

Need to Add Discussion on RAI 2.1.2A(1) and 2.1.2A(2) in this Section

renewal, as required by 10 CFR 54.4(a), and the RHR system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.2.5 Core Spray System

2.3.2.5.1 Summary of Technical Information in the Application

In LRA Section 2.3.2.5, the applicant described the CS system. The CS system, in conjunction with the other ECCSs, provides spray cooling to the reactor core to limit the peak fuel clad temperature over the complete spectrum of possible break sizes in the RCPB during design-basis accidents. Each individual unit contains a separate CS system with two independent loops. Each loop has two pumps that can pump water from the suppression pool directed into the reactor vessel to the spray headers located above the core and within the core shroud. Some CS system components are located within the reactor vessel; these components are evaluated in the reactor vessel internals section of this SER.

Full-flow pump test capability is provided by discharge line to the suppression pool. During normal operation, the CS system is in standby and can be started automatically, when required. Full-flow suction lines from the condensate storage tanks penetrate the secondary containment and provide a suction flow path for the RCIC and HPCI systems.

N-Add

The CS system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the CS system could prevent the satisfactory accomplishment of an SR function. In addition, the CS system performs functions that support EQ.

The intended functions within the scope of license renewal include the following:

- supplies cooling water to the reactor (automatic initiation)
- provides RCPB
- provides a primary containment boundary
- provides a secondary containment boundary and pressure boundary interface with the condensate system ring header
- provides debris protection
- restricts flow
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.2.5, the applicant identified the following CS system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, RCPB fittings, piping, RCPB piping, pumps, restricting orifice, RCPB restricting orifice, strainers, tanks, tubing, valves, and RCPB valves.

have pumps that pump the drywell or torus atmosphere past the hydrogen and oxygen sensors and back to the torus. In the event of an accident, the containment inerting system would be manually started.

(N)-Add

The containment inerting system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the containment inerting system could prevent the satisfactory accomplishment of an SR function. In addition, the containment inerting system performs functions that support EQ.

The intended functions within the scope of license renewal include the following:

- provides oxygen and hydrogen gas analyzers and indicators to monitor gas concentrations inside the primary containment in support of CAD system operation,
- provides a primary containment boundary
- provides a secondary containment boundary
- provides debris protection
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.2.6, the applicant identified the following containment inerting system component types that are within the scope of license renewal and subject to an AMR: bolting, flexible connectors, heat exchangers, fittings, piping, pumps, strainers, traps, tubing, and valves.

2.3.2.6.2 Staff Evaluation

The staff reviewed LRA Section 2.3.2.6, LRA Appendix F, and UFSAR Section 5.2.6 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting the review, the staff reviewed the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In reviewing LRA Section 2.3.2.6, the staff identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. Therefore, by the letter dated October 8, 2004, the staff issued an RAI concerning the specific issues to determine whether the applicant had properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The following paragraphs describe the staff's RAI and the applicant's response.

- 2.3.3.34 cranes system

The corresponding sub-sections of this SER (2.3.3.1 – 2.3.3.34) present the staff's review findings for each system of the auxiliary systems.

2.3.3.1 Auxiliary Boiler System

2.3.3.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.1, the applicant described the auxiliary boiler system. The auxiliary boiler system provides heating and miscellaneous steam services within the power house. This includes the ability to test the HPCI system and the RCIC system turbines while the reactor is shutdown. This system is a plant-shared system. The turbine building contains three oil-fired, auxiliary boilers.

(N)-Add

The auxiliary boiler system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of NSR SSCs in the auxiliary boiler system could prevent the satisfactory accomplishment of an SR function.

The intended functions within the scope of license renewal include the following:

- provides primary and secondary containment boundaries
- establishes an MSIV pathway to the condenser
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.3.1, the applicant identified the following auxiliary boiler system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, pipes, traps, tubing, and valves.

2.3.3.1.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.1 and UFSAR Sections 5.2, 5.3, and 10.20 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In order to resolve the 10 CFR 54.4(a)(2) issues discussed in RAI 2.1-2A(1) and (2) of SER Section 2.1 related to NSR piping segments that support secondary containment, the applicant expanded the system boundaries for the auxiliary boiler system. By letter dated May 31, 2005, the applicant submitted the results of its review of piping, supports, and other components

outside of the secondary containment required to maintain the structural integrity of the secondary containment that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2). In the enclosure to the letter the applicant stated that piping was added to scope. The component types do not differ from those listed in LRA Table 2.3.3.1; therefore, no changes to the auxiliary boiler system portion of the LRA are required.

The staff reviewed the NSR piping segments and found the expanded scope of components to be acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components.

2.3.3.1.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the auxiliary boiler system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the auxiliary boiler system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.2 Fuel Oil System

2.3.3.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.2, the applicant described the fuel oil system. The fuel oil system is a plant-shared system; two large storage tanks are provided for the entire plant. Pumps transfer fuel oil to the auxiliary boilers and storage tanks for the various diesel-driven engines. The standby alternating current (AC) power fuel oil system consists of three interconnected storage tanks for each of the system's eight diesel generators (DGs). Transfer pumps are provided to transfer fuel from a 7-day storage tank to the associated DG day tank. These 7-day storage tanks can provide sufficient fuel for the operation of the DGs during seven continuous days, following a LOCA. The system is in standby during normal operation and starts automatically, when required, to supply fuel to any operating DG. The other plant DGs each have a single storage tank.

N-Add

The fuel oil system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the fuel oil system could prevent the satisfactory accomplishment of an SR function. In addition, the fuel oil system performs functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

- provides diesel fuel oil to the DG system
- maintains a 7-day (long term) supply of fuel oil in storage tanks to support the DG system
- provides debris protection

Need to Address Draft OI 2.3.4.4-1 and Draft OI 2.3.4.4-2 in this Section

scope of license renewal in accordance with the requirements of 10 CFR 54.4(a). Therefore, the staff's concern described in RAI 2.3.3.2-1 is resolved.

RAI 2.3.3.2-2. The staff identified that a drain valve and associated piping and fittings on the diesel fuel tank for the diesel-driven fire pump had not been included in the LRA as being within the scope of license renewal and subject to an AMR. Failure of this piping could affect the upstream valve and drain the storage tank. Therefore, the staff requested that the applicant justify the exclusion of the drain valve and associated piping and fittings from the scope of license renewal.

In its response, dated October 19, 2004, the applicant stated that none of the piping shown on the license renewal drawing is SR or seismically qualified; the piping is within the scope of license renewal for fire protection. Failure of the short section of piping and fittings downstream of normally closed valve, 0-DRV-703, would not cause the storage tank to drain.

Based on its review, the staff found the applicant's response to RAI 2.3.3.2-2 acceptable. There is a normally closed valve within the scope of license renewal upstream of the drain valve in question; thus, failure of the short section of piping and fittings downstream of this valve would not affect the intended function of the storage tank. Therefore, the staff's concern described in RAI 2.3.3.2-2 is resolved.

2.3.3.2.3 Conclusion

The staff reviewed the LRA and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the fuel oil system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the fuel oil system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.3 Residual Heat Removal Service Water System

2.3.3.3.1 *Summary of Technical Information in the Application*

In LRA Section 2.3.3.3, the applicant described the RHRSW system. The RHRSW system is a plant-shared system. The system pumps water directly from Wheeler Reservoir through the RHR heat exchangers and EECW system components and discharges the water back into the Wheeler Reservoir.

Add N

The RHRSW system contains SR components that are relied upon to remain functional during, and following DBEs. The failure of SR SSCs in the RHRSW could prevent the satisfactory accomplishment of an SR function. In addition, the RHRSW performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- provides cooling water to the RHR system heat exchangers

In LRA Table 2.3.3.4, the applicant identified the following RCW system component types that are within the scope of license renewal and subject to an AMR: bolting, expansion joint, fittings, flex hose, piping, pumps, strainers, tubing and valves.

2.3.3.4.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.4 and UFSAR Sections 5.3, 10.7, and F.6.5 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In reviewing LRA Section 2.3.3.4, the staff identified an area in which additional information was necessary to complete the evaluation of the applicant's scoping and screening results. Therefore, by letter to the applicant dated August 31, 2004, the staff issued an RAI concerning the specific issue to determine whether the applicant had properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The following paragraphs describe the staff's RAI and the applicant's response.

RAI 2.3.3.4-1. The staff identified that water chillers 1A and 1B on license renewal drawing 1-47E844-2-LR are not subject to an AMR, and heat exchangers are not listed as a component type in LRA Table 2.3.3.4. The shell of the chillers serves as the pressure boundary and structural support for the attached raw cooling water piping which is subject to an AMR. Therefore, the staff requested that the applicant justify the exclusion of these chillers from being subject to an AMR.

delete and Add (—)

In its response dated October 19, 2004, the applicant stated that the piping on the shell side of water chillers 1A and 1B had been removed to show these chillers abandoned in place on drawing 1-47E844-1-LR. Since the raw water piping has been removed, the chillers no longer perform a pressure boundary or structural support function. The applicant further stated that the drawing has been revised and will be sent to the staff as part of the annual update.

Based on its review, the staff found the applicant's response to RAI 2.3.3.4-1 acceptable. Water chillers 1A and 1B no longer perform an intended function in accordance with the requirements of 10 CFR 54.4(a) and are outside the scope of license renewal. Therefore, the staff's concern described in RAI 2.3.3.4-1 is resolved.

In order to resolve the 10 CFR 54.4(a)(2) issues discussed in RAI 2.1-2A(1) and (2) of SER Section 2.1 related to NSR piping segments that support secondary containment, the applicant expanded the system boundaries for the raw cooling water system. By letter dated May 31, 2005, the applicant submitted the results of its review of piping, supports, and other components outside of the secondary containment required to maintain the structural integrity of the secondary containment that are within the scope of license renewal in accordance with the

Need to Add Discussion on RAI 2.1-2(c) in this Section

requirements of 10 CFR 54.4(a)(2). In the enclosure to the letter the applicant stated that piping was added to scope. The component types do not differ from those listed in LRA Table 2.3.3.1; therefore, no changes to the raw cooling water system portion of the LRA are required. change to 2.3.3.4

The staff reviewed the NSR piping segments and found the expanded scope of components to be acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components.

2.3.3.4.3 Conclusion

The staff reviewed the LRA and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the RCW system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the RCW system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.5 Raw Service Water System

2.3.3.5.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.5, the applicant described the raw service water (RSW) system. The RSW system furnishes water for yard-watering and the cooling of miscellaneous plant equipment that requires only small quantities of cooling water. The system also functions as a 'keep-fill' system for the fire protection system. The RSW system is supplied from river water from the condenser circulating water inlet conduit, through a strainer, and to the main RCW pump suction header for each unit. Units 1 and 2 each have one RSW pump; Unit 3 has two RSW pumps. Therefore, four pumps supply the common plant system. Two 10,000-gallon storage tanks are located on top of the reactor building. These tanks pressurize the high-pressure fire protection (HPFP) system header.

The RSW system contains SR components that are relied upon to remain functional during, and following, DBEs. In addition, the RSW system performs functions that support fire protection.

The intended functions within the scope of license renewal include the following:

- provides a secondary containment boundary
- provides a keep-fill system for the fire protection system
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.3.5, the applicant identified the following RSW system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, piping, tanks, tubing, and valves.

omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the RSW system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the RSW system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.6 High Pressure Fire Protection System

2.3.3.6.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.6, the applicant described the HPFP system. The HPFP system supplies water for fixed water spray, pre-action sprinkler, and aqueous foam systems for selected equipment and areas in the control building, reactor buildings, turbine building, intake pumping station, hydrogen trailer port, transformer yard, DG buildings, and service buildings.

N-Add

The HPFP system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the HPFP system could prevent the satisfactory accomplishment of an SR function. In addition, the HPFP system performs functions that support fire protection.

The intended functions within the scope of license renewal include the following:

- supports a secondary containment function
- provides automatic fire protection for known hazardous areas where it is practical
- provides adequate warning of a fire in hazardous areas where automatic protection is not feasible to provide adequate manually-actuated fire protection systems for the entire plant and yard areas (i.e., hose stations, hydrants, etc.)
- ensures the maintenance of divisional integrity of SR systems to the extent that the capability for safe shutdown of the reactors is assured during and after a fire
- provides debris protection
- provides mechanical closure
- provides pressure boundary
- provides spray pattern
- provides structural support

In LRA Table 2.3.3.6, the applicant identified the following HPFP system component types that are within the scope of license renewal and subject to an AMR: bolting, fan housing, fire hydrants, fire hose stations, fittings, flexible connectors, heaters, heat exchangers, piping, pumps, restricting orifice, silencer, sprinkler heads, strainers, tanks, tubing, and valves.

2.3.3.6.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.6 and UFSAR Sections 10.11 and F.6.9 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In reviewing the FPR, the staff identified the need for additional information related to the fire water supply systems and fire protection coating. In a letter dated August 23, 2004, the staff asked the applicant to clarify information contained in the FPR Volume 1, Sections 4.4.1.A and 4.4.5. The following paragraphs describe the staff's RAIs and the applicant's related responses.

RAI 4.4.1-1. FPR Section 4.4.1.A addresses a separate water supply system, including tank and pumps, which does not appear in the LRA or boundary drawings. The applicant was requested to verify whether these system components are within the scope of license renewal and provide the justification if they are not.

In its response, by letter dated September 30, 2004, the applicant stated that the separate water supply ID referring to the outside loop is not within the scope of license renewal, since it is servicing NSR areas of the plant that provide equipment/property protection and meet the Nuclear Electric Insurance Limited (NEIL) requirements. Therefore, they do not meet any criteria of 10 CFR 54.4.

Based on it review, the staff found the applicant's response to RAI 4.4.1-1 acceptable. Even though the separate water supply can be connected to the HPFP system as a backup identified in plant procedures, it is not connected by fixed piping and valves. Therefore, the staff concurred that the separate water supply is not within the scope of license renewal, and the staff concern described in RAI 4.4.1-1 is resolved.

RAI 4.4.5-1. FPR Section 4.4.5 states that "Flamemastic" was applied to cables that did not meet Institute of Electrical and Electronics Engineers (IEEE)-383 flame test requirements. Inspection Testing and Maintenance of this is not referenced in the FPR. No reference is made to it in the LRA, either under the Fire Protection Program, LRA Section B.2.1.23, or in the electrical or structural programs. The staff requested that the applicant supply the AMR and AMP that are applicable to the Flamemastic coating. The staff also asked the applicant to include program documents and procedures credited for managing the loss of material for Flamemastic coating.

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In its response, by letter dated September ~~28~~, 2004, the applicant stated that Flamemastic is primarily used as a flame retardant on non-IEEE-383 qualified cables. This commitment originated as part of the post-Fire Recovery Plan. As stated in the FPR, current practice is to use cables that meet the IEEE-383 requirements for flame retardant and, therefore, Flamemastic is not applied to these cables. Since Flamemastic is not considered a fire stop or a fire-resistive barrier, the 10 CFR Part 50, Appendix R, safe-shutdown analysis does not take credit for it. Some cable tray penetration seal assemblies, however, use a coating of Flamemastic on the fiber board and cables around the opening to meet the fire barrier function. Materials listed in LRA Sections 3.5.2.1.2 and 3.5.2.1.5 should include Flamemastic coatings, when used in a qualified fire barrier configuration, to include both sides of the reactor building/turbine building wall cable tray penetrations.

By letter dated January 25, 2005, applicant stated that the aging effects requiring management were incorrectly assigned to Flamemastic when used in the qualified fire barrier configuration. At ~~BNF~~, fire barrier penetration seal materials and Flamemastic coatings on exposed cables in open trays are exposed to an inside air environment and, therefore, have no aging effects and require no AMP.

BFN

The applicant further stated that, based on the above discussion, aging effects were also incorrectly assigned to fire barrier materials Thermolag, Elastomers, and Gypsum. LRA Section 3.5 will be revised to update the aging effects requiring management for these fire barrier materials.

Based on review of the applicant's response, as supplemented by letter dated January 25, 2005, the staff concurred that the proposed modifications to the LRA are appropriate, because Flamemastic coating on exposed cable trays are exposed to an inside air environment and require no AMR and AMP but are included within the scope of license renewal. Therefore, the staff's concern described in RAI 4.4.5-1 is resolved.

Add

In addition the staff, during its audit review, held during the week of July 21 - 25, 2004, discussed the following issue for the Fire Protection Program.

GALL Question 137-

Procedure FP-0-041-INS008, Process Computer Room Halon 1301 System Functional Test, identifies a Halon 1301 total flooding system on elevation 539 feet of the Control Bay (room 594.0-C1). No reference to Halon systems appears in the LRA (scoping, screening, AMR or AMP.) The applicant was requested to justify the exclusion of this system from license renewal.

(For response to GALL Audit Question 137)-Add

The applicant stated that the Halon system does not provide fire protection for any equipment for plant shutdown but is installed to provide equipment/property protection and meet NEIL requirements. Therefore, this system does not meet any of the criteria of 10 CFR 54.4. Based upon its review, the staff agrees that the Halon 1301 systems identified in FP-0-041-INS008 are part of the plant licensing basis and therefore are not within the scope of license renewal. The staff concern described above is resolved.

Not Add

2.3.3.6.3 Conclusion

The staff reviewed the LRA and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the HPFP system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the HPFP system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.7 Potable Water System

2.3.3.7.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.7, the applicant described the potable water system. The potable water system supplies potable water for use in the plumbing systems and is supplied by the city of Athens, AL. Potable water is supplied to various areas in the plant. Backflow preventers are installed at each interface between the potable water system and the separate connecting systems, in order to protect the potable water supply from possible contamination due to backflow. The potable water system is a plant-shared system.

Add N

The potable water system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the potable water system could prevent the satisfactory accomplishment of an SR function.

The intended functions within the scope of license renewal include the following:

- provides a secondary containment boundary
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.3.7, the applicant identified the following potable water system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, piping, tubing, and valves.

2.3.3.7.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.7 and UFSAR Sections 5.3, 10.15, and F.6.11 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In order to resolve the 10 CFR 54.4(a)(2) issues discussed in RAI 2.1-2A(1) and (2) of SER Section 2.1 related to NSR piping segments that support secondary containment, the applicant expanded the system boundaries for the potable water system. By letter dated May 31, 2005, the applicant submitted the results of its review of piping, supports, and other components outside of the secondary containment required to maintain the structural integrity of the secondary containment that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2). In the enclosure to the letter the applicant stated that piping was added to scope. The component types ~~do not differ from~~ those listed in LRA Table 2.3.3.1; therefore, no changes to the potable water system portion of the LRA are required.
change to were

The staff ~~reviewed the~~ NSR piping segments and found the expanded scope of components to be acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components.

, Valves, and tanks

2.3.3.7.3 Conclusion

The staff reviewed the LRA and RAI response to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that

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New Component type tank was added to LRA table 2.3.3.7 and 3.3.2.7.

conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting the review, the staff reviewed the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In reviewing LRA Section 2.3.3.8, the staff identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. Therefore, by the letter dated October 8, 2004, the staff issued an RAI concerning the specific issues to determine whether the applicant had properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The following paragraphs describe the staff's RAI and the applicant's related responses.

RAI 2.3.3.8-1. The staff requested that the applicant clarify whether all the system components such as, but not limited to, damper housings including fire damper housings, fan housings, air intake and exhaust structures including screens, supply and exhaust grills, etc., are within the scope of license renewal in accordance with 10 CFR 54.4(a), and subject to an AMR in accordance with 10 CFR 54.21(a)(1).

In its response, dated November 3, 2004, and supplemented by a letter dated December 3, 2004, the applicant stated that (1) the damper housings and fan housings are included in component type "ductwork" in LRA Table 2.3.3.8, (2) fire damper housings are included in component type "fire dampers" in LRA Table 2.3.3.8, (3) screens associated with the exhaust plenum in the Units 1 & 2 DG building and the Unit 3 DG building are included in component type "ductwork" in LRA Table 2.3.3.8, and (4) intake/exhaust plenums associated with the DG buildings are considered part of the structure and are contained in LRA Table 2.4.3.1 and LRA Table 3.5.2.5. LRA Section 2.3.5, "Notes Associated with the Section 2.3 Tables," "Component Types" are revised to reflect these components and, therefore, are part of LRA Table 2.3.3.8, "ventilation system" and LRA Table 3.3.2.8, "Ventilation System-Summary of Aging Management Evaluation."

Based on its review, the staff found the applicant's response to RAI 2.3.3.8-1 acceptable. The applicant clarified that all applicable system components consisting of damper housings including fire damper housings, fan housings, air intake and exhaust structures including screens, supply and exhaust grills, and all other applicable components of the system are within the scope of license renewal, and subject to an AMR for the ventilation system and are added as "Component Types" in LRA Tables 2.3.3.8 and 3.3.2.8. Therefore, the staff's concern described in RAI 2.3.3.8-1 is resolved.

delete RAI said not in scope

delete

2.3.3.8.3 Conclusion

delete and add already included in

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No

omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the ventilation system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the ventilation system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.9 Heating, Ventilation, and Air Conditioning System

2.3.3.9.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.9, the applicant described the HVAC system. The HVAC subsystems provide air-conditioned ventilation for various plant areas. The various HVAC subsystems provide environmental control, ventilation, and cooling. Ventilation and cooling is provided so that the temperatures of the control bay and shutdown electrical board rooms (including those in the Unit 3 DG building) are maintained within acceptable limits for the operation of instruments and other equipment during accidents and events. Ventilation is also provided to the battery room to prevent the buildup of explosive gases. In addition, the HVAC subsystems provide for the cooling of various electrical equipment rooms (e.g., computer and communications rooms) so that their temperatures are maintained within acceptable limits for the operation of instruments and other equipment.

N Add

The HVAC system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the HVAC system could prevent the satisfactory accomplishment of an SR function. In addition, the HVAC system performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- isolates supply ducts and supplies pressurized filtered outdoor air to main control room on primary containment isolation system group six signal or radiation monitoring system initiation signal
- provides ventilation to cable spreading rooms and control bay mechanical equipment rooms
- recirculates cool air to the reactor building board rooms
- provides ventilation and air conditioning to the board rooms of the Unit 3 DG buildings and ventilation to the battery rooms
- provides recirculation air conditioning to control rooms and auxiliary instrument rooms
- provides manual lineup of HVAC equipment with total loss of control air
- provides a secondary containment boundary
- provides debris protection
- provides fire barrier
- provides for heat transfer
- provides mechanical closure

- Valve bodies are included in component type "valves" in LRA Table 2.3.3.9.
- Structural sealants such as those required to maintain the control room envelope or secondary containment are contained in Section 3.5.2.1.2 and in component type "compression joints and seals" and in component type "caulking and sealants" in LRA Table 3.5.2.2,
- Pressure boundary sealants associated with ductwork for HVAC~~S~~ System are included in component type "ductwork" in LRA Tables 2.3.3.9 and 3.3.2.9, and screens and plenums are included in the component type "ductwork."

The supply and return grilles have no 10 CFR 54.4(a)1, 10 CFR 54.4(a)2, or 10 CFR 54.4(a)3 functions for license renewal and are not included in the LRA Tables. LRA Section 2.3.5, "Notes Associated with the LRA Section 2.3 tables," "Component Types" is revised to reflect these components and, therefore, is part of LRA Table 2.3.3.9, "Heating, Ventilation, and Air Conditioning System," and LRA Table 3.3.2.9, "Heating, Ventilation, and Air Conditioning System-Summary of Aging Management Evaluation."

Based on its review, the staff found the applicant's response to RAI 2.3.3.9-1 acceptable. The applicant clarified that all applicable system components consisting of fan housings, filter housings, cooling coil housings, damper housings, metal lath screens, screens and plenums, valve bodies, structural sealants to maintain the control room envelope including compression joints and seals, and pressure boundary sealants associated with ductwork are within the scope of license renewal, and subject to an AMR for the HVACS and are added as "Component Types" in LRA Tables 2.3.3.9 and 3.3.2.9. Therefore, the staff's concern described in RAI 2.3.3.9-1 is resolved.

delete and Add already included in

2.3.3.9.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the HVAC system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the HVAC system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.10 Control Air System

2.3.3.10.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.10, the applicant described the control air system. The control air system provides motive power for numerous plant components during normal operations and post-accident motive power to the torus vacuum breaker valves. The system also provides post-accident motive power to the MS isolation valves and the main steam safety relief valves (MSRVs) for reactor vessel overpressure relief protection and reactor vessel depressurization, including the ECCS automatic depressurization function.

N Add

The control air system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the control air system could prevent the satisfactory accomplishment of an SR function. In addition, the control air system performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- performs isolation action(s) upon receiving primary containment system (64D) group six isolation signals
- provides compressed air to the MS system atmospheric dilution system (ADS) safety relief valves
- ~~provides compressed air for closure of the main steam isolation valves (MSIVs)~~
- Add provide primary containment boundary
- ~~provides compressed air to equipment access air lock seals to provide~~ ~~a primary and~~ secondary containment boundary delete
- provides and supports the secondary containment boundary
- provides for flow path integrity for supply of CAD nitrogen to the torus vacuum breaker valves
- provides a flow path for the CAD system to provide nitrogen to MSRVs
- provides for flow distribution
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.3.10, the applicant identified the following control air system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, flexible connectors, heat exchangers, piping, restricting orifice, tanks, tubing, and valves.

2.3.3.10.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.10 and UFSAR Sections 5.2.3, 5.3, 10.14, and F.6.3 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

Add
, fittings, and valves

In order to resolve the 10 CFR 54.4(a)(2) issues discussed in RAI 2.1-2A(1) and (2) of SER Section 2.1 related to NSR piping segments that support secondary containment, the applicant expanded the system boundaries for the service air system. By letter dated May 31, 2005, the applicant submitted the results of its review of piping, supports, and other components outside of the secondary containment required to maintain the structural integrity of the secondary containment that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2). In the enclosure to the letter the applicant stated that piping was added to scope. The component types do not differ from those listed in LRA Table 2.3.3.1; therefore, no changes to the service air system portion of the LRA are required.

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The staff reviewed the NSR piping segments and found the expanded scope of components to be acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components.

2.3.3.11.3 Conclusion

The staff reviewed the LRA and RAI response to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the service air system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the service air system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.12 CO_2 System

2.3.3.12.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.12, the applicant described the CO_2 system. The CO_2 system is a fire suppression system for the DG buildings, turbine building, and control bay spaces that contain electrical, lubricating oil, or fuel oil components. Units 1 and 2 share a system that includes a 17-ton storage tank. Unit 3 has a separate system with a 6-ton tank. The system is in standby during normal operation and initiates automatically, as required. When initiated, ventilation systems that could reduce the effectiveness of the CO_2 discharge are isolated. Detection and alarm devices that automatically initiate the system, or would prompt manual fire firefighting activities, are also included in the CO_2 system. The CO_2 system performs functions that support fire protection.

The intended functions within the scope of license renewal include the following:

- provides CO_2 fire protection for oil and electrical hazards affecting the minimum safe shutdown system (SSDS) components required to achieve safe shutdown capability
- provides fire barrier
- provides mechanical closure
- provides pressure boundary

- provides structural support

In LRA Table 2.3.3.12, the applicant identified the following CO_2 system component types that are within the scope of license renewal and subject to an AMR: bolting, ductwork, fire dampers, fittings, piping, rupture disk, tanks, tubing, and valves.

2.3.3.12.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.12 and UFSAR Sections 10.11 and F.6.9 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). In addition, the staff also reviewed BFN FPR volumes 1 and 2. This report is referenced directly in the fire protection CLB and summarizes the Fire Protection Program and commitments to 10 CFR 50.48 using the guidance of Appendix A to BTP APCSB 9.5-1. The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In reviewing LRA Section 2.3.3.12, the staff identified areas in which additional information was necessary to complete the evaluation of the applicant's scoping and screening results. Therefore, by letter to the applicant dated August 23, 2004, the staff issued RAIs concerning the specific issues to determine whether the applicant had properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The following paragraphs describe the staff's RAIs and the applicant's related responses.

RAI 2.3.3.12-1. The CO_2 system addressed in LRA Section 2.3.3.12 typically requires discharge nozzles to achieve the proper flow rate. The staff identified that the system description and LRA Table 2.3.3.12 do not include any reference to discharge nozzles. Therefore, the staff requested the applicant to indicate whether this system includes discharge nozzles. If so, the staff stated that the nozzles, which perform an intended function for flow control, are passive and long lived and should be subject to an AMR.

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In its response, by letter dated September 28, 2004, the applicant stated that the discharge nozzles were included within component type "fittings" in Table 2.3.3.12 with an intended function of pressure boundary and subject to an AMR.

Based on the response, the staff concurred that the nozzles are within the scope of license renewal and subject to an AMR, but disagreed that the intended function is pressure boundary. The nozzles contain open orifices and serve a flow control function rather than a pressure boundary. The staff reviewed plant procedures 0-SI-4.11.D.1.b, 1/2-SI-4.11.D.1.b, and 3-SI-4.11.D.1.b for CO_2 system functional testing and found the nozzles are adequately addressed in the fire protection AMP. Therefore, the staff concern described in RAI 2.3.3.12-1 is resolved.

RAI 2.3.3.12-2. The system description of the CO_2 system in LRA Section 2.3.3.12 addresses detection and alarm devices that automatically initiate the system or prompt manual fire fighting. The staff stated that these devices are not identified on the license renewal drawings, nor are they discussed in the fire protection program. Therefore, the staff requested that the applicant explain what these devices are and whether they are subject to an AMR.

In its response, by letter dated September ~~28~~ 30, 2004, the applicant stated that the CO_2 system fire protection detection and alarm devices do not form a pressure boundary and are active components and evaluated as electrical commodities.

Based on its review, the staff found the applicant's response to RAI 2.3.3.12-2 acceptable. The components in question are electrical, not mechanical, and are therefore active and not subject to an AMR. Therefore, the staff's concern described in RAI 2.3.3.12-2 is resolved.

2.3.3.12.3 Conclusion

The staff reviewed the LRA and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the CO_2 system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the CO_2 system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.13 Station Drainage System

2.3.3.13.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.13, the applicant described the station drainage system. The station drainage system is a plant-shared system that collects, processes, stores, and disposes of non-radioactive liquid waste. Portions of the piping within the system penetrate the secondary containment.

N-Add

The station drainage system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the station drainage system could prevent the satisfactory accomplishment of an SR function.

The intended functions within the scope of license renewal include the following:

- provides a secondary containment boundary
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.3.13, the applicant identified the following station drainage system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, piping, and valves.

Need to Address RAI 2.1-2, A.3 to discussion in this Section

2.3.3.13.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.13 and UFSAR Sections 5.3 and 10.16 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In reviewing LRA Section 2.3.3.13, the staff identified an area in which additional information was necessary to complete the evaluation of the applicant's scoping and screening results. Therefore, by letter to the applicant dated August 31, 2004, the staff issued an RAI concerning the specific issue to determine whether the applicant had properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The following paragraphs describe the staff's RAI and the applicant's related response.

RAI 2.3.3.13-1. The staff identified a 3-inch roof drain (at roof elevation 667 feet on license renewal drawing 0-47E851-1-LR,) that is not within the scope of license renewal and subject to an AMR. This drain provides a pressure boundary function between the standby gas treatment system and the off-gas system; thus it should be within the scope of license renewal. The staff noted that a 4-inch roof drain on the same drawing is shown as being subject to an AMR. The staff requested that the applicant justify the exclusion of the 3-inch roof drain from the scope of license renewal and from being subject to an AMR.

In its response dated October 19, 2004, the applicant stated that the 3-inch roof drain should have been colored in red on drawing 0-47E851-1-LR, since it is within the scope of license renewal as part of the component type "fittings" in LRA Table 2.3.3.13 and subject to an AMR. The applicant further stated that drawing 0-47E851-1-LR has been revised to show the 3-inch roof drain highlighted in red and will be resent as part of the annual update.

Based on its review, the staff found the applicant's response to RAI 2.3.3.13-1 acceptable. It concurs that the 3-inch roof drain should be within the scope of license renewal and the drain included in LRA Table 2.3.3.13 as a component type subject to an AMR. Therefore, the staff's concern described in RAI 2.3.3.13-1 is resolved.

In order to resolve the 10 CFR 54.4(a)(2) issues discussed in RAI 2.1-2A(1) and (2) of SER Section 2.1 related to NSR piping segments that support secondary containment, the applicant expanded the system boundaries for the station drainage system. By letter dated May 31, 2005, the applicant submitted the results of its review of piping, supports, and other components outside of the secondary containment required to maintain the structural integrity of the secondary containment that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2). In the enclosure to the letter the applicant stated that piping was added to scope. The component types do not differ from those listed in LRA Table 2.3.3.1; therefore, no changes to the station drainage system portion of the LRA are required.

change to 2.3.3.13

, fittings, and check valves

Add

The staff reviewed the NSR piping segments and found the expanded scope of components to be acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components.

2.3.3.13.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the station drainage system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the station drainage system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.14 Sampling and Water Quality System

2.3.3.14.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.14, the applicant described the sampling and water quality system. The sampling and water quality system provides the capability to obtain representative samples for testing. The data are used to evaluate the performance of the plant, equipment, and systems during normal plant operations. Using a post-accident sample subsystem, representative samples of reactor coolant, torus liquid, drywell atmosphere, torus atmosphere, and secondary containment atmosphere can be obtained after a LOCA to guide post-LOCA actions regarding Units 2 and 3. Portions of the system are credited in analyses for MSIV alternate leakage treatment.

N Add

The sampling and water quality system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the sampling and water quality system could prevent the satisfactory accomplishment of an SR function. In addition, the sampling and water quality system performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- provides RCPB
- provides primary and secondary containment boundaries
- maintains residual heat removal service water system pressure boundary integrity
- provides a pressure boundary of the sampling and water quality system components connected to the control air system that must maintain a pressure boundary in order to supply the CAD and MSRVs
- establishes MSIV leakage pathway to the condenser
- provides mechanical closure

RAI 2.3.3.15-1. LRA Section 2.3.3.15 states that the intended function of the building heat system is to provide a secondary containment boundary. The staff identified that valves 1-1029, 1-1030, 2-1318, 2-1319, 3-1386, and 3-1387 are included in the scope of license renewal and subject to an AMR, but the connected piping on one side of these valves is not included within the scope of license renewal and not subject to an AMR. The staff could not determine if the piping on both sides of these open valves provides a secondary containment boundary. Therefore, the staff requested that the applicant provide a basis for these valves being the boundary of the piping and components that are not subject to an AMR.

In its response, dated October 19, 2004, the applicant stated that valves 1-1029, 1-1030, 2-1318, 2-1319, 3-1386, and 3-1387 were included in the scope of license renewal in error and that only the piping and valves for the building heat system located in the reactor building perform a secondary containment function. Valves 1-1029, 1-1030, 2-1318, 2-1319, 3-1386, and 3-1387 are located in the turbine building and, therefore, are not within the scope of license renewal. The applicant also stated that drawing 0-47E866-1-LR has been revised to show the boundary ending at the reactor building wall and will be resent as part of the annual update.

Based on its review, the staff found the applicant's response to RAI 2.3.3.15-1 acceptable. Valves 1-1029, 1-1030, 2-1318, 2-1319, 3-1386, and 3-1387 do not perform an intended function in accordance with the requirements of 10 CFR 54.4(a) and are outside the scope of license renewal. Therefore, the staff's concern described in RAI 2.3.3.15-1 is resolved.

2.3.3.15.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the building heat system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the building heat system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.16 Raw Water Chemical Treatment System

2.3.3.16.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.16, the applicant described the raw water chemical treatment system. The raw water chemical treatment system prevents bio-fouling of systems, including the EECW and RHRSW systems, that use water directly from Wheeler Reservoir. The raw water chemical treatment system provides the capability to inject a biocide into the fluid stream.

The raw water chemical treatment system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the raw water chemical treatment system could prevent the satisfactory accomplishment of an SR function.

NL Add

N-Add

The demineralizer backwash air system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the demineralizer backwash air system could prevent the satisfactory accomplishment of an SR function.

The intended functions within the scope of license renewal include the following:

- provides a secondary containment boundary
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.3.17, the applicant identified the following demineralizer backwash air system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, piping, traps, and valves.

2.3.3.17.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.17 and UFSAR Section 5.3.3 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.3.17.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the demineralizer backwash air system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the demineralizer backwash air system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.18 Standby Liquid Control System

2.3.3.18.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.18, the applicant described the SLC system. The SLC system provides a backup method, independent of the control rods, to make the reactor subcritical over the full range of operating conditions. The SLC system can be manually initiated from the main control room to pump a boron neutron absorber solution into the reactor. This function is initiated if the operator determines that the reactor cannot be shut down or kept shut down with the control

rods alone. During normal operation, the SLC system is in standby and must be manually initiated, if required.

N-Add

The SLC system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the SLC system could prevent the satisfactory accomplishment of an SR function. In addition, the SLC system performs functions that support ATWS.

The intended functions within the scope of license renewal include the following:

- provides RCPB
- provides a primary containment boundary
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.3.18, the applicant identified the following SLC component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, RCPB fittings, piping, RCPB piping, pumps, tanks, tubing, valves, and RCPB valves.

2.3.3.18.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.18 and UFSAR Sections 3.8, 5.2.3, and 7.19 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In reviewing LRA Section 2.3.3.18, the staff identified an area in which additional information was necessary to complete the evaluation of the applicant's scoping and screening results. Therefore, by letter to the applicant dated August 31, 2004, the staff issued an RAI concerning the specific issue to determine whether the applicant had properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The following paragraphs describe the staff's RAI and the applicant's response.

RAI 2.3.3.18-1. Component electric heaters, located inside the SLC tank, are shown on license renewal drawings 1-47E854-1-LR, 2-47E854-1-LR, and 3-47E854-1-LR as subject to an AMR. However, LRA Section 2.3.5 lists the component UNID of the heater in three different component types (fittings, heaters, or tanks). The staff requested that the applicant identify which component type in LRA Table 2.3.3.18 includes the electric heater. Furthermore, during a telephone conference on October 7, 2004, the staff requested that the applicant justify the exclusion of a strainer, addressed in UFSAR Section 3.8.3 but not depicted on the license renewal drawings or included in LRA Table 2.3.3.18, from the scope of license renewal and

of the seismic Class I qualification documentation to identify the NSR piping, supports/equivalent anchors, or other components that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components. In the February 28, 2005 letter, enclosure 2, "Mechanical Systems," the applicant stated that additional components, valves, had been added to the scope of the off-gas system. The component type valve was added to LRA Table 2.3.3.19.

The staff reviewed the NSR piping up to first equivalent anchor point of seismic Class I piping boundaries and found the expanded scope of components to be acceptable on the basis that the applicant had adequately identified all SLC NSR components that meet the scoping criterion of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components..

2.3.3.19.3 Conclusion

The staff reviewed the LRA and RAI response to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the off-gas system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the off-gas system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.20 Emergency Equipment Cooling Water System

2.3.3.20.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.20, the applicant described the EECW system. The EECW system is a plant-shared system, which has two headers that use dedicated RHRSW pumps to supply water from the Wheeler Reservoir into heat exchangers. The heat exchangers cool equipment including the DG engine coolers, CS pump room coolers, RHR pump seal coolers and room coolers, control bay chillers, hydrogen and oxygen containment gas analyzers, and electric board room chillers. The EECW system provides cooling water to equipment that is essential for safe shutdown and a backup cooling water supply to the reactor building closed cooling water heat exchangers.

N - Add

The EECW system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the EECW system could prevent the satisfactory accomplishment of an SR function. In addition, the EECW system performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- provides cooling water to the HVAC system chillers, RHR system pump seal coolers, containment inerting system hydrogen and oxygen gas analyzers, DG, RHR and CS equipment room coolers, and FPC system

Need to Add Discussion on Draft OI 2.3.4.4-1 and Draft OI 2.3.4.4-2 in this Section

AMR.

In its response, dated October 19, 2004, the applicant stated that a note had been added to license renewal drawings 1-47E859-1-LR, 2-47E859-1-LR, and 3-47E859-1-LR to state that the EECW buried piping is within the scope of license renewal up to the catch basins shown on isometric drawing 0-17W300-9.

Based on its review, the staff found the applicant's response to RAI 2.3.3.20-1 acceptable. It adequately identifies the extent of the buried emergency equipment cooling water piping that is within the scope of license renewal and subject to an AMR. Therefore, the staff's concern described in RAI 2.3.3.20-1 is resolved.

2.3.3.20.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the EECW system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the EECW system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.21 Reactor Water Cleanup System

2.3.3.21.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.21, the applicant described the RWCU system. A separate RWCU system is provided for each unit. The major equipment for the RWCU system is located in the reactor building and consists of two pumps, regenerative and non-regenerative heat exchangers, and two filter/demineralizers with supporting equipment. Suction for the system is taken from the reactor vessel bottom drain and from the RHR system shutdown cooling suction line, which is supplied by the reactor coolant recirculation system. The system automatically isolates upon accident initiation and upon SLC system actuation. The RWCU system functions to maintain a high reactor-water purity to limit corrosion, chemical interactions, fouling, and deposits on reactor heat transfer surfaces. The system also removes corrosion products to limit impurities available for activation by neutron flux and the resultant radiation from deposits of corrosion products. In addition, the system provides a means for removal of water from the reactor vessel during normal operations. N Add

The RWCU system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the RWCU system could prevent the satisfactory accomplishment of an SR function. In addition, the RWCU system performs functions that support fire protection, EQ, and SBO.

because these components are not assigned UNID's on drawings. LRA Section 2.3.5 was generated to show where UNID's appearing on the license renewal drawings were grouped in a component type.

Based on its review, the staff found the applicant's response to RAI 2.3.3.21-1 acceptable. because thermal tees are included as a component type that is subject to an AMR. Therefore, the staff's concern described in RAI 2.3.3.21-1 is resolved.

RAI 2.3.3.21-2. The staff identified fusible plugs (FUPG) to be within the scope of license renewal and subject to an AMR. The drawing note associated with FUPGs states that the FUPG is a threaded pipe plug with a low temperature eutectic alloy that is attached to the RWCU pipe upstream of valve FCV-69-94. Eutectic material melts on high temperature, venting the control air line, which closes isolation valve FCV-69-94. Also, another drawing note states that the system shall be qualified for an elevated temperature excursion up to 562 °F during an Appendix R event from the non-generative heat exchanger outlet to valve FCV-69-94.

(A) The FUPGs are neither listed in LRA Table 2.3.3.21 as a component type subject to an AMR, nor as a subcomponent of the component types listed in LRA Section 2.3.5. The staff requested that the applicant indicate if FUPGs are already included in LRA Table 2.3.3.21 as a component type subject to an AMR, or justify the exclusion of these components from being subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

(B) Based on the above mentioned drawing notes, it appears that valve FCV-69-94 satisfies criterion 10 CFR 54.4(a)(3) for an EQ and fire protection regulated event. However, the piping and components associated with this valve, including the above-mentioned FUPG, are shown as within the scope of license renewal in accordance with the 10 CFR 54.4(a)(2) criterion. The staff requested that the applicant explain how valve FCV-69-94 functions differently from its associated pipeline.

In its response, dated April 28, 2005, the applicant stated that the FUPGs were inadvertently colored in blue on the drawing but should have been black since they are active components and are not within the scope of license renewal. The applicant also stated that the fusible plugs do not form a pressure boundary function for the RWCU system. The ~~license renewal drawings~~ have been revised to show FUPG-32-5105 in black instead of blue, that is not subject to an AMR.
delete delete and Add Since it

Based on its review, the staff found the applicant's response to RAI 2.3.3.21-2a acceptable. FUPGs meet the definition for an active component and, therefore, are not subject to an AMR. Therefore, the staff's concern described in RAI 2.3.3.21-2a is resolved.

With regard to RAI 2.3.3.21-2b, the applicant stated that the piping and equipment downstream of FCV-69-2 up to and including valve FCV-69-94 will be corrected on the drawings to show the components in scope per the criteria 10 CFR 54.4a(3) and subject to an AMR, since these components form the reactor coolant pressure boundary during an Appendix R event. The tube side of the heat exchanger is considered part of the reactor coolant pressure boundary while the shell side provides the structural support for the tubes. Shell side piping connections will remain in scope. Also, System 43 in drawing 0-105E3156-1-LR will be corrected to show its components required for pressure boundary integrity in red instead of blue on the drawing, that

renewal in accordance with the requirements of 10 CFR 54.4(a)(2). Therefore, the staff requested that the applicant clarify this apparent discrepancy.

In its response, dated April 28, 2005, the applicant stated that the line was inadvertently colored in blue but should have been in black. The drawing was corrected to show the line in black, that is, not within the scope of license renewal.

Based on its review, the staff found the applicant's response to RAI 2.3.3.21-5 acceptable. The applicant clarified that the piping in question is not within the scope of license renewal and corrected the corresponding drawing. Therefore, the staff's concern described in RAI 2.3.3.21-5 is resolved.

2.3.3.21.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the RWCU system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the RWCU system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.22 Reactor Building Closed Cooling Water System

2.3.3.22.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.22, the applicant described the reactor building closed cooling water system. The reactor building closed cooling water system provides a continuous supply of cooling water during normal operation to designated plant equipment located in the primary and secondary containments. Water cooled in the heat exchangers provides cooling water for components such as the reactor recirculation system pumps and motor, the RWCU system pumps and non-regenerative heat exchanger, the fuel pool cooling and cleanup system heat exchanger, the drywell atmosphere cooling coils, the reactor building equipment drain sump heat exchanger, the drywell equipment drain sump heat exchanger, the drywell air compressors and aftercoolers, and the sample coolers in the sampling and water quality system. The system is normally operational and will automatically trip if an accident initiates it.

N Add

The reactor building closed cooling water system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the reactor building closed cooling water system could prevent the satisfactory accomplishment of an SR function. In addition, the reactor building closed cooling water system performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- provides primary and secondary containment boundaries

as part of the One-Time Inspection Program.

Based on its review, the staff found the applicant's response to RAI 2.3.3.23-1 acceptable. The applicant included the subject component and its intended functions within the scope requiring an AMR. Therefore, the staff's concern described in RAI 2.3.3.23-1 is resolved.

2.3.3.23.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the RCIC system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the RCIC system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.24 Auxiliary Decay Heat Removal System

2.3.3.24.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.24, the applicant described the auxiliary decay heat removal (ADHR) system. The ADHR system can be used to remove residual heat from the spent fuel pool and reactor cavity during outages. The ADHR system supplements the fuel pool cooling and cleanup system and consists of two cooling water loops. The primary cooling loop circulates water from the spent fuel pool entirely inside the reactor building and rejects heat from the spent fuel pool to a secondary loop via a heat exchanger. The secondary loop transfers heat to the atmosphere outside of the reactor building by the means of evaporative cooling towers.

N Add

The ADHR system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the ADHR system could prevent the satisfactory accomplishment of an SR function.

The intended functions within the scope of license renewal include the following:

- provides a secondary containment boundary
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.3.24, the applicant identified the following ADHR system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, heat exchangers, piping, pumps, strainers, tubing, and valves.

2.3.3.24.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.24 and UFSAR Sections 5.3, 10.5, and 10.22 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In order to resolve the seismic Class I/II interface issues discussed in RAI 2.1-2A(3) of SER Section 2.1, the applicant expanded the system boundaries for the ADHR system. By letters dated January 31, 2005, and February 28, 2005, the applicant submitted the results of its review of the seismic Class I qualification documentation to identify the NSR piping, supports and equivalent anchors, or other components that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2) for the 10 CFR 54.4(a)(2) cases where NSR piping or components are directly connected to SR piping or components. In its February 28, 2005, letter, enclosure 2, "Mechanical Systems," the applicant stated that additional piping and components had been added to the scope of the ADHR system; however, the component types do not differ from those listed in LRA Table 2.3.3.24 and no changes to the ADHD system portion of the LRA are required.

The staff reviewed the NSR piping up to first equivalent anchor point of seismic Class I piping boundaries and found the expanded scope of components to be acceptable on the basis that the applicant had adequately identified all SLC NSR components that meet the scoping criterion of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components.

2.3.3.24.3 Conclusion

The staff reviewed the LRA and RAI response to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the ADHR system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the ADHR system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.25 Radioactive Waste Treatment System

2.3.3.25.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.25, the applicant described the radioactive waste treatment system. The radioactive waste treatment system is comprised of subsystems that process solid and liquid radwaste that is generated during normal plant operation. The subsystems are plant-shared systems.

N Add

The radioactive waste treatment system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the radioactive waste treatment system could prevent the satisfactory accomplishment of an SR function. In addition,

the radioactive waste treatment system performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- provides primary and secondary containment boundaries
- provides piping interface integrity with the SGT system and the off-gas system in support of the release of filtered SGT gases through the stack
- provides a pressure boundary of the radioactive waste treatment system components connected to the control air system that must maintain a pressure boundary in support of supplying CAD to the MSRVs
- provides mechanical closure
- provides pressure boundary
- provides structural support

change to SBGT

change to SBGT

In LRA Table 2.3.3.25, the applicant identified the following radioactive waste treatment system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, heat exchangers, piping, pumps, restricting orifices, tanks, strainers, tubing, and valves.

2.3.3.25.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.25 and UFSAR Sections 4.10, 5.2, 5.3, 9.1, 9.2, 9.3, 9.5, 10.16, F.6.7, F.6.8, F.6.20, and F.7.14 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In order to resolve the 10 CFR 54.4(a)(2) issues regarding NSR piping segments that support secondary containment discussed in RAI 2.1-2A(1) and (2) of SER Section 2.1, the applicant expanded the system boundaries for the radioactive waste treatment system. By letter dated May 31, 2005, the applicant submitted the NSR piping, supports, and other components outside secondary containment required to maintain the structural integrity of secondary containment that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2) for secondary containment qualification. In the enclosure to its letter dated May 31, 2005, the applicant stated that additional piping had been added to scope. However, the component type does not differ from those listed in LRA Table 2.3.3.25; therefore, no changes to the radioactive waste treatment system portion of the LRA are required.

The applicant also expanded the system boundaries for the radioactive waste treatment system

N-Add

The FPC system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the FPC system could prevent the satisfactory accomplishment of an SR function. In addition, the FPC system performs functions that support fire protection.

The intended functions within the scope of license renewal include the following:

- provides a secondary containment boundary
- provides for pressure boundary integrity at the RHR/FPC interface
- prevents inadvertent siphoning of the spent fuel pool
- provides mechanical closure
- *provides pressure boundary*
- provides structural support

In LRA Table 2.3.3.26, the applicant identified the following FPC system component types that are within the scope of license renewal and subject to an AMR: bolting, expansion joint, fittings, heat exchangers, piping, pumps, restricting orifice, tanks, tubing, and valves.

2.3.3.26.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.26 and UFSAR Sections 4.8, 5.3, 10.5, 10.17, and 10.22 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In order to resolve the 10 CFR 54.4(a)(2) issues discussed in RAI 2.1-2A(1) and (2) of SER Section 2.1 related to NSR piping segments that support secondary containment, the applicant expanded the system boundaries for the fuel pool cooling and cleanup system. By letter dated May 31, 2005, the applicant submitted the results of its review of piping, supports, and other components outside secondary containment required to maintain the structural integrity of secondary containment that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2) for secondary containment qualification. In the enclosure to its letter dated May 31, 2005, the applicant stated that additional piping had been added to scope. However, the component type does not differ from those listed in LRA Table 2.3.3.26; therefore, no changes to the fuel pool cooling and cleanup system portion of the LRA are required.

The applicant also expanded the system boundaries for the FPC system to resolve the seismic Class I/II interface issues discussed in RAI 2.1-2A(3) of SER Section 2.1. By letters dated January 31, 2005, and February 28, 2005, the applicant submitted the results of its review of the seismic Class I qualification documentation to identify the NSR piping, supports/equivalent anchors, or other qualification documentation to identify the NSR piping, supports/equivalent

anchors, or other components that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2) for the (a)(2) cases in which NSR piping or components are directly connected to SR piping or components. In the February 28, 2005 letter, enclosure 2, "Mechanical Systems," the applicant stated that additional piping and components had been added to the scope of the FPC system. However, the component types do not differ from those listed in LRA Table 2.3.3.26; therefore, no changes to the FPC system portion of the LRA are required.

The staff reviewed the results of the applicant's evaluation of NSR piping segments that support secondary containment in response to RAI 2.1-2A(1) and (2), and the results of the applicant's evaluation of seismic Class I piping boundaries in its response to RAI 2.1-2A(3). The staff found the expanded scope of components to be acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components.

2.3.3.26.3 Conclusion

The staff reviewed the LRA and RAI response to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the FPC system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the FPC system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.27 Fuel Handling and Storage System

2.3.3.27.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.27, the applicant described the fuel handling and storage system. Each unit is provided with a dry, new fuel storage vault. The new fuel storage racks provide a location in the vaults where new fuel can be stored. The racks are designed to preclude criticality even if the new fuel storage vault is flooded. Each reactor also has a spent fuel storage pool. A transfer canal is provided to join the pools for Units 1 and 2. The spent fuel storage racks provide a location where spent fuel, received from the reactor vessel, can be stored at the bottom of each fuel pool. The racks are full length, top entry, and are designed to maintain the spent fuel in a spatial geometry that precludes the possibility of criticality. The racks are comprised of staggered, stainless-steel container tubes. Each tube wall has a core of Boral sandwiched within stainless steel. Servicing equipment is provided to facilitate refueling, fuel inspection, and fuel maintenance.

N Add

The fuel handling and storage system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of NSR SSCs in the fuel handling and storage system could prevent the satisfactory accomplishment of an SR function.

(N)-Add

The intended functions within the scope of license renewal include the following:

- provides SR components that ensure the satisfactory performance of SR components
- provides structural support

In LRA Table 2.3.3.27, the applicant identified the following fuel handling and storage system component types that are within the scope of license renewal and subject to an AMR: bolting and fasteners, fuel preparation machines, and the refueling platform (including the assembly, rails, and main fuel grapple).

2.3.3.27.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.27 and UFSAR Sections 10.2, 10.3, 10.4, and 10.5 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In reviewing LRA Section 2.3.3.27, the staff identified an area in which additional information was necessary to complete the evaluation of the applicant's scoping and screening results. Therefore, by letter to the applicant dated August 31, 2004, the staff issued an RAI concerning the specific issue to determine whether the applicant had properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The following paragraphs describe the staff's RAI and the applicant's related response.

RAI 2.3.3.27-1. LRA Section 2.3.3.27 states that the portions of the fuel handling and storage system that contain components subject to an AMR are the fuel preparation machines, refueling platform (assembly, rails, and the main fuel grapple), and the bolting and fasteners associated with the refueling platform and fuel preparation machines. LRA Table 2.3.3.27 lists components associated with the fuel handling and storage systems that are subject to an AMR. UFSAR Section 10.4 (in Table 10.4-1, "Tools and Servicing Equipment") lists fuel servicing equipment, including general purpose grapple, channel transfer grapple, fuel inspection fixture, and new fuel inspection stand, but none of these are referenced in LRA Section 2.3.3.27. In reviewing LRA Section 2.3.3.27, the staff also found that no drawings are provided for this system. There is insufficient information for the staff to determine whether these components are within the scope of license renewal and subject to an AMR. Therefore, the staff requested that the applicant identify which of these components are within the scope of license renewal and subject to an AMR.

In its response, dated October 19, 2004, the applicant stated the general purpose grapple, channel transfer grapple, and fuel inspection fixture are within the scope of license renewal; however, an AMR is not required for these components since they are active (i.e., they change configuration). The applicant also stated that the new fuel inspection stand is not SR and does

not meet the criterion in 10 CFR 54.4(a)(1). The new fuel inspection stand is also not required for any of the 10 CFR 54.4(a)(3) regulated events. The applicant further stated that the new fuel inspection stand failure would not prevent the accomplishment of an SR intended function of an SR component and does not meet the requirements of 10 CFR 54.4(a)(2).

Based on its review, the staff found the applicant's response to RAI 2.3.3.27-1 acceptable. The applicant adequately clarifies that the components in question are either active or do not meet any of the requirements of 10 CFR 54.4(a). Therefore, the staff's concern described in RAI 2.3.3.27-1 is resolved.

2.3.3.27.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the fuel handling and storage system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the fuel handling and storage system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.28 Diesel Generator System

2.3.3.28.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.28, the applicant described the diesel generator (DG) system. The DG system is a plant-shared system that consists of four independent DG units, coupled as an alternate independent source of power to four 4160 V shared shutdown boards for Units 1 and 2. There are four additional DG units that provide an alternate independent source of power to four Unit 3 4160 V shutdown boards. The DG system provides an alternate source of power for the ECCS and the safe shutdown systems when the normal power supplies are unavailable. The DGs are normally in standby and can start automatically, when required.

(N)-Add

The DG system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the DG system could prevent the satisfactory accomplishment of an SR function. In addition, the DG system performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- starts standby AC power source for the 4kV system
- provides power to the 4kV system upon DG availability and loss of offsite power
- provides DG power to diesel fuel transfer pumps
- provides debris protection
- provides for heat transfer
- provides mechanical closure
- provides pressure boundary
- provides structural support

justified the exclusion of the governor from an AMR. The applicant also clarifies that the piping, valves, and fittings attached to the drain pan had been colored inadvertently and that the drain pan does not perform a license renewal intended function per 10 CFR 54.4. Therefore, the staff's concern described in RAI 2.3.3.28-1 is resolved.

2.3.3.28.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the DG system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the DG system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.29 Control Rod Drive System

2.3.3.29.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.29, the applicant described the control rod drive (CRD) system. The CRD system provides reactivity control by allowing positioning of the control rods at a controlled rate during normal operation; providing scram and diverse scram functions to ensure rapid shutdown, when required; limiting the rod drop rate to minimize the consequences of a rod drop accident; and limiting a rod ejection accident.

From the hydraulic control units, the portions of the system that are subject to an AMR extend to, and from, each control rod housing. From the hydraulic control units, the portions of the system that are subject to an AMR extend to, and then include, the scram discharge volume and associated components. From the hydraulic control units, portions of the system subject to an AMR extend to an interconnection with the RWCU system. The CRDs themselves are short-lived components and, hence, are not subject to an AMR; however, the CRD housing support is subject to an AMR and is included in the component supports commodity group, which is discussed in another section of this SER.

N-Add

The CRD system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the CRD system could prevent the satisfactory accomplishment of an SR function. In addition, the CRD system performs functions that support fire protection, EQ, ATWS, and SBO.

The intended functions within the scope of license renewal include the following:

- provides primary and secondary containment boundaries
- provides RCPB
- provides housing support to keep the rods in place
- limits the rod drop rate to less than 3.11 feet per second
- provides mechanical closure
- provides pressure boundary

identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the DG starting air system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the DG starting air system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.31 Radiation Monitoring System

2.3.3.31.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.31, the applicant described the radiation monitoring system. The radiation monitoring system consists of a number of radiation monitors and monitoring systems that are provided on process liquid and gas lines that may serve as discharge routes for radioactive materials.

N-Add

The radiation monitoring system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the radiation monitoring system could prevent the satisfactory accomplishment of an SR function. In addition, the radiation monitoring system performs functions that support EQ.

The intended functions within the scope of license renewal include the following:

- provides primary and secondary containment boundaries
- provides system pressure boundary integrity (with all mechanical joints and components associated with the offline liquid monitors) to RHRSW system cooling water for RHR system heat exchangers
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.3.31, the applicant identified the following radiation monitoring system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, flex hose, piping, pumps, strainers, traps, tubing, and valves.

2.3.3.31.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.31 and UFSAR Sections 5.2.3, 7.12, 7.13, 7.14, 7.15, and F.7.5 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the TIP system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the TIP system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.3.34 Cranes System

2.3.3.34.1 Summary of Technical Information in the Application

In LRA Section 2.3.3.34, the applicant described the cranes system. The cranes system includes numerous plant load-handling devices that are used for maintenance of selected plant components.

The portions of the cranes system containing components subject to an AMR include the structural portions of the cranes in structures with SR components.

The failure of SR SSCs in the cranes system could prevent the satisfactory accomplishment of an SR function.

The intended functions within the scope of license renewal include the following:

N-Add

- provides SR components that ensure the satisfactory performance of SR components
- provides structural support

In LRA Table 2.3.3.34, the applicant identified the following cranes system component types that are within the scope of license renewal and subject to an AMR: bolting and fasteners, monorails, rail, rail clips, and structural girders.

2.3.3.34.2 Staff Evaluation

The staff reviewed LRA Section 2.3.3.34 and UFSAR Section 12.2 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

In reviewing LRA Section 2.3.3.34, the staff identified an area in which additional information was necessary to complete the evaluation of the applicant's scoping and screening results. Therefore, by letter to the applicant dated August 31, 2004, the staff issued an RAI concerning the specific issue to determine whether the applicant had properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The following paragraphs describe the staff's RAI and the applicant's related response.

RAI 2.3.3.34-1. In reviewing the cranes system described in LRA Section 2.3.3.34, the staff found that no drawings had been provided for this system. There is insufficient information for the staff to determine which cranes are within the scope of license renewal in accordance with 10 CFR 54.4(a)(2). In addition, mobile A-frames mentioned in LRA Section 2.2.22 are not mentioned in LRA Section 2.3.3.34 or in the UFSAR. Therefore, the staff requested that the applicant identify which cranes are within the scope of license renewal and subject to an AMR, and whether the mobile A-frames are within the scope of license renewal. change to 2.1.2.2.

In its response, dated October 19, 2004, the applicant stated that the buildings that contain NSR cranes and monorails that could prevent SR SSCs from performing their intended function(s) are the reactor building, primary containment, DG building, intake pumping station, and the reinforced concrete chimney. All cranes and monorails in these buildings are within the scope of license renewal. The applicant further stated that the mobile A-frames are cranes on wheels. These A-frames are within the scope of license renewal since they could be used in an SR building, they are also subject to an AMR.

Based on its review, the staff found the applicant's response to RAI 2.3.3.34-1 acceptable. It identifies the buildings containing the cranes that are within the scope of license renewal to meet the 10 CFR 54.4(a)(2) requirements, and it confirms that the mobile A-frames are within the scope of license renewal and subject to an AMR. Therefore, the staff's concern described in RAI 2.3.3.34-1 is resolved.

2.3.3.34.3 Conclusion

The staff reviewed the LRA and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the cranes system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the cranes system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.4 Steam and Power Conversion Systems

In LRA Section 2.3.4, the applicant identified the structures and components of the steam and power conversion systems that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the steam and power conversion systems in the following sections of the LRA:

- 2.3.4.1 main steam system
- 2.3.4.2 condensate and demineralized water system
- 2.3.4.3 feedwater system
- 2.3.4.4 heater drains and vents system
- 2.3.4.5 turbine drains and miscellaneous piping system
- 2.3.4.6 condenser circulating water system
- 2.3.4.7 gland seal water system

The corresponding sections of this SER (2.3.4.1 – 2.3.4.7) present the staff's review findings with respect to the steam and power conversion systems for BFN.

2.3.4.1 Main Steam System

2.3.4.1.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.1, the applicant described the MS system. Each unit has its own MS system that consists of four MS lines that transfer steam from the reactor vessel to the various steam loads in the turbine building during normal plant operation. Two MSIVs are provided in each steam line to isolate the RCPB and the primary containment. A flow restrictor allows for the measurement of steam flow and also limits the steam flow rate in the event of a downstream steam line break. MSRVs are provided for overpressure protection and for depressurization following small-break LOCAs. Main steam components downstream of the MSIVs are credited in analyses for MSIV alternate leakage treatment.

Add — (N)

The MS system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the MS system could prevent the satisfactory accomplishment of an SR function. In addition, the MS system performs functions that support fire protection, EQ, and SBO.

The intended functions within the scope of license renewal include the following:

- provides for opening of safety relief valves (SRVs) during high reactor pressure to provide reactor pressure vessel relief
- provides MS line flow restrictors to passively limit the mass flow rate of the coolant being ejected following a steam-line break until MSIV closure occurs
- provides RCPB
- provides primary and secondary containment boundaries
- provides steam for the HPCI turbine
- establishes an MSIV leakage pathway to the condenser
- provides steam for the RCIC turbine
- restricts flow
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.4.1, the applicant identified the following MS system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, RCPB fittings, piping, RCPB piping, restricting orifice, RCPB restricting orifice, strainers, tubing, valves, and RCPB valves.

clarifies that the Unit 1 CLB for MSIV leakage does not incorporate an alternate leakage treatment pathway utilizing main steam piping and the main condenser since the activities (identified in LRA Appendix F.1) required to make the Unit 1 CLB for MSIV leakage the same as that for Units 2 and 3 is not subject to an AMR at this time. The applicant also clarifies that once the modification is implemented, Unit 1 license renewal drawings will be submitted with the same components on Unit 1 that require an AMR as those shown on the Unit 2 and Unit 3 license renewal drawings. The review of LRA Appendix F regarding Unit 1 restart will be addressed in SER Section 2.6.1.1. Therefore, the staff's concern described in RAI 2.3.4.1-2 is resolved.

In order to resolve the 10 CFR 54.4(a)(2) issues discussed in RAI 2.1-2A(1) and (2) of SER Section 2.1 related to NSR piping segments which support secondary containment, the applicant expanded the system boundaries for the main steam system. By letter dated May 31, 2005, the applicant submitted the results of its review of piping, supports, and other components outside secondary containment required to maintain the structural integrity of secondary containment that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2) for secondary containment qualification. In the enclosure to its letter dated May 31, 2005, the applicant stated that additional piping, fittings, and valves had been added to scope. However, the component types do not differ from those listed in LRA Table 2.3.4.1; therefore, no changes to the main steam system portion of the LRA are required.

The staff reviewed the NSR piping segments and found the expanded scope of components to be acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components

2.3.4.1.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawing, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the MS system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the MS system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.4.2 Condensate and Demineralized Water System

2.3.4.2.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.2, the applicant described the condensate and demineralized water system. The main system is the condensate system which provides treated water at required flow rates for the FW system during normal plant operation. The system is unique to each unit and the individual systems do not share components with one another. The turbine-generator condenser provides a heat sink for the closed-loop steam cycle and removes non-condensable gases. In addition, impurities are removed by a full-flow demineralizer system. The system also cools the steam jet air ejector intercondenser, the off-gas condenser, and the steam packing

Need to Add Discussion on Draft OI 2.3.4.4-1 and Draft OI 2.3.4.4-2 in this Section

exhauster condenser. The condenser is credited in analyses for MSIV alternate leakage treatment.

Subsystems of the condensate system are the condensate storage and transfer system, for radioactive high purity water, and the demineralized water system, for non-radioactive high purity water. ~~The tanks also provide a surge volume for flow testing of the HPCI CRD system.~~ The condensate water storage tanks and the demineralized water storage tank provide high purity water for miscellaneous makeup uses throughout the plant, which includes the reactor building.

N Add

The condensate and demineralized water system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the condensate and demineralized water system could prevent the satisfactory accomplishment of an SR function. In addition, the condensate and demineralized water system performs functions that support fire protection, and SBO.

The intended functions within the scope of license renewal include the following:

- provides a normally open water supply to the RHR system piping flow path, which continues to the HPCI system piping that is located up-stream of the HPCI system pump
- provides primary and secondary containment boundaries
- provides a water supply for both HPCI and RCIC systems during an SBO
- retains fission products by plateout on a surface
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.4.2, the applicant identified the following condensate and demineralized water system component types that are within the scope of license renewal and subject to an AMR: bolting, condenser, expansion joint, fittings, piping, pumps, restricting orifice, tanks, tubing, and valves.

2.3.4.2.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.2 and UFSAR Sections 10.13, 11.8, 11.9, F.6.10, and F.6.18 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

Delete and Add The tanks also provide a surge volume for flow testing of HPCI, RCIC, and CS Systems.

In order to resolve the 10 CFR 54.4(a)(2) issues discussed in RAI 2.1-2A(1) and (2) of SER Section 2.1 related to NSR piping segments that support secondary containment, the applicant expanded the system boundaries for the condensate and demineralized water system. By letter dated May 31, 2005, the applicant submitted the results of its review of piping, supports, and other components outside secondary containment required to maintain the structural integrity of secondary containment that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2) for secondary containment qualification. In the enclosure to the May 31, 2005 letter, the applicant stated that additional piping, fittings, valves, and the demineralized water tank have been added to scope. However, the component types do not differ from those listed in LRA Table 2.3.4.2; therefore, no changes to the condensate and demineralized water system portion of the LRA are required. The staff reviewed applicant's submittals and found the expanded scope of components to be acceptable, because the applicant adequately included NSR components with the configurations that meet the scoping criterion of 10 CFR 54.4(a)(2) for the cases where NSR piping or components are directly connected to SR piping or components.

2.3.4.2.3 Conclusion

The staff reviewed the LRA and RAI response to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the condensate and demineralized water system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the condensate and demineralized water system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.4.3 Feedwater System

2.3.4.3.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.3, the applicant described the FW system. The FW system provides demineralized water at an elevated temperature to the reactor vessel during normal plant operations. FW is fed to the reactor vessel through six feedwater inlet nozzles. Suction for the system is drawn from the condensate system and FW is delivered to the reactor vessel at a controlled rate in order to maintain a stable reactor vessel water level. The system provides a flow path to the reactor vessel for the HPCI, RCIC, and RWCU systems.

N - Add

The FW system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the FW system could prevent the satisfactory accomplishment of an SR function. In addition, the FW system performs functions that support fire protection, EQ, ATWS, and SBO.

The intended functions within the scope of license renewal include the following:

- provides RCPB
- provides primary and secondary containment boundaries

Need discussion added for RAI 2.1-2, A.3 in this section

2-47E801-2-LR as being within the scope of license renewal and subject to an AMR. However, the piping downstream of these check valves is not within the scope of license renewal. Likewise, the similar arrangement for Unit 3 is shown on license renewal drawing 3-47E801-2-R. Failure of the downstream piping would affect the intended function of the heater drains and vent system that is required to establish an MSIV leakage pathway to the condenser per LRA Section 2.3.4.4 and, therefore, should be within scope of license renewal as per 10 CFR 54.4(a)(2). Furthermore, the check valve orientation as shown on these drawings will not prevent flow to the downstream piping in the event of a failure. Therefore, the staff requested that the applicant provide a basis for excluding the piping downstream of check valves 742 and 744 from being subject to an AMR.

In its response, dated October 19, 2004, the applicant stated that a calculation issued in support of the MSIV leakage path has these valves listed as a boundary. The applicant committed to review the qualification of the MSIV leakage path and identify the piping, supports and other components past the isolation valve required to maintain the structural integrity of the MSIV leakage pathway.

In a supplemental response dated May 31, 2005, the applicant stated that check valves 742 and 744 on boundary drawings 2-47E801-2-LR and 3-47E801-2-LR are spring-loaded and close on low pressure upon MSIV closure to prevent backflow through these valves.

Based on its review, the staff found the applicant's response to RAI 2.3.4.4-2 acceptable, because it adequately addressed the intended function of check valves 742 and 744. Failure of the downstream piping during low-pressure events will not impede the intended function of these check valves. Therefore, the staff's concern described in RAI 2.3.4.4-2 is resolved.

MSIV leakage path

In order to resolve the 10 CFR 54.4(a)(2) issues discussed in RAI 2.1-2A(1) and (2) of SER Section 2.1 related to NSR piping segments that support ~~secondary containment,~~ the applicant expanded the system boundaries for the heaters drains and vents system. By letter dated May 31, 2005, the applicant submitted the results of its review of piping, supports, and other components ~~outside secondary containment~~ required to maintain the structural integrity of ~~secondary containment~~ the MSIV leakage path that are within the scope of license renewal in accordance with the requirements of 10 CFR 54.4(a)(2)~~, for secondary containment qualification~~. In the enclosure to the May 31, 2005 letter, the applicant stated that additional piping had been added to scope. However, the component type does not differ from those listed in LRA Table 2.3.4.4; therefore, no changes to the heater drains and vents system portion of the LRA are required. The staff reviewed the NSR piping segments and found the expanded scope of components to be acceptable because the applicant adequately included NSR components with the configuration that meets the scoping criterion of 10 CFR 54.4(a)(2) for the case where NSR piping or components are directly connected to SR piping segments.

2.3.4.4.3 Conclusion

During its review of the information provided in the LRA, license renewal drawings, RAI response, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the components of the heater drains and vents system. Therefore, the staff concludes the heater drains and vent system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and that the applicant has adequately identified the heater drains and vents system components that

~~delete~~ Heater Drains and Vents System does not perform a Secondary Containment function. They ~~do~~ are however required for the MSIV leakage path

outermost isolation valve up to the turbine stop valve, the bypass/drain piping to the main condenser, and the main condenser is being evaluated and modified as required to ensure that the structural integrity is retained during, and following, an SSE. However, it is not clear where the alternate leakage treatment flow path to the condenser exists on license renewal drawings 2-47E807-2-LR and 3-47E807-2-LR. The staff requested that the applicant identify which portions of these drawings show components that are part of the leakage pathway to the condenser.

In its response, dated October 25, 2004, the applicant stated that the alternate leakage path ensures that process lines containing steam have a boundary that contains an isolation point to form a preferred leakage path to the condenser. The boundary was established at the first closed valve or fails-closed valve on the red lines continuing from LR drawings 2-47E801-2-LR, 2-47E807-1-LR, 3-47E801-2-LR, and 3-47E807-1-LR.

Based on its review, the staff found the applicant's response to RAI F 2.3.4.5-1 acceptable. It adequately identifies the portions of the license renewal drawings showing components that are part of the leakage pathway to the condenser. Therefore, the staff's concern described in RAI F 2.3.4.5-1 is resolved.

2.3.4.5.3 Conclusion

The staff reviewed the LRA, the accompanying scoping boundary drawings, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the turbine drains and miscellaneous piping system components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the turbine drains and miscellaneous piping system components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.3.4.6 Condenser Circulating Water System

2.3.4.6.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.6, the applicant described the condenser circulating water system. Each unit contains a condenser circulating water system that does not share any components with the other units' systems. Each unit has three circulation water pumps that take water from a common intake channel in Wheeler Reservoir. After passing through the condensers, the heated water is cooled by the cooling towers or discharged directly back to Wheeler Reservoir. Provisions, including a loop in the discharge conduit with a vacuum breaker, are made for the prevention of the backflow of heated water into the intake channel, which serves as the ultimate heat sink, if normal offsite power is lost. One condenser circulating water pump has more than enough capacity to dissipate the shutdown heat for all three of the units.

(N)-Add

The condenser circulating water system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the condenser circulating water system could prevent the satisfactory accomplishment of an SR function.

2.3.4.7 Gland Seal Water System

2.3.4.7.1 Summary of Technical Information in the Application

In LRA Section 2.3.4.7, the applicant described the gland seal water system. The gland seal water system provides pressurized sealing water to the condenser and condensate system components that are under a vacuum in order to prevent air leakage into the condenser. Each individual system has an elevated gland seal tank that is located in the reactor building and also contains the associated piping that maintains a static pressure on seals (e.g., packing) of components of the main condenser and condensate systems that are under a vacuum during normal plant operations.

N-Add

The gland seal water system contains SR components that are relied upon to remain functional during, and following, DBEs. The failure of SR SSCs in the gland seal water system could prevent the satisfactory accomplishment of an SR function.

The intended functions within the scope of license renewal include the following:

- provides a secondary containment boundary
- provides mechanical closure
- provides pressure boundary
- provides structural support

In LRA Table 2.3.4.7, the applicant identified the following gland seal water system component types that are within the scope of license renewal and subject to an AMR: bolting, fittings, piping, tanks, tubing, and valves.

2.3.4.7.2 Staff Evaluation

The staff reviewed LRA Section 2.3.4.7 using the evaluation methodology described in SER Section 2.3. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.3.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.3.4.7.3 Conclusion

The staff reviewed the LRA to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the gland seal water system components that are within the scope of

2.4 Scoping and Screening Results: Structures

This section documents the staff's review of the applicant's scoping and screening results for structures. Specifically, this section discusses the following structures:

- Boiling water reactor containment structures
- Class 1 Group 2 structures
- Class 1 Group 3 structures
- Class 1 Group 6 structures
- Class 1 Group 8 structures
- Class 1 Group 9 structures
- Non-Class 1 structures
- Structures and component supports commodities

Structural

In accordance with the requirements of 10 CFR 54.21(a)(1), the applicant must identify and list passive, long-lived ~~mechanical~~ SSCs that are within the scope of license renewal and subject to an AMR. To verify that the applicant properly implemented its methodology, the staff focused its review on the implementation results. This approach allowed the staff to confirm that there were no omissions of structures and components that meet the scoping criteria and are subject to an AMR.

Staff Evaluation Methodology. The staff's evaluation of the information provided in the LRA was performed in the same manner for all structures. The objective of the review was to determine if the components and supporting structures for a specific structure that appeared to meet the scoping criteria specified in the Rule had been identified by the applicant as within the scope of license renewal, in accordance with 10 CFR 54.4. Similarly, the staff evaluated the applicant's screening results to verify that all long-lived, passive components were subject to an AMR in accordance with 10 CFR 54.21(a)(1).

Scoping. To perform its evaluation, the staff reviewed the applicable LRA section and associated component drawings, focusing its review on components that had not been identified as within the scope of license renewal. The staff reviewed relevant licensing basis documents, including the UFSAR, for each structure and component to determine if the applicant had omitted components with intended functions delineated under 10 CFR 54.4(a) from the scope of license renewal. The staff also reviewed the licensing basis documents to determine if all intended functions delineated under 10 CFR 54.4(a) were specified in the LRA. If omissions were identified, the staff requested additional information to resolve the discrepancies.

Screening. Once the staff completed its review of the scoping results, the staff evaluated the applicant's screening results. For those structures and components with intended functions, the staff sought to determine if the functions are performed with moving parts or a change in configuration or properties, or if they are subject to replacement based on a qualified life or specified time period, as described in 10 CFR 54.21(a)(1). For those that did not meet either of these criteria, the staff sought to confirm that these structures and components were subject to an AMR as required by 10 CFR 54.21(a)(1). If discrepancies were identified, the staff requested additional information to resolve them.

2.4.1 Boiling Water Reactor Containment Structures

2.4.1.1 Primary Containment Structure

2.4.1.1.1 Summary of Technical Information in the Application I

In LRA Section 2.4.1.1, the applicant described the primary containment structure. The primary containment structure is a General Electric ~~Corporation~~ Mark ~~1~~ containment design. Each unit has a primary containment structure that is completely enclosed within the unit's reactor building. The main function of the primary containment structure is to limit the release of fission products to the environment in the event of a design-basis LOCA.

The primary containment consists of a drywell, pressure suppression chamber, and a connecting vent system. The drywell is a steel pressure vessel enclosed in reinforced concrete. The drywell contains the reactor vessel, reactor recirculation system, and portions of other systems that form the reactor coolant pressure boundary. Also included within the drywell are structural steel framing, electrical and mechanical equipment and system supports, a concrete shield wall around the reactor vessel, a removable steel head, a personnel airlock with two mechanically interlocked doors, two equipment hatches, and miscellaneous electrical and mechanical penetrations. The pressure suppression chamber is a steel, toroidal-shaped pressure vessel. The pressure suppression chamber is commonly referred to as the "torus." The torus includes internal steel framing, vent header, supports, access hatches, and penetrations. The torus is mounted on support structures that transmit loads to the concrete foundation of the reactor building. The drywell is connected to the pressure suppression chamber with eight equally spaced vent lines. These vent lines are connected to a header, which is contained within the air space of the pressure suppression chamber. The pressure suppression chamber contains a large pool of water that condenses the steam from a failure of the reactor coolant pressure boundary piping in the drywell. The pool also condenses steam from the main steam relief valve discharge, high pressure coolant injection, and reactor core isolation cooling turbine discharge.

The primary containment structure contains SR SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. The failure of NSR SSCs in the primary containment structure could prevent the satisfactory accomplishment of an SR function. In addition, the primary containment structure performs functions that support fire protection, EQ, ATWS, and SBO.

The intended functions within the scope of license renewal include the following:

and — delete commas

- provides structural support, shelter, ~~and~~ protection for components relied upon to demonstrate compliance with fire protection, EQ, and ATWS regulated events
- provides structural support, and shelter, ~~and~~ protection for SR components, NSR components, and components relied upon to demonstrate compliance with the SBO regulated event
- limits and controls the release of fission products to the secondary containment during DBAs

- provides sufficient air and water volumes to absorb the energy released to the containment during DBAs
- provides a source of water to the emergency core cooling systems
- provides protection to personnel and components from radiation
- provides a pressure boundary
- shelters and protects a component from the effects of weather or localized environmental conditions
- reduces a radiation dose
- provides structural and functional support for structures and components that are within the scope of license renewal

In LRA Table 2.4.1.1, the applicant identified the following primary containment structure component types that are within the scope of license renewal and subject to an AMR:

- caulking and sealants
- compressible joints and seals
- controlled leakage doors
- hatches/plugs
- high density shielding concrete
- electrical and I&C penetrations
- mechanical penetrations
- reinforced concrete beams, columns, walls, and slabs
- steel containment elements
- structural bellows
- structural steel beams, columns, plates, and trusses

2.4.1.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.1.1 and UFSAR Sections 5.2, 12.2.2 and C.5 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.1.1 identified areas in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAIs as discussed below.

RAI 2.4-2. In reviewing LRA Section 2.4.1.1, the staff noted that this section of the LRA should address not only the primary containment (drywell, pressure suppression chamber, and the vent

system connecting the two structures), but also all the structures inside the primary containment, all attachments to the containment, and the containment supports. The staff also noted that LRA Table 2.4.1.1 identified the primary containment component types requiring AMR and the associated component intended function(s). Since LRA Table 2.4.1.1 combined many components under a single component type, in RAI 2.4-2, dated December 20, 2004, the staff requested that the applicant identify which component type had been intended to cover the specific components listed in (a) through (k) below, or to identify the location in the LRA where these specific components had been addressed. If these specific components had not been considered to be within the scope of license renewal, the applicant was requested to provide the technical bases for their exclusion.

(A) reactor vessel to biological shield stabilizers

(B) biological shield to containment stabilizer

(C) reactor pressure vessel (RPV) male stabilizer attached to outside of drywell shell

(D) RPV female stabilizer and anchor rods (also referred to as gib) embedded in reactor building concrete wall

(E) biological shield wall and anchor bolts

(F) reactor vessel support skirt and anchor bolts

(G) reactor vessel support ring girder and anchor bolts

(H) reactor vessel support pedestal

(I) drywell internal steel shear ring

(J) drywell steel support skirt and anchor bolts

(K) drywell head closure bolts and double gasket, tongue-and-groove seal arrangement

In its response, by letter dated January 24, 2005, the applicant provided the following response:

> The Primary Containment Structure scoping and screening results are presented in LRA Section 2.4.1.1, the Reactor Vessel scoping and screening results are presented in LRA Section 2.3.1.1, and the Structures and Component Supports Commodity Group scoping and screening results are presented in LRA Section 2.4.8.1. The following list of components roll-up to the listed component groups:
>
> (a) Reactor Vessel to Biological Shield Stabilizers:
>
> - Table 2.4.8.1, ASME Equivalent Supports and Components
> - Table 3.5.2.26, ASME Equivalent Supports and Components
> - Table 2.3.1.1, Stabilizer Bracket
> - Table 3.1.2.1, Stabilizer Bracket
> - LRA Section 3.1.2.2.16.1 BWRVIP-74-A Table 4-1 Items

Indent

The applicant noted that this biological shield wall is internal to the drywell.

> (b) Biological Shield to Containment Stabilizer:

were identified as in-scope of 10 CFR 54. These structural components were generally evaluated as generic structural commodities, not as individual components.

LRA Section 2.4.1.1 addresses the primary containment structure and includes all component types, as noted in LRA Table 2.4.1.1. The component type "Reinforced Concrete Beams, Columns, Walls, and Slabs" includes the concrete of the reactor vessel support pedestal and other structural concrete located within the primary containment structure. The component type "High Density Shielding Concrete" includes the concrete of the biological shield wall. The component type "Structural Steel Beams, Columns, Plates, Trusses" includes the plates that form the cylindrical shell of the biological shield wall and other structural steel components such as the steel platforms located within the primary containment structure. The component type "Steel Containment Elements" includes the stabilizers between the biological shield wall and containment shell, RPV male stabilizer bracket and RPV female stabilizer and anchor bolts, drywell, drywell steel support skirt and anchor bolts, drywell head and closure bolts, torus and torus ring girder, embedded steel, and other components that comprise the primary containment boundary of the primary containment structure. The component type "Compressible Joints and Seals" includes the gasket material used in the drywell head seal, drywell and torus access hatch seals, and personnel access doors and penetration seals located in the primary containment structure. Components identified as supports that are located within the primary containment structure were addressed in Section 2.4.8.1, Structures and Component Supports Commodity Group. The component type "ASME Equivalent Supports and Components" includes the anchor bolts of the RPV support skirt, RPV ring girder and anchor bolts and other supports for American Society for Mechanical Engineers (ASME) Code Class 1 and Class 2 piping within the primary containment structure.

Based on this detailed description of the commodity groups that are included within the scope of license renewal, the staff found that all structural as well as non-structural (e.g., seals and gaskets) components within the primary containment structures have been included within the scope of license renewal. Therefore, the staff found the applicant's scoping of the components within the primary containment acceptable, and the staff's ~~concern~~ described in RAI 2.4-2 is resolved. need for additional information (typical comment)

RAI 2.4-3. In RAI 2.4-3, dated December 20, 2004, the staff explained its concern that leakage through the refueling seals located at the top of the drywell potentially exposes the carbon steel drywell shell inner and outer surfaces to loss of material due to corrosion. This is a particular concern for the embedded portion of the drywell shell. Corrosion detected on the outer shell surface in the sand pocket region in a number of Mark 1 steel containments has been attributed to leakage past the drywell-to-reactor building refueling seal, coupled with clogging of the sand pocket drains. Leakage into the drywell, past the reactor vessel-to-drywell refueling seal, creates the potential for corrosion of the inaccessible portion of the inner surface of the drywell shell, embedded in the concrete floor.

From the information contained in the LRA, the staff noted that it was not clear (1) whether the refueling seals had been included within the scope of license renewal, and (2) if included, how aging management of the seals was addressed. Therefore, in RAI 2.4-3, the staff requested the applicant to verify that the plants' refueling seals were included in a component type that required an AMR, or a detailed explanation for their exclusion. The staff also requested the applicant to provide a detailed description of the plant-specific operating experience for the refueling seals in all three units, including incidences of degradation, method of detection, root

cause, corrective actions, and current inspection procedures.

In its response, by letter dated January 24, 2005, the applicant stated that it had not included the refueling seals at the top of the drywell within the scope of license renewal, as providing a watertight barrier to permit flooding above the RPV flange in support of refueling operations is not an SR function. The applicant explained its logic as follows:

> The performance of the drywell-to-reactor building refueling seal is not considered a safety related function. The drywell to reactor building refueling seal and the reactor pressure vessel (RPV)-to-drywell refueling seal, in conjunction with the refueling bulkhead, provides a watertight barrier to permit flooding above the RPV flange while preventing water from entering the drywell. Providing a watertight barrier to permit flooding above the RPV flange in support of refueling operations is not a safety-related function.

The applicant provided further supporting explanation:

> A postulated failure of the drywell-to-reactor building refueling seal can result in water intrusion into the annulus space around the drywell. This leakage can occur only during refueling outages when the reactor cavity is flooded to allow movement of fuel between the reactor and the fuel pool. However, water intrusion does not cause failure of the drywell's intended function. Any water leakage resulting from a postulated failure of the drywell-to-reactor building refueling seal could not remain suspended in the annulus region for an indefinite period of time and would eventually be routed to the sand-pocket area drains or would evaporate due to the heat generated in the drywell during operation.

The staff disagreed with the applicant's logic and requested the applicant to include the aging of refueling seals in the scope of license renewal. Therefore, RAI 2.4-3 is unresolved and is now **OI 2.4-3.**

Supplement 1 of IN 86-99 indicates that if leakage from the flooded reactor cavity is not monitored and managed, there is a potential for corrosion of the cylindrical portion of the drywell shell. As this corrosion would commence in the non-inspectible areas of the drywell, it cannot be monitored by inspections as described in Subsection IWE of Section XI of the ASME Boiler and Pressure Vessel Code. Moreover, this degradation of drywell shell can occur even if there is very little water found in the sand-pocket area of the drywell. Thus, the reactor building-to-drywell refueling seal becomes an NSR item, that can affect the integrity of the drywell shell (which is a pressure boundary component) during the period of extended operation, and falls under the requirement of 10 CFR 54.4(a)(2). For two BWR plants, the staff accepted an alternative to managing the aging of the seal. The alternative is to periodically perform ultrasonic testing (UT) of the cylindrical portion of the drywell shell with an acceptable sampling program, as part of the containment ISI program. After reviewing the applicant's response to RAI 3.5-4, letter dated January 31, 2005, related to the operating experience of drywell shell corrosion at BFN, the staff came to the conclusion that the applicant should manage the aging (i.e., leakage) of refueling seals; therefore, the applicant was requested to include the refueling seals within the scope of license renewal.

last paragraph of 2.4.1.1.2 states staff will not require these seals to be inscope. See page 2-153

In ~~its draft~~ letter response ~~to an e-mail from the staff of~~ dated 31 May ~~26~~, 2005, the applicant emphasized that

• Staff acceptance of RAI 3.5-4 is contained in Section 3.5, pages 3-302 thru 3-305. Managing of drywell liner acceptable under IWE.

BFN does not include the refueling seals at the top of the drywell in the scope of license renewal and provided the following technical basis for that conclusion:

> The drywell-to-reactor building refueling seal and the RPV-to-drywell refueling seal, in conjunction with the refueling bulkhead, provide a watertight barrier to permit flooding above the RPV flange while preventing water from entering the drywell. Providing a watertight barrier to permit flooding above the RPV flange in support of refueling operations is not a safety-related function. Section 54.4(a) of 10 CFR sets forth the criteria that determine whether plant systems, structures, and components are within the scope of license renewal. The refueling seals do not satisfy any of the requirements set forth in 10 CFR 54.4(a)(1). The refueling seals are not safety related and they are not relied upon to remain functional during design basis events to ensure 10 CFR 54.4(a)(1)(i) the integrity of the reactor coolant pressure boundary, 10 CFR 54.4(a)(1)(ii) the capability to shutdown the reactor and maintain it in a safe shutdown condition, or 10 CFR 54.4(a)(1)(iii) the capability to prevent or mitigate potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 50.67(b)(2), or 100.11. Thus, the refueling seals are not brought into scope of license renewal by 10 CFR 54.4(a)(1).

Additionally, the applicant ~~argued~~ stated that the performance of the drywell-to-reactor building refueling seal and the RPV-to-drywell refueling seal, in conjunction with the refueling bulkhead is not considered a II over I issue. A postulated failure of the drywell-to-reactor building refueling seal can result in water intrusion into the annulus space around the drywell. This leakage can occur only during refueling outages when the reactor cavity is flooded to allow movement of fuel between the reactor and the fuel pool. However, water intrusion does not cause failure of the drywell's intended function. Any water leakage resulting from a postulated failure of the drywell-to-reactor building refueling seal could not remain suspended in the annulus region for an indefinite period of time and would eventually be routed to the sandpocket area drains or would evaporate due to the heat generated in the drywell during operation. The refueling seals are not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the NRC regulations for fire protection, EQ, pressurized thermal shock (N/A for BWRs), ATWS, or SBO. The applicant discussed, in detail, the differences between the condition of BFN and that at Dresden 3, emphasizing that the Browns Ferry refueling seals are not within the scope of license renewal and do not require an AMR. The applicant, also pointed out that Edwin I. Hatch Units 1 & 2 (NUREG-1803), Peach Bottom Units 2 & 3 (NUREG-1769), Dresden Units 2 & 3, and Quad Cities Units 1 & 2 (NUREG-1796) did not identify refueling seals to be within the scope of license renewal. Thereafter, the applicant provided a detailed description of the steel shell inspections in the sand-pocket areas (these are discussed in the staff's evaluation of RAI 3.5-4), and concluded: "Based on Browns Ferry scoping results, Browns Ferry operating experience, and prior industry precedents, Browns Ferry refueling seals are not within the scope of license renewal, nor are additional drywell inspections warranted at Browns Ferry."

In a ~~detailed responce~~ May 31, 2005 letter to the staff's follow-up item 3.5-4 related to the seal area near drywell flange, the applicant noted:

> This area is exposed to standing water and repeated wetting and drying during refueling operations. The area is not accessible for detailed visual examination from the outside surface. There are no documented UT thickness measurements of this area. No

Add remaining part of the response from letter

previous problems have been documented relative to degradation of this area. Standing water was observed in this area during the April 1998, Unit 3 mid-cycle outage, during a walkdown performed immediately following drywell head removal and prior to floodup. Since the true surface condition cannot be determined by visual examination or review of existing data, this area appears to warrant additional investigation to determine whether it should be included for augmented examination.

This was addressed in RAI 3.5-4 and accepted in Section 3.5

In its response, the applicant also provided a description of the limited number of UT measurements taken. The staff stated that 10 CFR 54.4(a)(2) applies to the uninspectable side of the drywell shell, as significant corrosion of the drywell shell would jeopardize capability of the primary containment to prevent or mitigate the consequences of accidents as per 10 CFR 54.4(a)(1)(iii). Based on the applicant's responses to RAI 2.4-3, and to the follow-up RAI 3.5-4, the staff would not insist on having the drywell-to-reactor building seal within the scope of license renewal. This item remains unresolved and the staff needs further assurance from the applicant that the potential degradation of the uninspectable side of the drywell is monitored and managed during the period of extended operation. This remains as **OI 2.4-3**.

See Staff response noted on page 2-151 which requires seals to be in-scope

2.4.1.1.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded, **pending satisfactory resolution of OI 2.4-3**, that there is reasonable assurance that the applicant has adequately identified the primary containment structure components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the primary containment structure components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.2 Class 1 Group 2 Structures

In LRA Section 2.4.2, the applicant identified the structures and components of the Class 1 Group 2 structures that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the Class 1 Group 2 structures in the following sections of the LRA:

- 2.4.2.1 reactor buildings
- 2.4.2.2 equipment access lock

The corresponding subsections of the SER, 2.4.2.1 – 2.4.2.2, present the staff's review findings with respect to the Class 1 Group 2 structures for BFN.

2.4.2.1 Reactor Buildings

2.4.2.1.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.1, the applicant described the reactor buildings. Each unit has its own reactor building that completely encloses the reactors, the primary containment structures, and the auxiliary and emergency systems of the nuclear steam supply system (NSSS). A major substructure of the reactor building is the reinforced concrete biological shield that surrounds the drywell portion of the primary containment. The reactor buildings house features such as the spent fuel pool, steam dryer/moisture separator storage pool, reactor cavity, reactor auxiliary equipment, refueling equipment, reactor servicing equipment, and the control bay. The control bay houses the main control room that is required for plant operation and the operation of other important auxiliary systems. The reactor building consists of monolithic, reinforced concrete floors and walls from the foundation ~~with~~ to the refueling floor. The refueling floor is common for all ~~three units and is enclosed~~ by the steel superstructure with metal siding and a built-up roof. Blowout or pressure relief panels are installed as part of the reactor building superstructure to relieve pressure during a DBA or DBE.

delete

The reactor buildings contain SR systems, SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. The failure of NSR SSCs in the reactor buildings could prevent the satisfactory accomplishment of an SR function. In addition, the reactor buildings perform functions that support fire protection, EQ, ATWS, and SBO.

The intended functions within the scope of license renewal include the following:

- provides controls for the potential release of fission products to the external environment
- provides a secondary containment function when the primary containment is required to be in service
- provides a primary containment function during reactor refueling and maintenance operations when the primary containment systems are open
- provides radiation shielding protection for personnel, equipment, and components
- provides structural support and shelter/~~and~~ protection for components relied upon to demonstrate compliance with the fire protection, EQ, and ATWS regulated events
- provides structural support and shelter/~~and~~ protection for SR components, NSR components, and components relied upon to demonstrate compliance with the SBO regulated event
- provides protection for the safe storage of new and spent fuel
- prevents criticality of new and spent fuel
- allows for expansion of a component
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant

- provides flood protection barrier for internal and external flooding events
- provides protection against the effects of a high-energy or low-energy (moderate) line break
- provides a barrier for protection against internally or externally generated missiles
- provides a pressure boundary
- shelters and protects a component from the effects of weather or localized environmental conditions
- reduces a radiation dose
- provides structural and functional support for structures and components within the scope of license renewal
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.2.1, the applicant identified the following reactor buildings component types that are within the scope of license renewal and subject to an AMR:

- bolting and fasteners
- caulking and sealants
- compressible joints and seals
- controlled leakage doors
- expansion joints
- fire barriers
- hatches and plugs
- masonry block
- metal roofing
- metal siding
- electrical and I&C penetrations
- mechanical penetrations
- reinforced concrete beams, columns, walls, and slabs
- roof membrane
- spent fuel pool liners
- spent fuel storage racks (includes new fuel storage racks)
- structural steel, beams, plates, and trusses

2.4.2.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.1 and UFSAR Sections 5.3 and 12.2.2 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

structural component
In conducting its review, the staff evaluated the ~~system~~ functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not

personnel is provided in one of the buildings.

Structural Elements within the Transformer Yard and other miscellaneous buildings

The Transformer Yard is in the scope of license renewal based on the criteria of 54.4(a)(3) for SBO. See LRA section 2.4.7.4 for Transformer Yard scoping and screening results. Note that the 161 kV Switchyard (LRA section 2.4.7.5) and the 500 kV Switchyard (LRA section 2.4.7.6) are also in the scope of license renewal based on the criteria of 54.4(a)(3) for SBO. There are no permanent buildings within the license renewal boundary diagram for Transformer Yard or 161 kV Switchyard or 500 kV Switchyard.

The staff reviewed the above response including the Attachments 1 and 2 of the applicant's letter dated January 24, 2005. The staff requested the applicant to commit that the applicant will include the contents and tables of Attachments 1 and 2 as a part of LRA Section 2.4 in a future LRA update. With formal documentation of the above-noted commitment, the staff found that the response is adequate and acceptable. Therefore, the staff's concern described in RAI 2.4-1 is resolved. Delete

RAI 2.4-4. LRA Table 2.4.2.1 presents a list of component types that are part of the reactor building, the auxiliary and emergency systems of the NSSS, the biological shield, the spent fuel pool, the steam dryer/moisture separator storage pool, the reactor cavity reactor auxiliary equipment, the steel superstructure with metal siding and the built-up roof. In RAI 2.4-4, dated December 20, 2004, the staff requested the applicant to provide a description of the "Neutron-Absorbing Sheets" used for the spent fuel storage racks and confirm that they are part of the spent fuel storage racks listed in LRA Table 2.4.2.1.

In its response, by letter dated January 24, 2005, the applicant stated:

> NUREG 1801, Section VII.A2.1-b, identifies "Spent Fuel Storage Racks – neutron absorbing sheets" as a component type. In BFN LRA Section 2.3.3.27 "Fuel Handling and Storage System (079)," it states that the spent fuel pool components are evaluated as structural components in Section 2.4.2.1 "Reactor Building Structure". BFN LRA Table 2.4.2.1 "Reactor Building Structure" identifies "Spent Fuel Storage Racks (includes new fuel storage racks)" as a component requiring aging management. The "Neutron Absorbing Sheet" is a component of the BFN spent fuel storage rack container tube wall and is comprised of Boral sandwiched within the stainless steel wall of each container tube.

The staff found the above response acceptable. Therefore, the staff's concern described in RAI 2.4-4 is resolved.

RAI 2.4-5. Referring to LRA Section 2.4.2.1, in RAI 2.4-5, dated December 20, 2004, the staff requested the applicant to clarify if the reactor buildings are designed to maintain an internal negative pressure under neutral wind conditions in order to serve as the secondary containment whose primary purpose is to minimize the ground level release of airborne radioactive materials and to provide for a controlled, elevated release of the building atmosphere under accident conditions. If this assumption was correct, the staff wanted to know if reactor building pipe penetrations were provided with some type of silicone rubber seals that allow pipe movement

and provide a seal between the pipe and the reactor buildings and maintain the negative internal pressure. The staff wanted the applicant to confirm that these penetration seals are included within the scope of licence renewal and are included in LRA Table 2.4.2.1.

In its response, by letter dated January 24, 2005, the applicant stated:

> With the exception of the Control Room, the Reactor Building is designed to maintain an internal negative pressure under neutral wind conditions in order to serve as the secondary containment whose primary purpose is to minimize the ground level release of airborne radioactive materials and to provide for a controlled, elevated release of the building atmosphere under accident conditions. The Control Room and portions of the Control Bay that are contained within the Reactor Building are maintained at a positive pressure to prevent the introduction of fission products during design basis events. Piping that is not anchored within a reinforced concrete wall is sealed with caulking or sealants. The reinforced concrete wall, and caulking and sealants are identified as component type "Reinforced Concrete Beams, Columns, Walls, and Slabs" and "Caulking & Sealants" respectively in Table 2.4.2.1 as requiring aging management review with a ~~press~~ pressure boundary (PB) intended function.

The staff found the above response adequate and acceptable. Therefore, the staff's concern described in RAI 2.4-5 is resolved.

RAI 2.4-12. Based on information provided in LRA Sections 2.4.2.1, 2.4.2.2, 2.4.3.1, 2.4.4.1, and 2.4.7.1, it was unclear which cranes and hoists were determined to be within the scope of license renewal and which subset of the in-scope items have been screened in as items requiring an AMR. In RAI 2.4-12, dated December 20, 2004, the staff requested the applicant to clarify the treatment of cranes and hoists in the scoping and screening, and in the AMR. The applicant was requested to submit the following information:

- A list of all cranes, hoists, rails, and associated components in the scope of license renewal.
- Additional information to identify the location within the LRA where cranes, hoists, rails, and associated components are addressed. If these specific components are not considered to be within the scope of license renewal, provide the technical bases for their exclusion.
- A list of all cranes, hoists, rails, and associated components requiring an AMR (i.e., passive, long-lived components).
- A list of all cranes, hoists, rails, and associated components requiring aging management and/or TLAA.

In its response, by letter dated January 24, 2005, the applicant stated that the cranes and hoists are addressed in LRA Section 2.3.3.34 and the AMR results are contained in Table 3.3.2.34. This same question was asked in RAI 2.3.3.34-1, dated August 31, 2004. In its response to RAI 2.3.3.34-1 dated October 19, 2004, the applicant stated:

> The following buildings that contain NSR cranes and monorails which could potentially prevent safety related SSCs from performing their intended function(s) are: Reactor

Building, Primary Containment, Diesel Generator Buildings, Intake Pumping Station, and Reinforced Concrete Chimney. All cranes and monorails in these buildings are in scope. The Mobile A-frames is a crane on wheels. The A-frame cranes are in scope since they could be used in a safety related building. This crane is subject to an AMR.

The staff found that the applicant adequately responded to RAI ~~3.5-12~~ 2.4-12 related to scoping and screening of cranes, hoists, rails, and associated components. Therefore, the staff's concern described in RAI ~~3.5-12~~ 2.4-12 is resolved.

2.4.2.1.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the reactor buildings components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the reactor buildings components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.2.2 Equipment Access Lock

2.4.2.2.1 Summary of Technical Information in the Application

In LRA Section 2.4.2.2, the applicant described the equipment access lock. The equipment access lock is a shared feature for all three reactor buildings. The equipment access lock is a reinforced concrete structure, supported on piles, located on the south end of the Unit 1 reactor building. The structure is sized to allow for the passage of a railcar or a tractor trailer within the structure. This allows for the transit of large equipment into, or out of, the reactor buildings, while maintaining the secondary containment. The equipment access lock is an airlock with large equipment doors that open to the outside environment on the south end, and allow access to the Unit 1 reactor building on the north end.

The equipment access lock contains SR SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. The failure of NSR SSCs in the equipment access lock could prevent the satisfactory accomplishment of an SR function.

This is not in the LRA. This appears to be a boiler plate statement repeated many times in Section 2.4. The paragraph as written is not totally applicable to each building structure.

The intended functions within the scope of license renewal include the following:

- provides controls for the potential release of fission products to the external environment
- provides a secondary containment envelope between the reactor building and the outside entrance
- provides structural support, shelter, and protection for SR and NSR components

- provides flood protection barrier for internal and external flooding events
- provides a barrier for protection against internally or externally generated missiles
- provides a pressure boundary
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support for structures and components within the scope of license renewal
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.2.2, the applicant identified the following equipment access lock component types that are within the scope of license renewal and subject to an AMR:

- caulking and sealants
- compressible joints and seals
- controlled leakage doors
- electrical and I&C penetrations
- mechanical penetrations
- piles
- reinforced concrete beams, columns, walls, and slabs
- structural steel beams, columns, plates, and trusses

2.4.2.2.2 Staff Evaluation

The staff reviewed LRA Section 2.4.2.2 and UFSAR Sections 5.3.3.5 and 12.2.9 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.4.2.2.3 Conclusion

The staff reviewed the LRA and related structural components to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the equipment access lock components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the equipment access lock components that are subject to an AMR, as required by

10 CFR 54.21(a)(1).

2.4.3 Class 1 Group 3 Structures

In LRA Section 2.4.3, the applicant identified the structures and components of the Class 1 Group 3 structures that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the Class 1 Group 3 structures in the following sections of the LRA:

- 2.4.3.1 diesel generator buildings
- 2.4.3.2 standby gas treatment building
- 2.4.3.3 off-gas treatment building
- 2.4.3.4 vacuum pipe building
- 2.4.3.5 residual heat removal service water tunnels
- 2.4.3.6 electrical cable tunnel from the intake pumping station to the powerhouse
- 2.4.3.7 underground concrete encased structures
- 2.4.3.8 earth berm

The corresponding subsections of the SER (2.4.3.1 – 2.4.3.8) present the staff's review findings with respect to the Class 1 Group 3 structures for BFN.

2.4.3.1 Diesel Generator Buildings

2.4.3.1.1 Summary of Technical Information in the Application

In LRA Section 2.4.3.1, the applicant described the diesel generator buildings. The diesel generator buildings provide structural support and shelter/ ~~and~~ protection for the diesel generators (DGs) and other components within the scope of license renewal that are essential for the safe shutdown of the plant when there is a sustained loss of off-site power. The Unit 1 and 2 diesel generator building houses four DGs that provide power to the four shared Unit 1 and 2 shutdown boards that are located in the reactor buildings. The Unit 3 DG building houses four DGs that provide power to the four separate unit shutdown boards that are located in the Unit 3 DG building.

See page 2-160 comment

The diesel generator buildings contain SR SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. The failure of NSR SSCs in the diesel generator buildings could prevent the satisfactory accomplishment of an SR function. In addition, the DG buildings perform functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

- provides structural support and shelter/ ~~and~~ protection for SR and NSR components, and components that are relied upon to demonstrate compliance with the fire protection and SBO regulated events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent

areas of the plant

- provides flood protection barrier for internal and external flooding events
- provides a barrier for protection against internally or externally generated missiles
- provides a pressure boundary
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support for structures and components within the scope of license renewal
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.3.1, the applicant identified the following diesel generator building component types that are within the scope of license renewal and subject to an AMR:

- caulking and sealants
- compressible joints and seals
- controlled leakage doors
- fire barriers
- hatches/plugs
- masonry block
- metal siding
- electrical and I&C penetrations
- mechanical penetrations
- reinforced concrete beams, columns, walls, and slabs
- structural steel beams, columns, plates, and trusses

2.4.3.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.3.1 and UFSAR Sections 8.5, 12.2.8 and 12.2.13 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.3.1 identified an area in which additional information was required to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-8. LRA Section 2.4.3.1 refers to Units 1 and 2 DG building and Unit 3 diesel generator building. The license renewal drawing 0-10E201-01-LR shows a diesel generator building at the

required by 10 CFR 54.21(a)(1).

2.4.3.2 Standby Gas Treatment Building

2.4.3.2.1 Summary of Technical Information in the Application

In LRA Section 2.4.3.2, the applicant described the SGT building. The SGT building houses shared components for all three units and provides a protected environment for the SGT system. The building consists of two double-barreled, reinforced concrete, box-frame structures with closed ends. The two structures are located side-by-side and adjacent to the southwest corner of the Unit 1 reactor building. The two structures also lie within the earth berm. One structure houses two SGT trains, and the other structure houses the remaining SGT train.

See comment page 2-160

The SGT building contains SR SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. The failure of NSR SSCs in the SGT building could prevent the satisfactory accomplishment of an SR function.

The intended functions within the scope of license renewal include the following:

- provides structural support and shelter ~~, and~~ protection for SR and NSR components
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support for structures and components within the scope of license renewal
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.3.2, the applicant identified the following SGT building component types that are within the scope of license renewal and subject to an AMR:

- electrical and I&C penetrations
- mechanical penetrations
- reinforced concrete beams, columns, walls, and slabs

2.4.3.2.2 Staff Evaluation

The staff reviewed LRA Section 2.4.3.2 and UFSAR Sections 5.3 and 12.2.10 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not

omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.4.3.2.3 Conclusion

The staff reviewed the LRA and related structural components to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the SGT building components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the SGT building components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.3.3 Off-Gas Treatment Building

2.4.3.3.1 Summary of Technical Information in the Application

Units 1, 2 & 3

In LRA Section 2.4.3.3, the applicant described the off-gas treatment building. The off-gas treatment building is an underground structure that houses the off-gas system charcoal adsorbers and the supporting equipment for BFN. The exterior walls and bottom slab are designed and constructed to maintain their structural integrity if a partial collapse of the reinforced concrete chimney were to occur during an external event (i.e., seismic, tornadic, etc.). The maintained structural integrity would not permit water leakage into, or out of, the building below an elevation of 566.25 feet.

The portions of the off-gas treatment building containing components subject to an AMR include the exterior walls and bottom slab.

See comment p. 2-160

The off-gas treatment building contains SR SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure.

The intended functions within the scope of license renewal include the following:

- prevents the release of radiation into the surrounding groundwater from the failure or collapse of the activated charcoal beds
- provides a pressure boundary

In LRA Table 2.4.3.3, the applicant identified the following off-gas treatment building component types that are within the scope of license renewal and subject to an AMR:

- caulking and sealants
- mechanical penetrations
- reinforced concrete beams, columns, walls, and slabs

2.4.3.3.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the off-gas treatment building components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the off-gas treatment building components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.3.4 Vacuum Pipe Building

2.4.3.4.1 Summary of Technical Information in the Application

In LRA Section 2.4.3.4, the applicant described the vacuum pipe building. The vacuum pipe building is a structure shared by all of the units. It is located underground and provides structural support and shelter, ~~and~~ protection for the condenser circulating water system vacuum breaker components. These components prevent backflow from the warm water channel into the intake channel. This ensures that the maximum temperature analysis assumptions, for accident cooling systems, are maintained during accidents and events.

See p. 2-160 Comment

The vacuum pipe building contains SR SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. The failure of NSR SSCs in the vacuum pipe building could prevent the satisfactory accomplishment of an SR function.

The intended functions within the scope of license renewal include the following:

- provides structural support and shelter, ~~and~~ protection for SR and NSR components
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support for structures and components within the scope of license renewal
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.3.4, the applicant identified the following vacuum pipe building component types that are within the scope of license renewal and subject to an AMR:

- hatches and plugs
- electrical and I&C penetrations
- mechanical penetrations
- reinforced concrete beams, columns, walls, and slabs

2.4.3.4.2 Staff Evaluation

The staff reviewed LRA Section 2.4.3.4 and UFSAR Section 12.2.7.8.3 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.3.4 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-9(b). LRA Section 2.4.3 lists several structures that are not shown in drawing 0-10E201-01-LR. In RAI 2.4-9(b), dated December 20, 2004, the staff requested the applicant to describe the specific location of the vacuum pipe building and confirm that there are no items such as structural steel embedments, carbon steel boltings, reinforced concrete foundation footings, grouted concrete, compressible joints and seals, waterproofing membrane and caulking materials that require an AMR.

In its response, by letter dated January 24, 2005, the applicant stated:

> The vacuum pipe building is an underground structure accessed through a manhole and contains the condenser circulating water system vacuum breaker components that prevent back flow from the warm water channel to the intake channel (Reference UFSAR 12.2.7.8.3). The vacuum pipe building is an underground structure located south-east of the plant administration building as depicted on TVA drawing 0-10E201-01 and LR drawing 0-10E201-01-LR. The following components are also located in the vacuum pipe building and are evaluated as structures and component supports commodities in LRA Section 2.4.8:
>
> - Conduit and Supports
> - Electrical Panels, Racks, Cabinets, and Other Enclosures
> - Non-ASME Equivalent Supports and Components

The applicant noted that for in-scope components evaluated in LRA Section 2.4.8, the components also include support structural members, welds, bolting, anchorage and building concrete at anchorage (including base plate and grout) to the structure. Waterproofing membranes are not relied upon to support the intended functions of the structural components of BFN structures.

The staff found that the applicant adequately responded to RAI 2.4-9(b) concerning the vacuum pipe building structure. Therefore, the staff's concern described in RAI 2.4-9(b) is resolved.

2.4.3.4.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the vacuum pipe building components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the vacuum pipe building components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.3.5 Residual Heat Removal Service Water Tunnels

2.4.3.5.1 Summary of Technical Information in the Application

In LRA Section 2.4.3.5, the applicant described the RHRSW tunnels. The RHRSW tunnels are underground, multi-plate, arch tunnels that protect SR piping systems. This includes the RHRSW and EECW supply and discharge piping that penetrates the south wall of the reactor building and is buried, below grade, near the south end of the tunnel.

The failure of an NSR SSC in the RHRSW tunnel could prevent the satisfactory accomplishment of an SR function. The RHRSW tunnel also performs functions that support fire protection.

The intended functions within the scope of license renewal include the following:

- provides structural support and shelter/~~and~~ protection for SR and NSR components, and components that are relied upon to demonstrate compliance with the fire protection regulated event
- prevents debris from entering a system or component
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.3.5, the applicant identified the following RHRSW tunnel component types that are within the scope of license renewal and subject to an AMR:

- compressible joints and seals
- electrical and I&C penetrations
- piles
- tunnels

2.4.3.5.2 Staff Evaluation

The staff reviewed LRA Section 2.4.3.5 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in

SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.3.5 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-9(c). The staff noted that LRA Section 2.4.3, Class 1 Group 3 Structures, lists several BFN structures that are not shown in drawing 0-10E201-01-LR. In RAI 2.4-9(c), dated December 20, 2004, the staff requested the applicant to describe the specific location of the RHRSW tunnels including their embedded boundaries in drawing 0-10E201-01-LR. The staff also requested the applicant to identify, as appropriate, items requiring an AMR that are part of the service water tunnels, such as structural steel embedments, carbon steel boltings, reinforced concrete beams, walls, slabs and foundation footings, grouted concrete, mechanical penetrations, waterproofing membrane and caulking materials.

In its response, by letter dated January 24, 2005, the applicant stated:

> The RHRSW tunnels are underground multi-plate arch tunnels that are buried in the earth berm. The north end of the tunnel terminates at the south wall of the reactor building. The south end of the tunnel is open to the outside on the south end of the earth berm. There are two tunnels for each reactor building. The following components are also located in the RHRSW tunnels and are evaluated as structures and component supports commodities in LRA Section 2.4.8:
>
> - ASME Equivalent Supports and Components
> - Conduit and Supports
> - Electrical Panels, Racks, Cabinets, and Other Enclosures
> - Non-ASME Equivalent Supports and Components

The applicant noted that for in-scope components evaluated in LRA Section 2.4.8, the components also include support structural members, welds, bolting, anchorage and building concrete at anchorage (including base plate and grout) to the structure. Waterproofing membranes are not relied upon to support the intended functions of the structural components of BFN structures.

The staff found that the applicant had adequately responded to RAI 2.4-9(c) related to the RHRSW structure. Therefore, the staff's concern described in RAI 2.4-9(c) is resolved.

2.4.3.5.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the RHRSW tunnels components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the RHRSW tunnels components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.3.6 Electrical Cable Tunnel from the Intake Pumping Station to the Powerhouse

2.4.3.6.1 Summary of Technical Information in the Application

In LRA Section 2.4.3.6, the applicant described the electrical cable tunnel from the intake pumping station to the powerhouse, which is a Class ~~1~~ I structure. The structure is an underground, concrete-encased tunnel that provides structural support, shelter, and ~~and~~ protection for power cables. These power cables are intended for components in the intake pumping station and include the RHRSW system, EECW system, and electric fire pumps. The tunnel runs east-west under the southern portion of the turbine buildings.

See P. 2-160 Comment

The electrical cable tunnel from the intake pumping station to the powerhouse structure contains SR systems, SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. The failure of NSR SSCs in the electrical cable tunnel from the intake pumping station to the powerhouse structure could prevent the satisfactory accomplishment of an SR function. In addition, the electrical cable tunnel from the intake pumping station to the powerhouse structure performs functions that support fire protection.

The intended functions within the scope of license renewal include the following:

- provides structural support, shelter, and protection for SR and NSR components, and components that are relied upon to demonstrate compliance with the fire protection regulated event
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support for structures and components within the scope of license renewal

In LRA Table 2.4.3.6, the applicant identified the following electrical cable tunnel component types that are within the scope of license renewal and subject to an AMR: fire barrier, tunnels,

Delete repeat of first paragraph

Delete, repeat of first paragraph

and electrical and I&C penetrations.

The electrical cable tunnel from the intake pumping station to the powerhouse is an underground concrete-encased tunnel that provides structural support and shelter/protection for the power cables for components (including the RHRSW System, EECW System, and the electric fire pumps) in the intake pumping station. The tunnel also runs east-west under the southern portion of the turbine buildings.

In LRA Table 2.4.3.6, the applicant identified the following electrical cable tunnel component types that are within the scope of license renewal and subject to an AMR:

- fire barrier
- electrical and I&C penetrations
- tunnels

2.4.3.6.2 Staff Evaluation

The staff reviewed LRA Section 2.4.3.6 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.3.6 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-9(d). The staff noted that LRA Section 2.4.3, Class 1 Group 3 Structures, lists several structures that are not shown in drawing 0-10E201-01-LR. In RAI 2.4-9(d), dated December 20, 2004, the staff requested the applicant to describe the specific locations of the electrical cable tunnel from the intake pumping station to the powerhouse, including the portion running east-west under the southern portion of the turbine buildings. The staff also requested the applicant to identify items such as structural steel embedments, carbon steel boltings, reinforced concrete beams, walls, slabs, and foundation footings, grouted concrete, mechanical penetrations, and waterproofing membrane and caulking materials that require an AMR.

In its response, by letter dated January 24, 2005, the applicant stated:

> The Electrical Cable Tunnel is an underground concrete encased tunnel that runs from the northwest corner of the Intake Pumping Station (IPS) to the southeast corner of the unit 3 Turbine Building and then east-west along the southern portion of the BFN Turbine Building. The following components are also located in the Electrical Cable Tunnel and are evaluated as Structures and Component Supports commodities in LRA

Section 2.4.8:

- Cable Trays and Supports
- Conduit and Supports
- Electrical Panels, Racks, Cabinets, and Other Enclosures

The applicant noted that for in-scope components evaluated in LRA Section 2.4.8, the components also include support structural members, welds, bolting, anchorage and building concrete at anchorage (including base plate and grout) to the structure. Waterproofing membranes are not relied upon to support the intended functions of the structural components of BFN structures.

The staff found that the applicant adequately responded to RAI 2.4-9(d) related to the electrical cable tunnel structure. Therefore, the staff's concern described in RAI 2.4-9(d) is resolved.

2.4.3.6.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the electrical cable tunnel components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the electrical cable tunnel components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.3.7 Underground Concrete Encased Structures

2.4.3.7.1 Summary of Technical Information in the Application

In LRA Section 2.4.3.7, the applicant described the underground concrete encased structures. The underground concrete encased structures include SR manholes, handholes and duct banks that span between the SR structures, manholes, and handholes. This group of structures also includes those manholes, handholes, and duct banks that are required to support the SBO regulated event.

See p. 2-160 comment

The underground concrete encased structures contains SR systems, SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. The failure of NSR SSCs in the underground concrete encased structures could prevent the satisfactory accomplishment of an SR function. In addition, the underground concrete encased structures performs functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

- provides structural support and shelter/~~and~~ protection for SR and NSR components, and components that are relied upon to demonstrate compliance with the fire protection and

SBO regulated events

- provides flood protection barrier for internal and external flooding events
- shelters and protects a component from the effects of weather or localized environmental conditions
- *provides structural and functional support for structures and components within the scope of license renewal*
- provides structural and functional support, for in-scope structures and components, by an NSR component

Repeat from above

In LRA Table 2.4.3.7, the applicant identified the following underground concrete encased structures component types that are within the scope of license renewal and subject to an AMR: caulking and sealants, duct banks, manholes, mechanical penetrations, and electrical and I&C penetrations.

The underground concrete encased structures include SR manholes, handholes and duct banks that span between SR structures, manholes and handholes. This group of structures also includes those manholes, handholes, and duct banks required for SBO.

In LRA Table 2.4.3.7, the applicant identified the following underground concrete encased structures component types that are within the scope of license renewal and subject to an AMR:

- caulking and sealants
- duct banks, manholes
- electrical and I&C penetrations
- penetrations, mechanical

2.4.3.7.2 Staff Evaluation

The staff reviewed LRA Section 2.4.3.7 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.3.7 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below

RAI 2.4-9(e). The staff noted that LRA Section 2.4.3, Class 1 Group 3 structures lists several BFN structures on page 2.4-12 that are not shown in drawing 0-10E201-01-LR. In RAI 2.4-9(e),

underground concrete encased structures. Therefore, the staff's concern described in RAI 2.4-9(e) is resolved.

2.4.3.7.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the underground concrete encased structures components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the underground concrete encased structures components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.3.8 Earth Berm

2.4.3.8.1 Summary of Technical Information in the Application

In LRA Section 2.4.3.8, the applicant described the earth berm. The earth berm is classified as an SR earthen embankment and is common to BFN. The earth berm extends along the west, south, and east walls of the reactor building from the Unit 1 DG building to the Unit 3 DG building. The equipment access lock, the RHRSW tunnels, the vent vaults, and the SGT building are all located within the earth berm.

See p. 2-160 Comment

The earth berm contains SR systems, SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure.

The intended function, within the scope of license renewal, is to provide structural and functional support for in-scope structures and features.

In LRA Table 2.4.3.8, the applicant identified the following earth berm component type~~s~~ that ~~are~~ is within the scope of license renewal and subject to an AMR:

- Intake canals, dikes, embankments
- ~~dikes~~
- ~~embankments~~

2.4.3.8.2 Staff Evaluation

The staff reviewed LRA Section 2.4.3.8 and UFSAR Sections 12.2.9 and 12.2.10 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions

delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.4.3.8.3 Conclusion

The staff reviewed the LRA and related structural components to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the earth berm components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the earth berm components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.4 Class 1 Group 6 Structures

Jan 24, 2005 response to RAI 2.4-1 added South Access Retaining Wall

In LRA Section 2.4.4, the applicant identified the structures and components of the Class 1 Group 6 structures that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the Class 1 Group 6 structures in the following sections of the LRA:

- 2.4.4.1 intake pumping station
- 2.4.4.2 gate structure No. 3
- 2.4.4.3 intake channel
- 2.4.4.4 north bank of cool water channel east of gate structure No. 2
- 2.4.4.5 south dike of cool water channel between gate structure Nos. 2 and 3

Add line

The corresponding subsections of the SER, 2.4.4.1 – 2.4.4.5, present the staff's review findings with respect to the Class 1 Group 6 structures.

2.4.4.1 Intake Pumping Station

2.4.4.1.1 Summary of Technical Information in the Application

In LRA Section 2.4.4.1, the applicant described the intake pumping station, which is a Class 1 structure constructed of reinforced concrete. The intake pumping station houses components for BFN Units 1,2&3 and provides structural support, shelter, and ~~and~~ protection for the condenser circulating water pumps, the electric fire pumps, and the pumps that supply the RHRSW and the EECW systems. The station also protects SR equipment and components, such as the pumps supplying the RHRSW and EECW systems, from design-basis events such as earthquakes, floods, and tornadoes.

See P. 2-160 Comment

The intake pumping station contains SR systems, SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. The failure of NSR SSCs in the intake pumping station could prevent the satisfactory

accomplishment of an SR function. In addition, the intake pumping station performs functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

- provides structural support, and shelter/~~and~~ protection for SR and NSR components, and components relied upon to demonstrate compliance with the fire protection and SBO regulated events
- provides a rated fire barrier to confine or retard a fire from spreading to or from adjacent areas of the plant
- provides a flood protection barrier for internal and external flooding events
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support for structures and components within the scope of license renewal
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.4.1, the applicant identified the following intake pumping station component types that are within the scope of license renewal and subject to an AMR:

- caulking and sealants
- compressible joints and seals
- controlled leakage doors
- fire barriers
- masonry block
- electrical and I&C penetrations
- mechanical penetrations
- reinforced concrete beams, columns, walls, and slabs
- structural steel beams, columns, plates, and trusses

2.4.4.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.4.1 and UFSAR Sections 12.2.7 and 12.2.16 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the structural component ~~system~~ functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.4.1 identified an area in which additional information was

2.4.4.2 Gate Structure No. 3

2.4.4.2.1 Summary of Technical Information in the Application

In LRA Section 2.4.4.2, the applicant described the gate structure No. 3, which is a Class 1 structure common to all three of the units. The structure acts as a skimmer wall for water drawn from Wheeler Reservoir and used in the plant for cooling. Gate structure No 3 is designed so that a sufficient flow of water from Wheeler Reservoir is provided to the intake channel, in order to supply the RHRSW and the EECW systems. Gate structure No. 3 is located at the southeast end of the plant, below the intake pumping station and the intake channel.

See P.2-166 comment

Gate structure No. 3 contains SR SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. In addition, gate structure No. 3 performs functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

- ensures a source of cooling water to SR components
- ensures a source of cooling water to components relied upon to demonstrate compliance with the fire protection and SBO events
- provides for flow distribution
- provides structural and functional support for structures and components within the scope of license renewal

In LRA Table 2.4.4.2, the applicant identified the following gate structure No. 3 component types that are within the scope of license renewal and subject to an AMR:

- piles
- reinforced concrete beams, columns, walls, and slabs
- structural steel beams, columns, plates, and trusses

2.4.4.2.2 Staff Evaluation

The staff reviewed LRA Section 2.4.4.2 and UFSAR Sections 11.6 and 12.2.7 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.4.4.2.3 Conclusion

The staff reviewed the LRA and related structural components to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the gate structure No. 3 components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the gate structure No. 3 components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.4.3 Intake Channel

2.4.4.3.1 Summary of Technical Information in the Application

In LRA Section 2.4.4.3, the applicant described the intake channel, which is common to all three units and provides an excavated channel that extends from the intake pumping station to the river channel that would exist if the Wheeler Dam failed. The channel provides a source of water to the condenser circulating water system and the other plant cooling systems during normal operation. The channel also provides a source of cooling water, post-transient and post-accident, for decay heat removal, containment cooling, spent fuel cooling, control bay cooling, essential equipment cooling, and fire protection. In addition, the channel can provide sufficient flow and heat sink capacity to maintain a safe shutdown following a failure of the downstream Wheeler Dam.

See P. 2-160 comment

The intake channel contains SR systems, SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. In addition, the intake channel performs functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

- ensures a source of cooling water to SR components
- ensures a source of cooling water to components relied upon to demonstrate compliance with the fire protection and SBO events
- provides a source of cooling water
- provides structural and functional support for structures and components within the scope of license renewal

In LRA Table 2.4.4.3, the applicant identified the following intake channel component type~~s~~ that is ~~are~~ within the scope of license renewal and subject to an AMR:

- intake canals, dikes, embankments
- ~~intake dikes~~
- ~~intake embankments~~

2.4.4.3.2 Staff Evaluation

The staff reviewed LRA Section 2.4.4.3 and UFSAR Sections 2.4.2 and 12.2.7 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.4.4.3.3 Conclusion

The staff reviewed the LRA and related structural components to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the intake channel components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the intake channel components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.4.4 North Bank of the Cool Water Channel East of Gate Structure No. 2

2.4.4.4.1 Summary of Technical Information in the Application

In LRA Section 2.4.4.4, the applicant described the north bank of the cool water channel east of gate structure No. 2. The structure is an earthen embankment that is located on the north side of the cool water channel and south of the reactor buildings. The structure is SR, with a sloped portion protected by vegetation and rock rip-rap. The bank is designed to protect the buried RHRSW system discharge piping that is located within the bank that discharges into the Wheeler Reservoir.

~~[illegible]~~ see P. 2-160 comment

The north bank of the cool water channel east of gate structure No. 2 contains SR systems, SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. In addition, the structure performs functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

- provides for structural support of the buried SR components, namely piping, and components relied upon to demonstrate compliance with the fire protection and SBO regulated events

- provides structural and functional support for structures and components within the scope of license renewal

In LRA Table 2.4.4.4, the applicant identified the following component type~~s~~ in the north bank of the cool water chanel east of gate structure No. 2 that ~~are~~ is within the scope of license renewal and subject to an AMR:

- intake canals, dikes, embankments
- ~~intake dikes~~
- ~~intake embankments~~

2.4.4.4.2 Staff Evaluation

The staff reviewed LRA Section 2.4.4.4 and UFSAR Section 12.2.7 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.4.4.4.3 Conclusion

The staff reviewed the LRA and related structural components to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the components of the cool water channel east of gate structure No. 2 that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the components of the cool water channel east of gate structure No. 2 that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

north bank of the

2.4.4.5 South Dike of Cool Water Channel between Gate Structure Nos. 2 and 3

2.4.4.5.1 Summary of Technical Information in the Application

In LRA Section 2.4.4.5, the applicant described the south dike of the cool water channel between gate structure Nos. 2 and 3. The structure is an earthen dike that is located on the south side of the cool water channel and forms a boundary with the Wheeler Reservoir on the north side. The dike is an SR earthen structure that has a sloped portion that is protected with vegetation and rock rip-rap. The dike is designed to protect the buried RHRSW system discharge piping that is located within the dike and that discharges into Wheeler Reservoir.

The portions of the south dike of cool water channel between gate structure Nos. 2 and 3 structure containing components subject to an AMR are those portions located above the RHRSW system discharge piping.

See p.2-160 comment

The south dike of the cool water channel between gate structure Nos. 2 and 3 contains SR SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. In addition, the dike performs functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

- provides structural support of buried SR components, namely piping, and components relied upon to demonstrate compliance with the fire protection and SBO regulated events
- provides structural and functional support for structures and components within the scope of license renewal

In LRA Table 2.4.4.5, the applicant identified the following component type~~s~~ in the south dike of cool water channel between gate structure Nos. 2 and 3 that ~~are~~ is within the scope of license renewal and subject to an AMR:

- intake canals, dikes, embankments
- ~~intake dikes~~
- ~~intake embankments~~

2.4.4.5.2 Staff Evaluation

The staff reviewed LRA Section 2.4.4.5 and UFSAR Section 12,2.7 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.4.5 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-6. LRA Section 2.4.4.5 states that the portion of the structure that contains components requiring an AMR is the portion above the RHRSW system discharge piping. In RAI 2.4-6, dated December 20, 2004, the staff requested applicant to clarify if the entire south dike of cooling

water channel between gate structure Nos. 2 and 3, or only the portion indicated, is designated to be within the scope requiring an AMR. The staff also stated that, if the applicant scoped only a portion of the south dike structure as requiring an AMR, the staff wanted the applicant to discuss the basis for narrowing the scope. The staff required the applicant to clearly define the boundary within the AMR scope.

In its response, by letter dated January 24, 2005, the applicant stated:

> Only the portion of the south dike of the cool water channel between gate structure Nos. 2 and 3 above the RHRSW discharge piping system plus approximately 30 feet on either side of the piping is within the scope of License Renewal and requires an AMR. The earthen dike provides a structural support intended function as noted in LRA Table 2.4.4.5 for the RHRSW discharge piping system and that portion of the dike has been qualified for a seismic event.

The staff found the above clarification provided by the applicant adequate and acceptable. The staff's concern described in RAI 2.4-6 is resolved.

2.4.4.5.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the components in the cool water channel between gate structure Nos. 2 and 3 that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the components in the cool water channel between gate structure Nos. 2 and 3 that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

South dike of the

south dike of the

2.4.5 Class 1 Group 8 Structures

In LRA Section 2.4.5, the applicant identified the structures and components of the Class 1 Group 8 structures that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the Class 1 Group 8 structures in the following sections of the LRA:

- 2.4.5.1 condensate water storage tanks' foundations and trenches
- 2.4.5.2 containment atmosphere dilution storage tanks' foundations

The corresponding subsections of the SER 2.4.5.1 – 2.4.5.2, present the staff's review findings with respect to the Class 1 Group 8 structures for BFN.

2.4.5.1 Condensate Water Storage Tanks' Foundations and Trenches

2.4.5.1.1 Summary of Technical Information in the Application

~~all~~ Units 1, 2, &3

In LRA Section 2.4.5.1, the applicant described the condensate water storage tanks' foundations and trenches. The condensate water storage tanks' foundations and trenches are a shared feature for BFN. Five 500,000-gallon tanks are supported on reinforced concrete ring foundations or on reinforced concrete slabs, on grade, with a sand bed. Only condensate water storage tank Nos. 1, 2, and 3 are within the scope of license renewal. Therefore, the foundations, trenches, and components for these tanks are also within the scope of license renewal.

capacity

The condensate water storage tanks' foundations and trenches are concrete structures that provide structural support to ensure that the condensate water storage tanks can provide: (1) a source of water makeup to the condenser hotwells and the control rod drive hydraulic system, during normal operations; (2) high purity water for miscellaneous makeup uses throughout the plant (e.g., demineralizer backwash and spent fuel pool makeup); and (3) a source of clean water to the HPCI and RCIC systems, when required for test; for reactor vessel makeup during accidents and regulated events; and to the core spray systems, when required for test.

The foundations and trenches for the three condensate water storage tanks that provide the normal water supply to the units, contain components requiring an AMR.

See P. 2-160 comment

The condensate water storage tanks' foundations and trenches contain SR systems, SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. In addition, the condensate water storage tanks' foundations and trenches perform functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

- provides physical support, and shelter ~~and~~ protection for components that are relied upon to demonstrate compliance with the fire protection and SBO regulated events
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support for structures and components within the scope of license renewal
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.5.1, the applicant identified the following condensate water storage tanks' foundations and trenches component types that are within the scope of license renewal and subject to an AMR:

- equipment supports and foundations
- electrical and I&C penetrations

- mechanical penetrations
- structural steel beams, columns, plates, and trusses
- trenches

2.4.5.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.5.1 and UFSAR Section 11.9 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

structural component

In conducting its review, the staff evaluated the ~~system~~ functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.5.1 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-10(b). In RAI 2.4-10(b), dated December 20, 2004, the applicant was asked to provide additional information regarding the condensate water storage tank's foundation and trenches. The staff also requested the applicant to confirm that the equipment supports and foundations as well as the trenches listed in LRA Table 2.4.5.1 consist of reinforced concrete components and to identify items such as structural steel embedments, carbon steel boltings, grouted concrete, and waterproofing membrane materials that require an AMR.

In its response, by letter dated January 24, 2005, the applicant stated:

> Regarding the Condensate Water Storage Tank's Foundation and Trenches, "Equipment Supports and Foundations" as well as "Trenches" components listed in Table 2.4.5.1 consist of reinforced concrete and this is confirmed in Table 3.5.2.17 of the LRA. Note that the Condensate Storage Tanks are supported on a reinforced concrete ring foundation and the earthen fill material (rock and sand) inside the ring is identified as Item 1 of Table 3.5.2.17. The following components are also located on the Condensate Water Storage Tanks Foundations and Trenches and are evaluated as Structures and Component Supports commodities in LRA Section 2.4.8:
>
> - Conduit and Supports
> - Electrical Panels, Racks, Cabinets, and Other Enclosures
> - Instrument Racks, Frames, Panels, & Enclosures
> - Non-ASME Equivalent Supports and Components

The applicant noted that for in-scope components evaluated in LRA Section 2.4.8, the components also include support structural members, welds, bolting, anchorage and building concrete at anchorage (including base plate and grout) to the structure. Waterproofing membranes are not relied upon to support the intended functions of the structural components

of BFN structures.

The staff found that the applicant had adequately responded to RAI 2.4-10(b) related to the condensate water storage tanks' foundations and trenches structures. Therefore, the staffs concern described in RAI 2.4-10(b) is resolved.

2.4.5.1.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the condensate water storage tanks' foundations and trenches components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the condensate water storage tanks' foundations and trenches components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

delete

2.4.5.2 Containment Atmosphere Dilution ~~System~~ Storage Tanks' Foundations

2.4.5.2.1 Summary of Technical Information in the Application

delete

In LRA Section 2.4.5.2, the applicant described the CAD ~~system~~ storage tanks' foundations. The tanks' foundations are reinforced concrete slabs on grade, or foundations, that provide structural support for the tanks. These tanks are used by the CAD system to control the concentration of combustible gases in the primary containment after an accident, and to provide a backup pneumatic supply to selected components when the control air system is unavailable.

See p. 2-160 comment

The CAD ~~system~~ storage tanks' foundations contain SR SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. In addition, the CAD system storage tanks' foundations perform functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

- provides structural support for SR components and components relied upon to demonstrate compliance with the fire protection and SBO regulated events
- provides structural and functional support for structures and components within the scope of license renewal

In LRA Table 2.4.5.2, the applicant identified the following CAD system storage tanks' foundations component types that are within the scope of license renewal and subject to an AMR: equipment supports and foundations.

•

2.4.5.2.2 Staff Evaluation

The staff reviewed LRA Section 2.4.5.2 and UFSAR Section 5.2.6 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.5.2 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-7. LRA Section 2.4.5.2, the applicant discussed the screening results of the CAD storage tank's foundations. In RAI 2.4-7, dated December 20, 2004, for items included in LRA Table 2.4.5.2, the staff requested the applicant to identify other items that require an AMR, such as structural steel embedments, carbon steel boltings, reinforced concrete slabs and foundation footings, and grouted concrete.

In its response, by letter dated January 24, 2005, the applicant stated:

> The reinforced concrete foundation slab for the Containment Atmosphere Dilution (CAD) Storage Tank's Foundation is included as part of the "Equipment Supports and Foundation" component type in Table 2.4.5.2. CAD Storage Tank's Foundation is a reinforced concrete foundation slab on grade that provides structural support for the tank of the CAD system.
>
> The following components are also located on the CAD storage tank foundation and are evaluated as part of the structures and component supports commodity group in LRA Section 2.4.8:
>
> - Electrical Panels, Racks, Cabinets, and Other Enclosures
> - Conduits and Supports
> - Non-ASME Equivalent Supports and Components
> - Instrument Racks, Frames, Panels, & Enclosures

The applicant noted that for in-scope components evaluated in LRA Section 2.4.8, the components also include support structural members, welds, bolting, anchorage and building concrete at anchorage (including base plate and grout) to the structure.

The staff found that the response adequately clarified delete ~~the ambiguity in~~ LRA Section 2.4.5.2. Therefore, the staff's concern described in RAI 2.4-7 is resolved.

2.4.5.2.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the CAD storage tanks' foundations components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the CAD storage tanks' foundations components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.6 Class 1 Group 9 Structures

2.4.6.1 Reinforced Concrete Chimney

2.4.6.1.1 Summary of Technical Information in the Application

In LRA Section 2.4.6.1, the applicant described the reinforced concrete chimney structure, which is a Class 1 structure that serves all three units. The chimney is 600 feet in elevation and provides an elevated release point for radioactive gases. These radioactive gases are released from the gaseous radwaste processing systems during normal plant operations. They are also released from the SGT system during secondary containment isolation and during primary containment venting. The hardened wetwell vent systems also release gaseous radwaste, following design-basis accidents. The system is designed so that Class 1 structures (with the exception of the off-gas treatment building) will not be damaged during DBEs.

See p. 2-160 comment

The reinforced concrete chimney contains SR SSCs that are relied upon to remain functional during, and following, DBEs to ensure the integrity of the reactor coolant pressure boundary, shut down the reactor and maintain it in a safe shutdown condition, and prevent or mitigate the consequences of accidents that could result in potential offsite exposure. The failure of NSR SSCs in the reinforced concrete chimney could prevent the satisfactory accomplishment of an SR function.

The intended functions within the scope of license renewal include the following:

- provides structural support and shelter/protection ...
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support for structures and components within the scope of license renewal
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.6.1, the applicant identified the following reinforced concrete chimney component types that are within the scope of license renewal and subject to an AMR:

- hatches and plugs
- metal roofing

- electrical and I&C penetrations
- mechanical penetrations
- reinforced concrete beams, columns, walls, and slabs
- roofing membrane
- structural steel beams, columns, plates, and trusses

2.4.6.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.6.1 and UFSAR Section 12.2.4 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

2.4.6.1.3 Conclusion

The staff reviewed the LRA and related structural components to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the reinforced concrete chimney components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the reinforced concrete chimney components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.7 Non-Class 1 Structures

In LRA Section 2.4.7, the applicant identified the structures and components of the non-Class 1 structures that are subject to an AMR for license renewal.

The applicant described the supporting structures and components of the non-Class 1 structures in the following sections of the LRA:

- 2.4.7.1 Turbine Buildings
- 2.4.7.2 Diesel High Pressure Fire Pump House
- 2.4.7.3 Vent Vault
- 2.4.7.4 Transformer Yard
- 2.4.7.5 161 kV Switchyard
- 2.4.7.6 500 kV Switchyard

general comment, sometime section titles are capitalized, other times not.

The corresponding subsections of the SER, 2.4.7.1 – 2.4.7.6, present the staff's review findings with respect to the non-Class 1 structures for BFN.

2.4.7.1 Turbine Buildings

2.4.7.1.1 Summary of Technical Information in the Application

In LRA Section 2.4.7.1, the applicant described the turbine buildings. The turbine buildings are a common Class ~~2~~ II structure that consist of a reinforced concrete structure with a steel superstructure. The buildings are compartmentalized; the primary consideration for the design of the walls within the buildings is for radiation shielding. The turbine buildings provide structural support, shelter, ~~and~~ and protection for components required for safe shutdown following the SBO and fire protection regulated events. The buildings also provide support, shelter, ~~and~~ and protection for the outboard main steam isolation valves ~~'~~ leakage pathway to condenser.

delete

The failure of NSR SSCs in the turbine buildings could prevent the satisfactory accomplishment of an SR function. The turbine buildings also perform functions that support fire protection and SBO.

The intended functions within the scope of license renewal include the following:

delete

- provide~~s~~ structural support, shelter, and protection for the outboard main steam isolation valves' leakage pathway to condenser
- not adversely impact other Class ~~1~~ I structures as a result of a DBE
- provides structural support, shelter, ~~and~~ and protection for components relied upon to demonstrate compliance with the SBO and fire protection regulated events
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.7.1, the applicant identified the following turbine buildings component types that are within the scope of license renewal and subject to an AMR:

- hatches/plugs
- metal roofing
- masonry block (within scope for Unit 2 only)
- electrical and I&C penetrations
- mechanical penetrations
- piles
- reinforced concrete beams, columns, walls, and slabs
- roof membrane
- structural steel beams, columns, plates and trusses

2.4.7.1.2 Staff Evaluation

The staff reviewed LRA Section 2.4.7.1 and UFSAR Section 12.2.3 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

structural component

In conducting its review, the staff evaluated the ~~system~~ functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.7.1 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-11(a). In RAI 2.4 -11(a), the applicant was asked to provide additional information regarding the turbine buildings. The staff also requested the applicant to explain the basis for stating that masonry block utilized for Units 1 and 3 is not in scope for the period of extended operation. The staff further requested the applicant to identify items that require an AMR, such as structural steel embedments, carbon steel boltings, grouted concrete, metal sidings, and waterproofing membrane materials.

In a letter dated January 24, 2005, the applicant responded as follows:

> The masonry wall in the unit 2 Turbine Building provides a structural NSR support intended function for cable tray supports for cables required to support the off-site AC recovery for SBO requirements. The SBO cables are routed through the unit 2 Turbine Building in a cable gallery with walls constructed of masonry block, to the north end of the unit 2 Turbine Building, and then to a concrete tunnel buried in the yard north of the Turbine Building. The concrete tunnel provides access to the 161 kV and 500kV Switchyards. Only the unit 2 Turbine Building masonry walls are in scope due to the unique cable gallery to tunnel routing of the cables required to support the off-site AC recovery for SBO requirements for all units. This unique cable gallery does not exist in the unit 1 or 3 Turbine Buildings. The following components are also located in the BFN Turbine Buildings and are evaluated as Structures and Component Supports commodities in LRA section 2.4.8:

start new paragraph

> - ASME Equivalent Supports and Components
> - Cable Trays and Supports
> - Conduit and Supports
> - Electrical Panels, Racks, Cabinets, and Other Enclosures
> - Equipment Supports and Foundations
> - Instrument Racks, Frames, Panels, & Enclosures
> - Non-ASME Equivalent Supports and Components
> - Stairs, Platforms, Grating Supports

The applicant noted that for in-scope components evaluated in LRA Section 2.4.8, the components also include support structural members, welds, bolting, anchorage and building concrete at anchorage (including base plate and grout) to the structure. Waterproofing membranes are not relied upon to support the intended functions of the structural components of BFN structures.

The staff found that the applicant had adequately responded to RAI 2.4 -11(a) related to the turbine buildings structures. Therefore, the concern described in RAI 2.4-11(a) is resolved.

2.4.7.1.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the turbine buildings components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the turbine buildings components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.7.2 Diesel High Pressure Fire Pump House

2.4.7.2.1 Summary of Technical Information in the Application

In LRA Section 2.4.7.2, the applicant described the diesel high pressure fire pump house. The diesel high pressure fire pump house is a shared structure for BFN units 1, 2, & 3. The pump house provides structural support and shelter/ ~~and~~ protection for the diesel high pressure fire pump.

The entire diesel high pressure fire pump house contains components that are subject to an AMR. The diesel high pressure fire pump house performs functions that support fire protection.

The intended functions within the scope of license renewal include the following:

- provides structural support and shelter/ ~~and~~ protection for components relied upon to demonstrate compliance with the fire protection regulated event
- prevents debris from entering a system or component
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.7.2, the applicant identified the following diesel high pressure fire pump house component types that are within the scope of license renewal and subject to an AMR:

- metal roofing
- metal siding
- electrical and I&C penetrations
- mechanical penetrations
- piles
- reinforced concrete beams, columns, walls, and slabs
- roof membrane
- structural steel beams, columns, plates, and trusses

2.4.7.2.2 Staff Evaluation

The staff reviewed LRA Section 2.4.7.2 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the system functions described in the LRA in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.7.2 identified area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

<u>RAI 2.4-11(b)</u>. In RAI 2.4 -11(b), dated December 20, 2004, the staff requested the applicant to identify items that require an AMR, such as structural steel embedments, carbon steel boltings, grouted concrete, and waterproofing membrane materials.

In its response, by letter dated January 24, 2005, the applicant stated:

> The following components are also located in the diesel high pressure fire pump house and are evaluated as structures and component supports commodities in LRA section 2.4.8:
>
> - Conduit and Supports
> - Electrical Panels, Racks, Cabinets, and Other Enclosures
> - Equipment Supports and Foundations
> - Non-ASME Equivalent Supports and Components

The applicant noted that for in-scope components evaluated in LRA Section 2.4.8, the components also include support structural members, welds, bolting, anchorage and building concrete at anchorage (including base plate and grout) to the structure. Waterproofing membranes are not relied upon to support the intended functions of the structural components of BFN structures.

The staff found that the applicant had adequately responded to RAI 2.4 -11(b) related to the diesel high pressure fire pressure fire pump house structure. Therefore, the staff's ~~concern described~~ additional information requested in RAI 2.4-11(b) is resolved.

2.4.7.2.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a

review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the diesel high pressure fire pump house components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the diesel high pressure fire pump house components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.7.3 Vent Vaults

2.4.7.3.1 Summary of Technical Information in the Application

In LRA Section 2.4.7.3, the applicant described the vent vaults. A vent vault is provided for each unit. Each vent vault is a concrete structure with an open top. The base foundation for each vent vault is founded on compacted backfill that is located within the earth berm and adjacent to the respective reactor building. The vent vaults contain components required for the reactor building ventilation system supply, including the secondary containment isolation dampers.

The portions of the vent vaults containing components subject to an AMR include the east and west walls and the floor slab. The failure of NSR systems, SSCs in the vent vaults could prevent the satisfactory accomplishment of an SR function.

The intended function within the scope of license renewal is to provide structural and functional support for in-scope structures and components by an NSR component.

In LRA Table 2.4.7.3, the applicant identified the following vent vaults component types that are within the scope of license renewal and subject to an AMR:

- ~~piles~~
- ~~structural steel beams~~
- ~~structural columns~~
- ~~structural plates~~
- ~~structural trusses~~

- Reinforced Concrete Beam, Columns, Walls & Slabs

2.4.7.3.2 Staff Evaluation

The staff reviewed LRA Section 2.4.7.3 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the system functions described in the LRA in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.7.3 identified area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The

- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.7.4, the applicant identified the following transformer yard component types that are within the scope of license renewal and subject to an AMR: piles, structural steel beams, structural columns, structural plats, and structural trusses. es need bullets.

2.4.7.4.2 Staff Evaluation

The staff reviewed LRA Section 2.4.7.4 and UFSAR Sections 8.2, 8.4 and 8.10 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.7.4 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI, as discussed below.

RAI 2.4-11(d). In RAI 2.4 -11(d), dated December 20, 2004, the staff requested the applicant, with respect to the transformer yard, to identify, items such as structural steel embedments, carbon steel plates and boltings, reinforced concrete pads and footings, grouted concrete, and waterproofing membrane materials that require an AMR.

In its response, by letter, dated January 24, 2005, the applicant stated:

> The following components are also located in the BFN Transformer Yard, and are evaluated as Structures and Component Supports commodities in LRA section 2.4.8:
>
> - Equipment Supports and Foundations

The applicant noted that for in-scope components evaluated in LRA Section 2.4.8, the components also include support structural members, welds, bolting, anchorage and building concrete at anchorage (including base plate and grout) to the structure. Waterproofing membranes are not relied upon to support the intended functions of the structural components of BFN structures.

The staff found that the applicant had adequately responded to RAI 2.4-11(d) related to the transformer yard structure. Therefore, the staff's concern described in RAI 2.4-11(d) is resolved.

2.4.7.4.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the transformer yard components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the transformer yard components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.7.5 161 kV Switchyard

2.4.7.5.1 Summary of Technical Information in the Application

In LRA Section 2.4.7.5, the applicant described the 161 kV switchyard, which is a shared feature for all three units. The switchyard routes power from offsite transmission lines into BFN for on-site use. The 161 kV switchyard supports components required for power restoration following the SBO regulated event.

The 161 kV switchyard performs functions that support SBO.

The intended functions within the scope of license renewal include the following:

- provides structural support and shelter, ~~and~~ protection for components that are relied upon to demonstrate compliance with the SBO regulated event
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.7.5, the applicant identified the following 161 kV switchyard component types that are within the scope of license renewal and subject to an AMR: structural steel beams, structural columns, structural plates, structural trusses, ~~and tunnels~~. needs bullets

2.4.7.5.2 Staff Evaluation

The staff reviewed LRA Section 2.4.7.5 and UFSAR Sections 1.5,1.6, 8.1, 8.3, 8.4, and 8.10 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in

accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.7.5 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-11(d). In RAI 2.4 -11(d)(2), dated December 20, 2004, the staff requested the applicant to identify items that require an AMR, such as structural steel embedments, carbon steel plates and boltings, reinforced concrete pads and footings, grouted concrete, and waterproofing membrane materials.

In its response, dated January 24, 2005, the applicant stated:

> The following components are also located in the BFN 161 kV Switchyard and are evaluated as Structures and Component Supports commodities in LRA section 2.4.8:
>
> - Equipment Supports and Foundations
> - Cable Trays and Supports
> - Conduit and Supports
> - Electrical Panels, Racks, Cabinets, and Other Enclosures

The applicant noted that for in-scope components evaluated in LRA Section 2.4.8, the components also include support structural members, welds, bolting, anchorage and building concrete at anchorage (including base plate and grout) to the structure. Waterproofing membranes are not relied upon to support the intended functions of the structural components of BFN structures.

The staff found that the applicant had adequately responded to RAI 2.4-11(d) related to the 161 kV switchyard structure. Therefore, the staff's ~~concern described~~ in RAI 2.4-11(d) is resolved.
additional information requested

2.4.7.5.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the 161 kV switchyard components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the 161 kV switchyard components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.7.6 500 kV switchyard

2.4.7.6.1 Summary of Technical Information in the Application

In LRA Section 2.4.7.6, the applicant described the 500 kV switchyard. The 500 kV switchyard is a shared feature for all three units. The switchyard routes power to offsite transmission lines and can be used to route power into BFN for on-site use. The 500 kV switchyard supports

components required for power restoration following an SBO regulated event.

The 500 kV switchyard performs functions that support SBO.

The intended functions within the scope of license renewal include the following:

- provides structural support, shelter, and protection for components that are relied upon to demonstrate compliance with the SBO regulated event
- shelters and protects a component from the effects of weather or localized environmental conditions
- provides structural and functional support, for in-scope structures and components, by an NSR component

In LRA Table 2.4.7.6, the applicant identified the following 500 kV switchyard component types that are within the scope of license renewal and subject to an AMR: structural steel beams, structural columns, structural plates, structural trusses, and tunnels.

add bullets

2.4.7.6.2 Staff Evaluation

The staff reviewed LRA Section 2.4.7.6 and UFSAR Sections 1.5, 1.6, 8.1, 8.3, 8.4, and 8.10 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.7.4.6 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-11(d). In RAI 2.4-11(d)(3), dated December 20, 2004, the staff requested the applicant to identify items that require an AMR, such as structural steel embedments, carbon steel plates and boltings, reinforced concrete pads and footings, grouted concrete, and waterproofing membrane materials.

In its response, by letter, dated January 24, 2005, the applicant stated:

> The following components are also located in the BFN 500 kV Switchyard and are evaluated as Structures and Component Supports commodities in LRA section 2.4.8:
>
> - Equipment Supports and Foundations
> - Cable Trays and Supports
> - Conduit and Supports

- Electrical Panels, Racks, Cabinets, and Other Enclosures

The applicant noted that for in-scope components evaluated in LRA Section 2.4.8, the components also include support structural members, welds, bolting, anchorage and building concrete at anchorage (including base plate and grout) to the structure. Waterproofing membranes are not relied upon to support the intended functions of the structural components of BFN structures.

The staff found that the applicant adequately responded to RAI 2.4-11(d) related to the 500 kV switchyard structure. Therefore, the staff's concern described in RAI 2.4-11(d) is resolved.

2.4.7.6.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the 500 kV switchyard components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the 500 kV switchyard components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

The staff in an earlier RAI 2.1-2A(3) dated September 3, 2004, requested additional information related to seismic Class I piping boundaries for identifying additional piping segments and supports/equivalent anchors that need to be placed in the scope of license renewal to satisfy the 10 CFR 54.4(a)(2) criterion. The staff had asked whether if this review brought into scope any new buildings not in the original application. ~~by~~ By response dated February 28, 2005, the applicant identified two additional buildings brought into the LRA scope as follows.

RAI 2.4-1 response dated ~~Dec. 20, 2004~~ Jan 24, 2005 added Section 2.4.7.7 Isolation Valve pits

2.4.7.7 Radwaste Building

2.4.7.7.1 Summary of Technical Information in the Application

In LRA Section 2.4.7.8, the applicant identified the structures and components of the radwaste building that are subject to an AMR for license renewal.

The radwaste building is a cellular box-type concrete structure extending approximately 20 feet below grade and 30 feet above grade and supported by steel H-piles driven to bedrock. This building houses services common to all three units. The radwaste building is comprised predominantly of thick walls and slabs, the dimensions of which are determined by shielding requirements. In a few instances, walls and slabs are determined by structural requirements. The roof system is a steel-framed structure with either bracket supports on concrete walls or steel columns supported by the concrete floor at an elevation of 580.0 feet.

In LRA Table 2.4.7.8, the applicant identified the following radwaste building component types that are within the scope of license renewal and subject to an AMR:

- masonry block

- metal roofing
- piles
- reinforced concrete beams, columns, walls, and slabs
- roof membrane
- structural steel beams, columns, plates, and trusses

2.4.7.7.2 Staff Evaluation

The staff reviewed LRA Section 2.4.7.8 and UFSAR Section 12.2.5 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

structural component

In conducting its review, the staff evaluated the ~~system~~ functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.7.8 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

RAI 2.4-15. LRA Section 2.4.7.8 states that "The portions of the radwaste building that contain components requiring an AMR include the entire structure and the component supports discussed above." In RAI 2.4-15, dated March 25, 2005, the staff requested the applicant to confirm that all structural elements of the radwaste building are scoped and screened in Table 2.4.7.8. If not, the applicant was requested to list those elements of the radwaste building that are excluded from the table and discuss the basis for their exclusion including BFN's assessment of the II/I implication of the excluded elements upon their adjacent in-scope elements pursuant to 10 CFR 54.4 (a)(2).

In its response, by letter dated April 14, 2005, the applicant stated that all structural elements of the radwaste building are scoped and screened in LRA Table 2.4.7.8.

The staff found the above response to RAI 2.4-15 acceptable. Therefore, the staff's concern described in RAI 2.4-15 is resolved.

2.4.7.7.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the radwaste building components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the radwaste building components that are subject to an AMR, as required

by 10 CFR 54.21(a)(1).

2.4.7.8 Service Building

2.4.7.8.1 Summary of Technical Information in the Application

In LRA Section 2.4.7.9, the applicant identified the structures and components of the service building that are subject to an AMR for license renewal.

This structure consists of exterior concrete walls and footings with an interior structural steel frame supported by concrete footings and floor slabs. The building provides office and shop areas for various on-site organizations.

In LRA Table 2.4.7.9, the applicant identified the following service building component types that are within the scope of license renewal and subject to an AMR:

- masonry block
- metal roofing
- reinforced concrete beams, columns, walls, and slabs
- roof membrane
- structural steel beams, columns, plates, and trusses

2.4.7.8.2 Staff Evaluation

The staff reviewed LRA Section 2.4.7.9 and UFSAR Section 12.2.6.2 using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the ~~system~~ structural component functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.7.9 identified an area in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

<u>RAI 2.4-16</u>. LRA Section 2.4.7.9 seems to indicate that only a portion of the service building is scoped and screened in LRA Table 2.4.7.9. Since the LRA provides only a general description of the boundaries between the in-scope and out-of-scope structural elements of the service building, in RAI 2.4-16, dated March 25, 2005, the staff requested the applicant to list those elements of the service building that are excluded from the table and discuss the basis for their exclusion including BFN's assessment of the II/I implication of the excluded elements upon their adjacent in-scope elements pursuant to 10 CFR 54.4 (a)(2).

In its response, by letter dated April 14, 2005, the applicant stated:

E3-9

During the scoping and screening of the Service Building for the newly identified mechanical systems discussed in the response to RAI 2.1-2A(3), only a limited area of the Service Building contained the new in-scope mechanical piping. Based on that fact, it was determined that the entire structure did not need to be within the scope of license renewal for the period of extended operation and this is described in the second paragraph of the response as noted on page ~~E3.9~~ and reads as following; "The Service Building contains CO_2 piping and a liquid (water) filled piping for the fire protection system that are required to support fire protection requirements (10 CFR 50.48) based on the criterion of 10 CFR 54.4 (a)(3). Only those rooms of the Service Building that contain the fire protection piping are required to provide structural support and shelter/protection to support the intended function of the fire protection piping."

In order to maintain the structural integrity of the structure within the scope of license renewal and provide reasonable assurance that these piping systems will be able to perform their intended functions, a portion of the structure was required to be in-scope such that the structure will perform its intended functions of "shelter/protection" and "structural support" of 10 CFR 54.4(a)(3) components. The in-scope boundary of the E3-10 Service Building is described in the second paragraph on page ~~E3.10 and reads~~ as following; "In order to maintain the structural integrity of the Service Building to provide its intended functions for the in-scope components, the building area considered in-scope for the structure will be extended two column line bays in the west direction to column line S4 and will include the entire structure in the north-south direction between the personnel corridors on elevations 565.0' and 580.0' and roof at elevation 595.0' south of column line Sa to the north exterior wall of the Service Building. It should be noted that column line S7 is the east exterior wall of the Service Building and is located adjacent and parallel to the west exterior wall of the Unit 1 turbine building. Additionally, from the foundation slab at El 565.0' (top of floor slab EL 565.0') to the general roof deck of the structure at EL 595.0' and to EL 605.0' above the mechanical equipment room located between column lines S5 and S6 (west to east) and the Pull-Out Space & Shop Storage between column lines S6 and S7 (west to east) and between column lines Sb to approximately 6 ft north of column line Sh (south to north) defines the in-scope height of the structure." The basis for concluding that the structural integrity boundary of the in-scope structure will be maintained is based on a review of the design of the Service Building.

The structural elements of the Service Building that are listed in Table 2.4.7.9 encompass all the structural elements of the Service Building and none were excluded.

The staff found the above response to RAI 2.4-16 acceptable. Therefore, the staff's concern described in RAI 2.4-16 is resolved.

2.4.7.8.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI response described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the

- bolting and fasteners
- cable trays and supports
- conduit and supports
- duct banks and manholes
- electrical panels, racks, cabinets, and other enclosures
- equipment supports and foundations
- HVAC duct supports
- instrument line supports
- instrument racks, frames, panels, and enclosures
- non-ASME equivalent supports and components
- pipe whip restraints and jet impingement shields
- reinforced concrete beams, columns, walls, and slabs
- stairs, platforms, and grating supports
- trenches
- tube rack
- tunnels

2.4.8.1.2 Staff Evaluation

UFSAR 5.2

The staff reviewed LRA Section 2.4.8.1 and UFSAR Appendix C using the evaluation methodology described in SER Section 2.4. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.4.

In conducting its review, the staff evaluated the system functions described in the LRA and UFSAR in accordance with the requirements of 10 CFR 54.4(a) to verify that the applicant had not omitted from the scope of license renewal any components with intended functions delineated under 10 CFR 54.4(a). The staff then reviewed those components that the applicant had identified as being within the scope of license renewal to verify that the applicant had not omitted any passive and long-lived components that should be subject to an AMR in accordance with the requirements of 10 CFR 54.21(a)(1).

The staff's review of LRA Section 2.4.8.1 identified areas in which additional information was necessary to complete the review of the applicant's scoping and screening results. The applicant responded to the staff's RAI as discussed below.

<u>RAI 2.4-13</u>. The information provided in LRA Section 2.4.8.1 did not make it clear to the staff that all component supports within the scope of license renewal are included in the component supports commodity group. In RAI 2.4-13, dated December 20, 2004, the staff requested clarification for several components listed in LRA Table 2.4.8.1. The staff ~~also~~ requested the applicant to provide the following:

delete

(A) Clarify whether the ASME Equivalent Supports and Components listed in Table 2.4.8.1 include the reactor vessel support skirt/support ring and reactor vessel upper lateral stabilizer support. If not, the applicant was requested (1) to explain where these supports were addressed in the LRA, and (2) to submit the technical basis for crediting an alternate AMP for these supports, if they are not managed by ASME Section XI, Subsection IWF.

(B) Clarify whether the ASME Equivalent Supports and Components of LRA Table 2.4.8.1 include the drywell lower ring support and the drywell upper lateral support. If the drywell supports are not managed by ASME Section XI, Subsection IWF, the applicant was requested to submit the AMR for them, including the technical basis for this exception.

(C) Since LRA Section 2.4.8.1 is not referenced anywhere in LRA Sections 2.3 or 2.4, the applicant was requested to verify that all supports associated with components listed in LRA Sections 2.3 and 2.4.1 through 2.4.7 are included in the component types listed in LRA Table 2.4.8.1. If not, the applicant was requested to identify the supports not included and submit the AMR, including credited AMPs.

(D) Confirm that the "Bolting and Fasteners" listed in LRA Table 2.4.8.1 includes anchors directly installed into concrete.

In its response, by letter dated January 24, 2005, the applicant stated:

> (A) The reactor vessel support skirt, reactor vessel support ring girder and reactor vessel upper lateral stabilizer are included with "ASME Equivalent Supports and Components" component group as listed in LRA Table 2.4.8.1. See response to RAI 2.4-2 (f), RAI 2.4-2 (g) and 2.4-2 (a) for AMR results for these components respectfully.
>
> (B) The ASME Equivalent Supports and Components of Table 2.4.8.1 do not include the drywell lower ring support and the drywell upper lateral support. Steel Containment Elements in Table 2.4.1.1 include the drywell lower ring support (drywell support skirt) and the drywell upper lateral supports. These components are classified as part of Class MC and BFN is not required to inspect MC supports in accordance with ASME Section XI. Refer to NRC RAIs B.2.1.33-1 and B.2.1.33-2 and TVA's responses to those RAIs for justification of why they are not inspected to ASME Section XI, Subsection IWF. The drywell lower ring support is inaccessible (embedded in the Reactor Building concrete).
>
> (C) LRA Section 2.4.8, "Structures and Component Supports Commodities," includes all supports associated with the components listed in LRA Sections 2.3 and 2.4.1 through 2.4.7, with one exception:
>
> (1) LRA Table 2.3.1.2 of Section 2.3.1.2 identifies various components internal to the reactor vessel that provide support for other internal components. Aging management of reactor vessel internals components is presented in LRA Table 3.1.2.2.
>
> (D) In LRA Table 2.4.8.1, the component group "Bolting and Fasteners" was included in error and should be deleted from the table. LRA Table 2.4.8.1 should read as shown below:
>
> LRA Table 2.4.8.1 - Structures and Component Supports

Component Type	Intended Functions
ASME Equivalent Supports and Components	SS
~~Bolting and Fasteners~~	~~PB, SS~~
Cable Trays and Supports	SS, and/or SS(NSR)

Deleted by RAI 2.4-13d response Jan 24, 2005

Conduit and Supports	SP, SS, and/or SS(NSR)
Duct Banks, Manholes	SS
Electrical Panels, Racks, Cabinets, and Other Enclosures	SP, SS, and/or SS(NSR)
Equipment Supports and Foundations	SS, and/or SS(NSR)
HVAC Duct Supports	SS, and/or SS(NSR)
Instrument Line Supports	SS, and/or SS(NSR)
Instrument Racks, Frames, Panels & Enclosures	SP, SS, and/or SS(NSR)
Non-ASME Equivalent Supports and Components	SS, and/or SS(NSR)
Pipe Whip Restraints and Jet Impingement Shields	PW and/or HE/ME
Reinforced Concrete Beams, Columns, Walls, and Slabs	SS, and/or SS(NSR)
Stairs, Platforms, Grating Supports	SS, and/or SS(NSR)
Trenches	SS(NSR)
Tube Track	SS, and/or SS(NSR)
Tunnels	SS, and/or SS(NSR)

Each of the component support commodity groups identified in LRA section 2.4.8.1 includes bolting and anchors, including anchors installed into concrete. This information has been provided in the discussion for the five Structures and Component Supports Commodity Groups in LRA Section 2.4.8, pages 2.4-55 and 2.4-56.

Item (b) of the above response refers to the applicant's response to RAIs B.2.1.33-1 and B.2.1.33-2, and the applicant's justification for why the drywell lower ring support and the drywell upper lateral support are not inspected to ASME Section XI, Subsection IWF. The staff evaluation covering the applicant's response to RAIs B.2.1.33-1 and B.2.1.33-2 is provided in SER Section ~~3.0.3.2.1.~~ 3,6,3.2.21

The staff found that the applicant response, above, fully addressed the concerns identified in RAI 2.4-13. Therefore, the staff's concern described in RAI 2.4-13 is resolved.

<u>RAI 2.4-14</u>. Based on information provided in LRA Section 2.4, the staff could not identify the insulation and insulation jacketing included within the scope of license renewal nor the specific subsets of insulation and insulation jacketing that are included in LRA Section 2.4 tables. It is also unclear whether insulation and jacketing on the reactor coolant system has been included. In RAI 2.4-14, dated December 20, 2004, the staff requested the following of the applicant:

- Identify the structures and structural components designated as within the license renewal scope that have insulation and/or insulation jacketing, and identify their location in the plant.
- List all insulation and insulation jacketing materials associated with the item (a) above that require an AMR and the results of the AMR for each.
- For insulation and insulation jacketing materials associated with the item (a) above that do not require aging management, submit the technical basis for this conclusion, including plant-specific operating experience.
- For insulation and insulation jacketing materials associated with the item (a) above that require aging management, identify the AMP(s) credited to manage aging.

In its response, by letter dated January 24, 2005, the applicant stated:

Insulation was addressed in follow-up to RAI 2-4-14 letter dated May 8, 2005

As stated in LRA Section 2.1.7.2 of the application, insulation at BFN does not have an intended function within the scope of 10 CFR 54.4(a)(3).

The staff found the above response to RAI 2.4-14 acceptable. Therefore, the staff's concern described above is resolved.

2.4.8.1.3 Conclusion

The staff reviewed the LRA, related structural components, and RAI responses described above to determine whether any SSCs that should be within the scope of license renewal had not been identified by the applicant. No omissions were identified. In addition, the staff performed a review to determine whether any components that should be subject to an AMR had not been identified by the applicant. No omissions were identified. On the basis of its review, the staff concluded that there is reasonable assurance that the applicant has adequately identified the structures and component supports commodity group components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the structures and component supports commodity group components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.4.9 Conclusion

On the basis of its review, the staff concluded that, **pending satisfactory resolution of OI 2.4-3,** the applicant has adequately identified the structures and components that are within the scope of license renewal, as required by 10 CFR 54.4(a), and the BFN structures and components that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

The electrical and I&C commodities contain SR components that are relied on to remain functional during, and following, design-basis events. The failure of NSR SSCs in the electrical and I&C commodities could prevent the satisfactory accomplishment of an SR function. In addition, the electrical and I&C commodities perform functions that support fire protection, EQ, ATWS, and SBO.

The intended functions within the scope of license renewal include the following:

- conducts electrical current
- provides electrical insulation
- provides structural support

In LRA Table 2.5.1, the applicant identified the following electrical and I&C commodities component types that are within the scope of license renewal and subject to an AMR:

- bus (with enclosures), transmission conductors, and high-voltage insulators (metallic portions)
- bus ~~(switchyard)~~ and high-voltage insulators (non-metallic portions)
- electrical cables and connections not subject to 10 CFR 50.49 EQ requirements (connections include connectors, splices, terminal blocks, fuse blocks/clips, and electrical/I&C penetration assembly pigtails and connectors)
- various electrical equipment subject to 10 CFR 50.49 EQ requirements

2.5.1.2 Staff Evaluation

The staff reviewed LRA Section 2.5.1 using the evaluation methodology described in SER Section 2.5. The scoping and screening of electrical and I&C components were performed using the spaces approach described in LRA Section 2.1. The staff conducted its review in accordance with the guidance described in SRP-LR Section 2.5, "Scoping and Screening Results - Electrical and Instrumentation and Controls Systems."

In the performance of the review, the staff reviewed the UFSAR for any functions delineated under 10 CFR 54.4(a) that had not been identified as intended functions in the LRA, to verify that the SSCs with such functions will be adequately managed to maintain the functions consistent with the CLB for the extended period of operation. The staff then reviewed the LRA to verify that passive or long-lived components were subject to an AMR in accordance with 10 CFR 54.21(a)(1).

In LRA Section 2.5.1, the applicant said that the electrical commodities meet 10 CFR 54.4(a)(1) because they contain components that must function post-accident to mitigate the effects of accidents. The electrical commodities meet 10 CFR 54.4(a)(2) because they contain NSR components that ensure the satisfactory performance of SR components. The electrical commodities meet the requirements of 10 CFR 54.4(a)(3) because they are scoped and screened under 10 CFR 54.4.(a)(3), complying with requirements of 10 CFR 50.48, 10 CFR 50.49, 10 CFR 50.62, and 10 CFR 50.63. Section 54(a)(3) of 10 CFR, in part, requires the applicant to consider all SSCs relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the regulations, fire protection (10 CFR 50.48), EQ

(10 CFR 50.49), ATWS (10 CFR 50.62), and SBO (10 CFR 50.63) to be within the scope of license renewal. During its review, the staff identified AMRs for components that are not explicitly addressed for Unit 1. These AMR items are those identified in the scoping and screening evaluation corresponding to LRA Appendices F3, F4, and F7, items shown with a bold-bordered enclosures in LRA Appendix F (see SER Sections 2.6.1.3, 2.6.1.4, and 2.6.1.7.). In a letter dated October 8, 2004, the staff requested additional information required for the AMR with respect to these Unit 1 items.

In response to a generic RAI dated January 31, 2005, the applicant provided additional information concerning integration of Unit 1 Restart and License Renewal Activities, which states

> The license renewal application was structured to reflect the configuration and current licensing basis of all three units. Scoping and screening as well as aging management reviews were done based on the current licensing bases and configuration of all three units. The differences between the units that are relevant to the application and will be resolved prior to Unit 1 restart, are listed in Appendix F. As each activity identified in Appendix F is completed, the corresponding highlighted (bolded bordered) text in the license renewal application will apply to Unit 1. The only change to the application will be to remove the bolded border. No changes are required to scoping and screening results, aging management review results, or TLAAs. In some cases, boundary drawings would change to reflect the bolded bordered text.

The staff reviewed the applicant's response for these items and accepts the methodology as proposed by the applicant for these bold-bordered items throughout the LRA. These modifications are currently not physically implemented for Unit 1 to match Units 2 and 3 CLB. However, the applicant stated in its response that the scoping and screening as well as the AMRs are done forward-looking for these bold-bordered enclosure items, based on the CLB for Units 2 and 3, which will also apply to Unit 1 when the modifications are completed. As each activity identified in Appendix F is completed, the corresponding bold-bordered text in the LRA will apply to Unit 1. The applicant commits to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, the next one in January 2006. ~~This commitment will be tracked through a temporary instruction (TI) xx as a part of the license application verification that this commitment be completed prior to unit 1 restart.~~ The applicant also committed to inform the staff as these activities are completed and to reflect the status in annual and other periodic updates. Based on the above, the staff finds this issue for the electrical and I&C resolved.

Delete (typical throughout SER)

In reviewing LRA Section 2.5, the staff identified areas in which additional information was necessary to complete the evaluation of the applicant's scoping and screening results. Therefore, the staff issued RAIs concerning the specific issues to determine whether the applicant had properly applied the scoping criteria of 10 CFR 54.4(a) and the screening criteria of 10 CFR 54.21(a)(1). The following discussion describes the staff's RAIs and the applicant's related responses.

RAI 2.5-1. In LRA Section , the applicant stated that scoping and screening of electrical and I&C components was performed using the spaces approach described in LRA Section 2.1. In an RAI dated November 1, 2004, the staff requested the applicant to specify if all plant spaces had been evaluated using this methodology. If any spaces had been excluded from this evaluation,

In its response dated January 18, 2005, the applicant stated that in performing SR functions, the off-gas system relies solely on mechanical components that do not require electrical power. Therefore, the applicant stated that medium-voltage cables routed to off-gas treatment building transformers A and B are screened out and not subject to an AMR.

The staff concurred with the applicant's response dated January 18, 2005, that the intended functions of the off-gas system addressed in LRA Section 2.3.3.19 are accomplished through mechanical means without electrical power. However, the fans of the standby gas treatment system listed in LRA Section 2.3.2.2 are within the scope of licence renewal and are powered by these transformers. Therefore, the cables listed in LRA Section 2.3.2.2 as being in the standby gas treatment system should be within the scope of license renewal.

Based on the above, the staff identified additional follow-up to RAI 2.5-2. In an informal request on January 31, 2005, the staff requested clarifications on why these medium-voltage cables to off-gas treatment building transformers A and B had been screened out.

In its response to clarifications to follow up to RAI 2.5-2, by letter dated March 2, 2005, the applicant stated that standby gas treatment blowers, which are within the scope for license renewal, are not powered from off-gas treatment building transformer A and B. The applicant stated that the standby gas treatment system and the off-gas treatment system are completely different systems, independent of each other and located in different buildings that do not share power distribution systems or equipment. Standby gas treatment blowers, which are in scope for license renewal, are not powered from off-gas treatment building transformers A and B. In its response dated March 2, 2005, the applicant also provided details of the electrical circuits that support its contention that these blowers are not powered from the above transformers. The staff was satisfied with the explanation and considers this issue resolved.

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On the basis of its review, the staff finds that the applicant has adequately addressed all of the staff's concerns raised in RAI 2.5-2. Therefore, the staff's concerns described in RAI 2.5-2 are resolved.

RAI 2.5-3. In RAI 2.5-3, dated November 1, 2004, the staff requested additional information regarding the three license renewal drawings identified in LRA Section 2.5.1 that depict the recovery path for SBO and identify the location of each commodity group component in the recovery path circuit.

In its response, dated December 1, 2004, the applicant properly identified the location of each commodity group component in the SBO recovery path. The response includes details from the 500 kV switchyard to the 4kV shutdown boards for all three units, transmission conductor runs between breakers, and isolated phase bus runs between the main transformers and the unit station service transformers. The applicant also stated that the SBO recovery path circuits include control circuit wiring. The low-voltage power and control circuit wiring associated with the power circuit breakers and disconnects are included within the scope of license renewal, and there are no 500kV, 161kV, or 4kV underground power circuits used in SBO recovery paths. These details are documented in its response.

The staff found these details were in order and on the basis of its review, the staff found the applicant's response acceptable. Therefore, the staff's concern described in RAI 2.5-3 is resolved.

- Prior to restart – The applicant will complete the resolution activities prior to Unit 1 restart.
- Permanent – The difference is acceptable as-is for license renewal. No changes related to license renewal are necessary or planned for the condition.
- If a submittal is required, the submittal milestone is stated.
- Systems/structures/components Impacted – The impacted systems, structures, or components are identified with links to the appropriate sections in LRA Chapter 2 sections and the appropriate LRA Chapter 3 sections.
- AMPs/TLAAs Impacted – The impacted AMPs and TLAAs are identified with links to the appropriate section in LRA Chapter 4 and Appendix B.

and January 31, 2005 letter

Staff Evaluation Methodology. In reviewing the technical information provided in LRA Appendix F, the staff review was limited to verifying (1) the sufficiency of information provided by the applicant for the 13 items that impacted the LRA review, (2) the applicability of the 13 items to Unit 1, (3) the systems these 13 items impacted, and (4) the plan to resolve differences between the CLB for Unit 1 and the CLB for Units 2 and 3, so that upon restart all units will have the same CLB. It should be noted that in the LRA the restart activities listed in LRA Appendix F are generally referred to as differences in the design basis or licensing basis. Based on the definition of CLB in 10 CFR 54.3, these activities are more precisely described as implementation activities of the design and licensing basis. Even though each of the 13 activities listed in LRA Appendix F is committed to and planned for completion prior to restart of Unit 1, any unimplemented commitments would remain valid, part of the CLB, carry over into the renewed license period, and be controlled by the NRC regulatory and oversight process.

The staff's evaluation of the information provided in the LRA was performed in the same manner for all mechanical, civil, electrical systems as it relates to the particular item in question. The objective of the review was to determine if the components and supporting structures for a specific mechanical system that appeared to meet the scoping criteria specified in the Rule had been identified by the applicant as being within the scope of license renewal. Similarly, the staff evaluated the applicant's screening results to verify that all long-lived, passive components are subject to an AMR in accordance with 10 CFR 54.21(a)(1).

Specific planned Unit 1 restart activities that impact license renewal are provided below.

2.6.1.1 Main Steam Isolation Valve Alternate Leakage Treatment

Description. In LRA Section F.1 the applicant described the proposed modification. The Unit 1 CLB for MSIV leakage does not incorporate an alternate leakage treatment pathway utilizing main steam system piping and main condenser. The Unit 1 main steam piping from the outermost isolation valve up to the turbine stop valve, the bypass/drain piping to the main condenser, and the main condenser is being evaluated and will be modified as required to ensure structural integrity is retained during and following an SSE. This will allow use of methodology that assumes plateout and holdup in the piping and condenser (in LOCA offsite and control room dose calculations) for radioactive leakage past the MSIVs. In the LRA, the applicant stated that this methodology was included in the Units 2 and 3 CLB and will be incorporated for Unit 1 prior to restart.

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In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by August 2006. ~~The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart~~. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification.

Conclusion. During its review of the information provided in the LRA, license renewal drawings, RAI responses, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the MSIV alternate leakage treatment modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated in SER Section 2.1.3.1.2, and the staff requested additional information. RAIs 2.1-2A(1) and (2) are related to seismic qualification of secondary containment penetration seals. The MSIV alternate treatment modification potential involves one such penetration. The staff in reviewing the structures and components impacted by these modifications concluded that the applicant has adequately identified Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21 (a)(1).

2.6.1.2 Containment Atmosphere Dilution System

Description. The CAD system consists of six pneumatic valves per unit, each with its own accumulator and check valve. The CAD system was originally designated for short-term use after DBEs. Long-term use (up to 100 days) was not considered in the original design. A request to consider the long-term use of the CAD system was included in NUREG 0737 (TMI action Plan), Item II.K.3.28 (Qualification of CAD Accumulators). The safety evaluation that documents the acceptability of the applicant's plan to satisfy Item II.K.3.28 for all three units was provided previously by letter dated July 24, 1985.

The CAD system must have the capability to supply pressurized nitrogen to operate the main steam relief valves when control air is not available to ensure the safe shutdown requirements of 10 CFR Part 50, Appendix R following fires, and 10 CFR 50.63 during an SBO. That capability has been installed on Units 2 and 3 and will be installed on Unit 1.

Difference Resolution. The differences between Unit 1 versus Units 2 and 3 will be resolved prior to restart of Unit 1 by upgrading the Unit 1 CAD accumulator system and implementing its CLB, letter to NRC dated July 12, 1984. The capability to supply pressurized nitrogen to operate the main steam relief valves for the long-term when control air is not available will be provided by splitting the ring header into two sections and providing an alternate nitrogen supply to the drywell control air system.

LRA Impact. The Unit 1 systems and structures impacted by this modification and their LRA sections:

- containment (2.3.2.1)

- containment atmosphere dilution (2.3.2.7)
- control air (2.3.3.10)
- sampling and water quality (2.3.3.14)
- reactor building closed cooling water (2.3.3.22)
- radioactive waste treatment (2.3.3.25)
- feedwater (2.3.4.3)

Following resolution of this item, the license renewal results shown with a bold bordered box in the sections identified above will be applicable to Unit 1.

Schedule for Completion. The Unit 1 modification is scheduled for completion prior to restart and currently forecast to be completed by July 2006. Should the applicant not make the modifications discussed above, the associated additional components planned to be installed would not be installed and, therefore, the additional components would not be within the scope of license renewal as currently planned. The Unit 1 boundary drawings would remain accurate and the increased scope identified by the bold bordered boxes in the application would not be applicable. Staff reviews of the application would not change.

Staff Evaluation. Once the Unit 1 modifications are completed there will be no functional differences in the containment atmosphere dilution nitrogen supply between Units 1, 2, and 3. The Unit 1 components that comprise the containment atmosphere dilution nitrogen supply will be incorporated into the appropriate AMPs specified in the LRA, and there will be no unit-specific differences. As stated above, this modification is forecast to be completed by July 2006, and it will be duly tracked by a separate LRA Appendix A commitment and LRA inspection prior to restart to confirm implementation.

In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by August 2006. The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through **TI-xx** as a part of the license application verification that this commitment will be completed prior to Unit 1 restart. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification.

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Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the containment atmosphere dilution system modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff did not identify any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.3 Fire Protection

It is reasonable to assume that the Fire Protection Program will be implemented prior to restart of Unit 1.

Schedule for Completion. The Unit 1 analyses and modifications are scheduled for completion prior to restart and currently forecast to be completed by August 2006.

Staff Evaluation. Once the Unit 1 Fire Protection Program modifications are completed there will be no functional differences between Units 1, 2, and 3. The Unit 1 components that comprise the high pressure fire protection system will be incorporated into the appropriate AMPs specified in the LRA and there will be no unit-specific differences. The staff review of Unit 1 items focused on the material, aging effects, and AMPs as they exist in Units 2 and 3, and there were no impacts of the evaluations on Unit 1 items, because the applicant stated that there was no unique AMP for Unit 1. The staff found the explanation acceptable.

Delete

In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by August 2006. The applicant committed to update the status of this implementation ~~in a future submittal and~~ through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the *license application verification* that this commitment will be completed prior to Unit 1 restart. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification.

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the fire protection modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff did not identify any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.4 Environmental Qualification

Description. A site-wide EQ Program required by 10 CFR 50.49 has been developed for BFN, and implemented on Units 2 and 3, and it is expected to be implemented on Unit 1 to ensure compliance with 10 CFR 50.49.

As part of the recovery program for Browns Ferry, by October 24, 1988 letter, the applicant committed to implement its EQ Program so that electrical equipment located in a harsh environment would meet 10 CFR 50.49 requirements prior to the restart of each unit. The safety evaluation for the program was issued by the staff on January 23, 1991. The site-wide EQ Program required by 10 CFR 50.49 was developed for BFN, implemented on Units 2 and 3, and is being implemented on Unit 1. This program defines responsibilities and specifies requirements to establish and maintain auditable documentation demonstrating the environmental qualification of equipment. This program is described in LRA Section 4.4.

- EQ TLAA (Section 4.4)
- EQ Program (Section B.3.1)

Following resolution of this item, the license renewal results shown with a bold bordered box in the sections identified above will be applicable to Unit 1.

Schedule for Completion. The Unit 1 analyses and modification is scheduled for completion prior to restart and currently forecast to be completed by July 2006.

Staff Evaluation. The differences between the CLB for Unit 1 and the CLB for Units 2 and 3 will be resolved prior to restart of Unit 1 by implementation of the EQ Program. Once the Unit 1 portion of the EQ Program is completed, the BFN site-wide EQ Program will ensure that the components subject to 10 CFR 50.49 requirements are maintained within the bounds of their qualification bases for the period of extended operation.

In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by August 2006. ~~The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart.~~ Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification. Delete

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the EQ modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff did not identify any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.5 Intergranular Stress Corrosion Cracking

The applicant submitted and implemented plans for addressing intergranular stainless steel stress corrosion cracking (IGSCC) in accordance with generic letter (GL) 88-01 and Supplement 1, for Units 2 and 3. In accordance with the Unit 1 restart plan, GL 88-01 will be addressed for Unit 1.

Description. The BWR Stress Corrosion Cracking Program manages intergranular stress corrosion cracking in reactor coolant pressure boundary components made of stainless steel.

The applicant's program to address GL 88-01, staff position on IGSCC in BWR Austenitic Stainless Steel Piping, for Unit 3 was provided by letter dated December 28, 1992. The applicant, by its letter dated August 1, 1988, previously committed to submit a report containing the details of the repair or replacement work. The safety evaluation documenting the acceptability of the program was provided and supplemental information regarding Unit 1 was

submitted by its letter dated December 3, 1993. The following wrought austenitic stainless steel piping systems and components on Unit 1 are considered susceptible to IGSCC according to the guidelines given in GL 88-01:

- reactor recirculation from the recirculation inlet and outlet nozzles to the connections with RHR
- RHR from the recirculation system to the first isolation valve outside of the drywell penetration
- reactor water cleanup (RWCU) from its connection to the RHR system to first isolation valve outside of the drywell penetration
- core spray from the core spray inlet nozzles to the drywell penetration, including the core spray inlet safe ends
- Jet pump instrument safe ends

In its letter, dated July 21, 2004, the applicant informed the staff that the IGSCC-susceptible piping on Unit 1 is being replaced using materials that are resistant to IGSCC. To address the requirements for inspection schedules and expansion plans, the susceptible weldments have been categorized according to NUREG 0313, Revision 2, Section 5, Table 1. The in-service Inspections are required by BFN Technical ~~Requirement,~~ Requirements Manual Section 3.4.3.

Difference Resolution. The differences between the CLB for Unit 1 and the CLB for Units 2 and 3 will be resolved prior to restart of Unit 1 by the replacement of the IGSCC-susceptible piping, and by providing IGSCC protection or mitigation.

UFSAR Impact. The Unit 1 systems and AMPs impacted by this modification and their LRA sections and table:

- reactor vessel (Section 2.3.1.1)
- reactor recirculation (Section 2.3.1.4)
- residual heat removal (Section 2.3.2.4)
- core spray (Section 2.3.2.5 and Table 3.2.2.5)
- reactor water cleanup (Section 2.3.3.21)
- Boiling Water Reactor Stress Corrosion Cracking Program (B.2.1.10)
- BWR Reactor Water Cleanup System Program (B.2.1.22)

It is reasonable to assume that replacement of the IGSCC-susceptible piping will be performed. The applicant has already removed the original piping and must replace it to operate the unit. Following resolution of this item, the license renewal results shown with a bold bordered box in the sections identified above will be applicable to Unit 1.

Schedule for Completion. Submittal of the Unit 1 IGSCC plan and implementation report, as well as the physical modification, are scheduled for completion prior to restart and currently forecast to be completed by March 2006. The applicant also will update the status of this implementation in a future submittal and through the annual LRA update to the CLB in January 2006. These commitments will be tracked through TI-XX as a part of the LRA inspection or until Unit 1 restart. Delete Other license conditions will not allow the applicant to enter the period of extended operation without implementing this modification.

Staff Evaluation. Once the piping replacement modifications are completed on Unit 1 there will be no functional differences in the IGSCC mitigation or protection between Units 1, 2, and 3. The Unit 1 components that mitigate IGSCC will be incorporated into the appropriate AMPs and there will be no unit-specific differences.

Delete

In its submittal dated January 31, 2005, the applicant forecast that ~~this~~ modification will be complete by August 2006. The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification.

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the IGSCC modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff has not identified any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.6 Boiling Water Reactor Vessel and Internals Project Inspection and Flaw Evaluation Guidelines Implementation

Summary of Technical Information. During Unit 1's extended outage, the BWRVIP was initiated to develop inspection and flaw evaluation guidelines. The following guidelines will be implemented on Unit 1 during its restart.

BWRVIP-03 Reactor Pressure Vessel and Internals Examination Guidelines
BWRVIP-05 BWR Reactor Pressure Vessel Shell Weld Inspection Recommendations
BWRVIP-06-A Safety Assessment of BWR Reactor Internals
BWRVIP-15 Configurations of Safety-Related BWR Reactor Internals
BWRVIP-18 BWR Core Spray Internals Inspection and Flaw Evaluation Guidelines
BWRVIP-25 BWR Core Plate Inspection and Flaw Evaluation Guidelines
BWRVIP-26 BWR Top Guide Inspection and Flaw Evaluation Guidelines
BWRVIP-27-A BWR Standby Liquid Control System/Core Plate Inspection and Flaw Evaluation Guidelines
BWRVIP-38 BWR Shroud Support Inspection and Flaw Evaluation Guidelines
BWRVIP-41 BWR Jet Pump Assembly Inspection and Flaw Evaluation Guidelines
BWRVIP-47 BWR Lower Plenum Inspection and Flaw Evaluation Guidelines
BWRVIP-48 Vessel ID Attachment Weld Inspection and Flaw Evaluation
BWRVIP-49-A Instrument Penetration Inspection and Flaw Evaluation Guidelines
BWRVIP-74-A BWR Reactor Pressure Vessel Inspection and Flaw Evaluation Guidelines
BWRVIP-75 Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules
BWRVIP-76 BWR Core Shroud Inspection and Flaw Evaluation Guidelines

BWRVIP-94 Program Implementation Guide
BWRVIP-104 Evaluation and Recommendations to Address Shroud Support Cracking in BWRs

Difference Resolution. The differences between the CLB for Unit 1 and the CLB for Units 2 and 3 with regard to the reactor vessel and internal inspection criteria will be resolved prior to restart of Unit 1 by the implementation of the BWRVIP guidelines on Unit 1.

UFSAR Impact. The Unit 1 systems and AMPs impacted by this modification and their LRA sections:

- reactor vessel (3.1.2.2.16)
- reactor vessel internals (3.1.2.2.16)
- Boiling Water Reactor Vessel Inside Diameter Attachment Welds Program (B.2.1.7)
- Boiling Water Reactor Penetrations Program (B.2.1.11)
- Boiling Water Reactor Vessel Internals Program (B.2.1.12)

It is reasonable to assume that the applicant will implement the BWRVIP guidelines. Without continued commitment to the BWRVIP, the applicant would have to independently develop and obtain staff approval of alternate methodologies for Unit 1, which is not economically feasible.

Following resolution of this item, the license renewal results shown with a bold bordered box in the sections identified above will be applicable to Unit 1.

Schedule for Completion. The Unit 1 modification is scheduled for completion prior to restart and currently forecast to be completed by November 2005.

Staff Evaluation. Prior to restart of Unit 1, the BWRVIP information included in the application will be implemented on Unit 1.

November 2005 delete

In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by ~~August 2006.~~ The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification.

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the BWRVIP and flaw evaluation guidelines implementation modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff has not identified any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.7 Anticipated Transients Without Scram

Description. Section 50.62 of 10 CFR requires applicants to reduce the risk from ATWS events. The applicant adopted the BWR Owners' Group recommendation for implementation of the ATWS rule by letter dated March 1, 1988. The staff approval of the applicant's approach for satisfying 10 CFR 50.62 was provided on January 22, 1989, and the associated TS changes were approved on January 26, 1989. Technical Specification 3.3.4.2 for the BFN units provides the requirements for the ATWS recirculation pump trip (ATWS-RPT) instrumentation. TS 3.1.7, standby liquid control (SLC) system, for the BFN units provides requirements for ATWS that satisfy 10 CFR 50.62. In its letter dated November 29, 1990, the applicant confirmed its commitment to install the required ATWS modifications prior to Unit 1 restart. Design features described in UFSAR Chapter 7.19 will be installed on Unit 1.

Difference Resolution. The differences between the CLB for Unit 1 and the CLB for Units 2 and 3 will be resolved prior to restart of Unit 1 by implementation of the ATWS modifications on Unit 1. The control rod drive system will have a diverse scram (i.e. alternate rod injection) in accordance with LRA Section 2.3.3.29.

UFSAR Impact. The Unit 1 systems, structures, and commodities impacted by this modification and their LRA sections:

- reactor core isolation cooling (2.3.3.23)
- control rod drive (2.3.3.29)
- feedwater (2.3.4.3)
- primary containment structure (2.4.1.1)
- reactor buildings (2.4.2.1)
- electrical and instrumentation and control commodities (2.5.1)

Following resolution of this item, it is expected that the license renewal results shown with a bold bordered box in the sections identified above will be applicable to Unit 1.

Schedule for Completion. The Unit 1 analyses and modifications are scheduled for completion prior to restart. If for any reason, the applicant changes its planned actions to address 10 CFR 50.62, it will need to submit a revised TS change for staff approval and address the aging management aspects of the changes as necessary.

Staff Evaluation. After the implementation of the ATWS modifications on Unit 1 there will be no functional differences in the ATWS system between Units 1, 2, and 3. The Unit 1 components that perform the ATWS function will be incorporated into the appropriate AMPs specified in the LRA and there will be no unit-specific differences.

May Delete

In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by ~~August~~ 2006. The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification.

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the ATWS modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff did not identify any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.8 Reactor Vessel Head Spray

Description. The reactor vessel head spray piping is susceptible to IGSCC and was included in GL 88-01. The applicant responded to GL 88-01 for all three units by letter dated August 1, 1988. In that letter, the applicant notified the staff that it had previously removed the head spray piping from Units 2 and 3, and planned to remove the head spray piping from Unit 1 prior to startup. The staff's approval was provided on December 3, 1993. The applicant reconfirmed, in its July 21, 2004, supplemental response to GL 88-01 for Unit 1, that it planned to remove the reactor vessel head spray piping prior to restart of Unit 1.

On Units 2 and 3, the reactor vessel head spray piping within the drywell has been removed and the reactor vessel head penetration has a flanged cap installed. The primary containment isolation valves have been removed and the primary containment penetration has been sealed. Head spray piping has also been removed and a permanent welded cap has been installed at the RHR system interface with its head spray header.

Difference Resolution. The differences between the CLB for Unit 1 and the CLB for Units 2 and 3 will be resolved prior to restart of Unit 1 by performing these head spray modifications on Unit 1. Once the head spray modifications are completed on Unit 1 prior to restart, the physical and operational differences between Unit 1 and Units 2 and 3 will be resolved

UFSAR Impact. The Unit 1 systems impacted by this modification and their LRA sections:

Reactor Vessel Internals (2.3.1.2)
Residual Heat Removal (2.3.2.4)

Following resolution of this item, the license renewal results shown with a bold bordered box in the LRA sections identified above will be applicable to Unit 1.

Schedule for Completion. The Unit 1 modification is scheduled for completion prior to restart and currently forecast to be completed by ~~May~~ 2006.
June

Staff Evaluation. After the implementation of the reactor vessel head spray modifications on Unit 1 there will be no functional differences in the reactor vessel head spray system between Units 1, 2, and 3. The Unit 1 components that perform the reactor vessel head spray function will be incorporated into the appropriate AMPs specified in the LRA, and there will be no unit-specific differences.

June

Delete

In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by ~~August~~ 2006. The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification.

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the reactor vessel head spray modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff did not identify any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.9 Hardened Wetwell Vent

Description. In GL 89-16, dated September 1, 1989, the staff requested applicants with Mark I containments to voluntarily install a hardened wetwell vent. In response, the applicant committed, by letter dated October 30, 1989, to install a hardened wetwell vent prior to restart of each unit. The hardened wetwell vent has been installed on Units 2 and 3, but has not yet been implemented on Unit 1.

Difference Resolution. The differences between the CLB for Unit 1 and the CLB for Units 2 and 3 will be resolved prior to restart of Unit 1 by the installation of the hardened wetwell vent on Unit 1. Once the modifications are completed, the physical and operational differences between Unit 1 and Units 2 and 3 will be resolved.

UFSAR Impact. The Unit 1 system and structure impacted by this modification and their LRA sections:

- containment (2.3.2.1)
- reinforced concrete chimney (2.4.6.1)

Following resolution of this item, the license renewal results shown with a bold bordered box in the sections identified above are applicable to Unit 1.

Schedule for Completion. The Unit 1 modification is scheduled for completion prior to restart and this modification is currently forecast to be complete by May 2006. If for any reason, the applicant decided it would implement an alternate solution to GL 89-19, the applicant would be required to notify the staff, and include any alternate modifications within the appropriate AMPs.

Staff Evaluation. After the Unit 1 hardened wetwell vent modifications are completed there will be no functional differences in the associated systems for Units 1, 2, and 3. The Unit 1

components that comprise the hardened wetwell vent will be incorporated into the appropriate AMPs specified in the LRA, and there will be no unit-specific differences.

~~June~~ May

In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by ~~August~~ 2006. The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification. Delete

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the hardened wetwell vent modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff did not identify any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.10 Service Air and Demineralized Water Primary Containment Penetrations

Description. The staff requested, by letter dated May 5, 1992, information regarding Unit 1 compliance with NUREG-0737, Item II.E.4.2; and 10 CFR Part 50, Appendix J. The staff compared the Unit 1 containment isolation scheme to the Unit 2 design and concluded, in the January 6, 1995, safety evaluation, that the isolation design was acceptable. Currently, the configuration of the Unit 1 primary containment penetrations numbers, X-20 and X-21, are different from the corresponding configuration on Units 2 and 3. On Unit 1 the penetrations are piped to the service air and demineralized water systems with primary containment isolation valves. On Units 2 and 3, they are capped and not assigned to a service system. These penetrations on Unit 1 will be capped and made identical to those of Units 2 and 3.

Difference Resolution. The differences between the CLB for Unit 1 and the CLB for Units 2 and 3 will be resolved prior to restart of Unit 1 by making the Unit 1 configuration the same as the current Units 2 and 3 configuration. Once the service air and demineralized water systems modifications are completed on Unit 1, the physical and operational differences between Unit 1 versus Units 2 and 3 will be resolved.

If for any reason, the applicant decided it would not implement the committed modifications, the applicant would be required to notify the staff so that the following action to bring the item into the scope of managed piping would apply. The Unit 1 associated piping and components that are to be removed are shown on the Unit 1 boundary drawings and if the piping were not removed, the AMPs specified in the LRA would apply. Thus, there would be no change in the application if the committed modifications were not completed.

UFSAR Impact. The Unit 1 systems impacted by this modification and their LRA sections:

- service air (2.3.3.11)
- condensate and demineralized water (2.3.4.2)

Following resolution of this item, the license renewal results shown with a bold bordered box in the LRA sections identified above will be applicable to Unit 1.

Schedule for Completion. The Unit 1 modification is scheduled for completion prior to restart and is currently forecasted to be completed by May 2006.

Staff Evaluation. After the modifications to the Unit 1 service air and condensate and demineralized systems piping are completed there will be no functional differences in the associated primary containment configurations for Units 1, 2, and 3.

May

Delete

In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by ~~August~~ May 2006. The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification.

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the service air and demineralized water primary containment penetrations modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff did not identify any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.11 Auxiliary Decay Heat Removal System

Description. As described in UFSAR 10.22, the ADHR system only serves Units 2 and 3. The only intended function for license renewal is to provide secondary containment integrity for the ADHR system's piping that transfers the fuel pool heat.

The ADHR system provides an NSR means to remove decay heat and residual heat from the spent fuel pool and reactor cavity, and currently serves only Units 2 and 3. The ADHR allows servicing of the RHR system components earlier in an outage, thus, potentially reducing the outage duration. The only intended function for license renewal is to provide secondary containment integrity for the ADHR system's piping that transfers the fuel pool heat to the heat sink outside containment. There is currently only a single piping loop serving both Units 2 and 3 that penetrates the secondary containment.

The configuration of the ADHR system will be modified to service Unit 1 as well as Units 2 and 3. When modified, there will continue to be only a single piping loop that penetrates the

secondary containment. That loop and its secondary containment penetrations will serve all three units.

Difference Resolution. The differences between the CLB for Unit 1 and the CLB for Units 2 and 3 will be resolved prior to restart of Unit 1 by modifying the ADHR system to service Unit 1 as well as Units 2 and 3. When modified, there will continue to be only a single piping loop that penetrates the secondary containment. That loop and its secondary containment penetrations will serve all three units. Once the ADHR modifications are completed on Unit 1 prior to restart, the physical and operational differences between Unit 1 and Units 2 and 3 will be resolved.

UFSAR Impact. The Unit 1 system impacted by this modification and its LRA sections and table is the auxiliary decay heat removal system (2.3.3.24 and 3.3.2.1.24 and Table 3.3.2.24).

Following resolution of this item, the license renewal results shown with a bold bordered box in the LRA sections and table identified above will be applicable to Unit 1. Should the applicant not make the modifications discussed above, the applicant would be required to notify the staff. Since these associated additional components planned to be installed would not be installed, the boundary drawings for Unit 1 would not change, and the additional components would not be included within the appropriate AMPs as currently planned.

Schedule for Completion. The Unit 1 modification is scheduled for completion prior to Unit 1 restart and is currently projected to be complete by May 2005.

Staff Evaluation. After the modifications to the ADHR system are completed there will be no functional differences in the system for Units 1, 2, and 3.

May 2005

In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by ~~August 2006.~~ The applicant committed to update ~~the status of this implementation in a future submittal and~~ through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart. ~~Other license conditions will not permit the applicant to enter the period of extended operation~~ without implementing this modification. Delete

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the ADHR system modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff did not identify any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.12 Maintenance Rule

Description. By letter dated August 9, 1999, the staff issued a partial temporary exemption.

This exempts the applicant from the specific scoping requirements of 10 CFR 50.65(b) and allows it to maintain the defueled and long-term layup status of Unit 1. The exemption does not impact Maintenance Rule scoping for equipment required to be functional to support Unit 1 in its defueled status or equipment required to support operation of Units 2 and 3.

The scoping results for the affected SSCs will not be changed. No changes are expected for AMR results or TLAAs.

The temporary exemption expires upon restart of Unit 1.

Difference Resolution. The differences between the CLB for Unit 1 and the CLB for Units 2 and 3 will be resolved upon the restart of Unit 1, when the temporary exemption ceases to be effective. Specifically, with respect to the CLB differences identified in the application, the differences in the Maintenance Rule implementation will be resolved.

UFSAR impact. There are no Unit 1 systems impacted by this modification because Unit 1 SSCs not required to be functional during the current shutdown and defueled status are not included within the scope of the Maintenance Rule.

Schedule for Completion. The committed completion date is at Unit 1 restart because the temporary exemption will expire upon Unit 1 restart and the full scope of the Maintenance Rule will apply to Unit 1.

Staff Evaluation. After the Maintenance Rule modifications are completed upon Unit 1 restart, there will be no functional differences in the system for Units 1, 2, and 3.

As stated above, this modification is forecast to be completed upon Unit 1 restart, and it will be duly tracked by a separate LRA Appendix A commitment and LRA inspection prior to restart to confirm implementation.

Unit 1 Restart

In its submittal dated January 31, 2005, the applicant forecast that this modification will be complete by ~~August 2006.~~ The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification.

Delete

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the Maintenance Rule modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff did not identify any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.1.13 Reactor Water Cleanup System

Description. BFN has selected an option in the RWCU System Program that allows the applicant not to test system piping outboard of the outboard primary containment isolation valve provided that the following actions are completed:

- The RWCU piping outside the outboard primary containment isolation valves will be replaced with IGSCC resistant piping
- The actions requested in GL 89-10 SR Motor-Operated Valve Testing and Surveillance, will be satisfactorily completed for the RWCU system; and, in addition, the RWCU system will be reconfigured so that the pumps are no longer exposed to a high temperature environment, consistent with Units 2 and 3.

The applicant committed to replace the 4-inch and larger, stainless steel, RWCU piping located outside the drywell prior to the restart of Unit 1. The applicant also committed to develop and implement a comprehensive Motor-operated Valve Testing and Surveillance Program for Unit 1, satisfying the intent of GL 89-10. At the time of its restart, the Unit 1 RWCU system will have been reconfigured so that the pumps are no longer exposed to a high-temperature environment.

Difference Resolution. The differences between the CLB for Unit 1 and the CLB for Units 2 and 3 will be resolved prior to restart of Unit 1 by performing the actions described above. Once these actions have been implemented, there will be no operational differences between the Unit 1 RWCU system and the Units 2 and 3 systems.

UFSAR Impact. The Unit 1 system and AMP impacted by this modification and their LRA sections:

- reactor water cleanup (2.3.3.21)
- Reactor Water Cleanup System Program (B.2.1.22)

Following resolution of this item, the license renewal results shown with a bold bordered box in the LRA sections identified above will be applicable to Unit 1.

Schedule for Completion. The Unit 1 modification is scheduled for completion prior to restart and is currently projected to be complete by July 2006.

The applicant will have completed the above commitments prior to restart since the piping has been removed and the system is being reconfigured as described above. The applicant also will update the status of this implementation in a future submittal and through the annual LRA update to the CLB in January 2006. These commitments will be tracked through TI-xx as a part of the LRA inspection or until Unit 1 restart. Other license conditions will not allow the applicant to enter the period of extended operation without implementing this modification Delete

Staff Evaluation. Prior to the restart of Unit 1, the applicant will have completed replacement of the RWCU system piping outside the outboard primary containment isolation valves, and completed implementation of its GL 89-10 program, such that the Unit 1 differences identified in the application in this regard are no longer applicable.

July

In its submittal dated January 31, 2005, the applicant forecast that this modification will be Delete complete by ~~August~~ 2006. The applicant committed to update the status of this implementation in a future submittal and through the annual LRA update to the CLB, next due in January 2006. This commitment will be tracked through TI-xx as a part of the license application verification that this commitment will be completed prior to Unit 1 restart. Other license conditions will not permit the applicant to enter the period of extended operation without implementing this modification.

Conclusion. During its review of the information provided in the LRA, license renewal drawings, and licensing-basis information, the staff did not identify any omissions or discrepancies in the applicant's scoping and screening results for the structures and components because of the reactor water cleanup system modification. The scoping and screening reviews were done based on the CLB. The differences between the units' CLBs that are relevant to the application will be resolved prior to Unit 1 restart. The Unit 1 systems and structures impacted by this modification, and their LRA sections and tables as indicated in the list above, were evaluated elsewhere in the SER, and the staff did not identify any omissions or discrepancies. Therefore, the staff concluded that the applicant had adequately identified the Unit 1 SSCs within the scope of license renewal, as required by 10 CFR 54.4 (a), and the SSCs that are subject to an AMR, as required by 10 CFR 54.21(a)(1).

2.6.2 Staff Evaluation

The staff evaluation of LRA Appendix F items used the methodology described in SER Section 2.6.1 to determine whether these items had been adequately scoped and screened. The staff did not perform any safety review of any of these modifications, but performed a limited disposition of the resolution activities for each of the LRA Appendix F items that will be completed prior to Unit 1 restart. As stipulated and agreed upon with the staff in its pre-application meetings, the applicant provided in its submittal dated January 31, 2005, "Additional Information Concerning the Integration of Unit 1 Restart and License Renewal Activities," a status update on completion of the restart activities that impact the CLB of Unit 1. The SER with OI presents the latest information on these modifications. Accordingly, the staff found that the disposition and validation of the modifications were consistent with the commitments. The staff will track modifications and implementation details of these items via separate LRA inspections prior to restart to confirm implementation.

In reviewing the technical information provided in LRA Appendix F, the staff review was limited to verifying:

(i) The sufficiency of information provided by the applicant for the 13 items that impacted the LRA review.

(ii) The applicability of the 13 items to Unit 1.

(iii) The systems these 13 items impact.. delete second period

(iii) The plan to resolve differences between the CLB for Unit 1 and the CLB for Units 2 and 3, so that upon restart all units will have the same CLB.

It should be noted that in the LRA the restart activities listed in LRA Appendix F were generally referred to as differences in the design basis or licensing basis. Based on the definition of CLB in 10 CFR 54.3, these activities are more precisely described as implementation activities of the design and licensing basis. Even though each of the 13 activities listed in LRA Appendix F is committed to and planned for completion prior to restart of Unit 1, any unimplemented commitments would remain valid, part of the CLB, carry over into the renewed license period, and be controlled by the NRC regulatory and oversight process.

The staff's evaluation of the information provided in the LRA was performed in the same manner for all mechanical, civil, and electrical systems as it relates to the particular item in question. The objective of the review was to determine if the components and supporting structures for a specific mechanical system that appeared to meet the scoping criteria specified in the Rule were identified by the applicant as being within the scope of license renewal. Similarly, the staff evaluated the applicant's screening results to verify that all long-lived, passive components were subject to an AMR in accordance with 10 CFR 54.21(a)(1).

2.6.3 Conclusion

The restart plan ensures compliance with the applicant's commitments made during the shutdown and with regulatory requirements that changed during the extended shutdown. In addition, a license condition will be imposed as part of LRA review that will require the Unit 1 restart activities, described in LRA Appendix F, to be completed prior to Unit 1 restart. Therefore, while implementation of the 13 items identified in LRA Appendix F is not yet complete, the staff found that this will not be a barrier to staff approval of license renewal for Unit 1. This type of approval has not been made for commitments in prior LRAs approved by the staff. Therefore, there are no staff evaluations or staff findings performed for these 13 ~~LRA~~ Appendix F items, except for restating the technical information provided in the LRA and the January 31, 2005 letter in the format described below and a status update on the physical implementation of these Unit 1 restart activities.

During its review of the information provided in LRA Appendix F, the staff did not identify any omissions or discrepancies in the applicant's integration of Unit 1 restart activities with license renewal activities. Therefore, the staff concluded that, pending satisfactory implementation of the activities identified in LRA Appendix F prior to restart of Unit 1, the applicant had adequately identified the Unit 1 systems, structures, and components that will be within the scope of license renewal, as required by 10 CFR 54.4(a), and the Unit 1 structures and components that will be subject to an AMR, as required by 10 CFR 54.21(a)(1). Satisfactory completion of these actions prior to Unit 1 restart will be a condition of the renewed license.

2.7 Conclusion for Scoping and Screening

The staff reviewed the information in LRA Section 2, "Scoping and Screening Methodology for Identifying Structures and Components Subject to Aging Management Review and Implementation and Results." The staff determined that the applicant's scoping and screening methodology, including its supplement 10 CFR 54.4(a)(2) review which brought additional NSR piping segments and associated components into the scope of license renewal, was consistent with the requirements of 10 CFR 54.21(a)(1) and the staff's position on the treatment of SR and NSR SSCs within the scope of

Table 3.0.3-1 BFN's Aging Management Programs

BFN's AMP (LRA Section)	GALL Comparison	GALL AMP(s)	LRA Systems or Structures That Credit the AMP	Staff's SER Section
Existing AMPs				
Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program (B.2.1.2)	Not consistent - exceptions taken	XI.E2	Electrical and instrumentation and controls	3.0.3.2.1
ASME Code Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program (B.2.1.4)	Consistent	XI.M1	Reactor vessel, internals, and reactor coolant system; ~~containments, structures, and component supports~~ ESF, Aux and SPC	3.0.3.1.3
Chemistry Control Program (B.2.1.5)	Not consistent - exceptions and enhancements taken	XI.M2	Reactor vessel, internals, and reactor coolant system; engineered safety features systems; auxiliary systems; steam and power conversion systems; containments, structures, and component supports	3.0.3.2.2
Reactor Head Closure Studs Program (B.2.1.6)	Consistent	XI.M3	Reactor vessel, internals, and reactor coolant system; ~~containments, structures, and component supports~~	3.0.3.1.4
Boiling Water Reactor Vessel Inside Diameter Attachment Welds Program (B.2.1.7)	Consistent with enhancements	XI.M4	Reactor vessel, internals, and reactor coolant systems	3.0.3.2.3
Boiling Water Reactor Feedwater Nozzle Program (B.2.1.8)	Consistent with enhancements	XI.M5	Reactor vessel, internals, and reactor coolant systems	3.0.3.2.4
Boiling Water Reactor Control Rod Drive Return Line Nozzle Program (B.2.1.9)	Consistent	XI.M6	Reactor vessel, internals, and reactor coolant systems	3.0.3.1.5

BFN's AMP (LRA Section)	GALL Comparison	GALL AMP(s)	LRA Systems or Structures That Credit the AMP	Staff's SER Section
Boiling Water Reactor Stress Corrosion Cracking Program (B.2.1.10)	Consistent with enhancements	XI.M7	Reactor vessel, internals, and reactor coolant systems; engineered safety features; auxiliary systems; steam and power conversion system	3.0.3.2.5
Boiling Water Reactor Penetrations Program (B.2.1.11)	Consistent with enhancements	XI.M8	Reactor vessel, internals, and reactor coolant systems	3.0.3.2.6
Boiling Water Reactor Vessel Internals Program (B.2.1.12)	Consistent with enhancements	XI.M9	Reactor vessel, Internals, and rector coolant systems	3.0.3.2.7
Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel Program (B.2.1.14)	~~Consistent with enhancements~~ N/A	XI.M13	~~Reactor vessel, internals, and reactor coolant systems~~ N/A	3.0.3.2.8
Flow-Accelerated Corrosion Program (B.2.1.15)	Consistent with enhancements	XI.M17	Steam and power conversion systems and ESF	3.0.3.2.9
Bolting Integrity Program (B.2.1.16)	Not consistent - exceptions taken	XI.M18	Reactor vessel, internals, ~~reactor vessel head closure studs~~ RCS, ESF, Aux, SPC	3.0.3.2.10
Open-Cycle Cooling Water Program (B.2.1.17)	Consistent with enhancements	XI.M20	Auxiliary systems; ~~steam and power conversion systems~~.	3.0.3.2.11
Closed-Cycle Cooling Water System Program (B.2.1.18)	Consistent with enhancements	XI.M21	~~Reactor vessel, internals~~ and ~~reactor coolant system; engineered safety features systems~~; auxiliary systems; ~~steam and power conversion systems; containments, structures, and component supports~~	3.0.3.2.12
Inspection of Overhead Heavy Load and Light Load Handling Systems Program (B.2.1.20)	Not consistent - exceptions taken	XI.M23	Auxiliary systems	3.0.3.2.13
Compressed Air Monitoring Program (B.2.1.21)	Consistent with enhancements	XI.M24	Auxiliary systems; steam and power conversion systems	3.0.3.2.14
BWR Reactor Water Cleanup System Program (B.2.1.22)	Consistent with enhancements	XI.M25	Auxiliary systems	3.0.3.2.15

BFN's AMP (LRA Section)	GALL Comparison	GALL AMP(s)	LRA Systems or Structures That Credit the AMP	Staff's SER Section
Fire Protection Program (B.2.1.23)	Not consistent - exceptions and enhancements taken	XI.M26	Auxiliary systems; containments, structures, and component supports	3.0.3.2.16
Fire Water System Program (B.2.1.24)	Not consistent - exceptions and enhancements taken	XI.M27	Auxiliary systems; ~~containments, structures, and component supports.~~	3.0.3.2.17
Aboveground Carbon Steel Tanks Program (B.2.1.26)	Consistent	XI.M29	~~Auxiliary systems~~ Stm & Pwr Conv	3.0.3.1.6
Fuel Oil Chemistry Program (B.2.1.27)	Not consistent - exceptions taken	XI.M30	Auxiliary systems	3.0.3.2.18
Reactor Vessel Surveillance Program (B.2.1.28)	Consistent with enhancements	XI.M31	Reactor vessel, internals, and reactor coolant system	3.0.3.2.19
Buried Piping and Tanks Inspection Program (B.2.1.31)	Consistent	XI.M34	Engineered safety feature systems; auxiliary systems	3.0.3.1.9
ASME Code Section XI Subsection IWE Program (B.2.1.32)	Not consistent - exceptions taken	XI.S1	~~Reactor vessel, internals, and reactor coolant system;~~ containments, structures, and component supports	3.0.3.2.20
ASME Code Section XI Subsection IWF Program (B.2.1.33)	Not consistent - exceptions taken	XI.S3	~~Reactor vessel, internals, and reactor coolant system~~; containments, structures, and component supports	3.0.3.2.21
10 CFR 50 Appendix J Program (B.2.1.34)	Consistent	XI.S4	~~Reactor vessel, internals, and reactor coolant system;~~ containments, structures, and component supports	3.0.3.1.10
Masonry Wall Program (B.2.1.35)	Consistent with enhancements	XI.S5	Containments, structures, and component supports	3.0.3.2.22
Structures Monitoring Program (B.2.1.36)	Consistent with enhancements	XI.S6	Containments, structures, and component supports	3.0.3.2.23
Inspection of Water-Control Structures Program (B.2.1.37)	Consistent with enhancements	XI.S7	Containments, structures, and component supports	3.0.3.2.24
Systems Monitoring Program (B.2.1.39)	Plant-specific	N/A	RCS, ESF, Aux & SPC	3.0.3.3.1

BFN's AMP (LRA Section)	GALL Comparison	GALL AMP(s)	LRA Systems or Structures That Credit the AMP	Staff's SER Section
Diesel Starting Air Program (B.2.1.41)	Plant-specific	N/A	Aux	3.0.3.3.3
Environmental Qualification Program (B.3.1)	Consistent with enhancements	X.E1	Electrical ~~components~~ and Instrumentation and controls	3.0.3.2.25
Fatigue Monitoring Program (B.3.2)	Consistent with enhancements	X.M1	Reactor vessel, internals, and reactor coolant systems; containment, structures, and component supports	3.0.3.2.26
New AMPs				
Accessible Non-Environmental Qualification Cables and Connections Inspection Program (B.2.1.1)	Consistent	XI.E1	Electrical ~~components~~ and Instrumentation and controls	3.0.3.1.1
Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program (B.2.1.3)	Consistent	XI.E3	Electrical and Instrumentation and controls	3.0.3.1.2
~~Thermal Aging Embrittlement of Cast Austenitic Stainless Steel Program (B.2.1.13)~~	~~N/A~~	~~N/A~~		~~3.0.3.3.4~~
One-Time Inspection Program (B.2.1.29)	Consistent	XI.M32	Reactor vessel, internals, and reactor coolant systems; engineered safety feature systems; auxiliary systems; steam and power conversion systems; containment, structures and component supports	3.0.3.1.7
Selective Leaching of Materials Program (B.2.1.30)	Consistent	XI.M33	~~Reactor vessel, internals, and reactor coolant systems;~~ engineered safety feature systems; auxiliary systems; SPC	3.0.3.1.8
Bus Inspection Program (B.2.1.40)	Plant-specific	N/A		3.0.3.3.2

3.0.3.1 AMPs that are Consistent with the GALL Report

In LRA Appendix B, the applicant identified that the following AMPs were consistent with the GALL Report:

- Accessible Non-Environmental Qualification Cables and Connections Inspection Program (B.2.1.1)
- Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program (B.2.1.3)
- ASME Code Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program (B.2.1.4)
- Reactor Head Closure Studs Program (B.2.1.6)
- Boiling Water Reactor Control Rod Drive Return Line Nozzle Program (B.2.1.9)
- Aboveground Carbon Steel Tanks Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.29)
- Selective Leaching of Materials Program (B.2.1.30)
- Buried Piping and Tanks Inspection Program (B.2.1.31)
- 10 CFR 50 Appendix J Program (B.2.1.34)

During its audit and review, conducted June 21 to 25, 2004, the staff confirmed the applicant's claim of consistency with the GALL Report. As a result of this review, the staff identified issues for several of the AMPs that were resolved with a docketed response from the applicant. Those issues and resolutions are discussed in Sections 3.0.3.1.1 to 3.0.3.1.10 below.

3.0.3.1.1 Accessible Non-Environmental Qualification Cables and Connections Inspection Program

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Summary of Technical Information in the Application. The applicant's Accessible Non-Environmental Qualification (Non-EQ) Cables and Connections Inspection Program is described in LRA Section B.2.1.1, "Accessible Non-Environmental Qualification Cables and Connections Inspection Program." In the LRA, the applicant stated that this is a new program that will be initiated prior to the period of operation. This commitment is identified on the applicant's license renewal commitment list as Item No. 1.(1) This program is consistent with GALL AMP XI.E1, "Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements."

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Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the BFN audit and review report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

As a result of this review, the staff identified two issues discussed below that were resolved with a docketed response from the applicant.

1. GALL AMP XI.E1 recommends that the program be written specifically to address cables and connections at plants whose configuration is such that most (if not all) cables and connections installed in adverse localized environments are accessible. However, the applicant's description of the Accessible Non-EQ Cables and Connections Inspection Program does not address the percentage of cables in adverse localized environments at BFN that are accessible.

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   The applicant stated, as documented in the staff's audit and review report that, based upon a search of as-designed data in the current cable routing database, greater than 50 percent of cables are located in accessible cable trays.

   The staff found the applicant's response acceptable since more than 50 percent of the cables will be accessible for inspection, which is consistent with the recommendations for GALL AMP XI.E1.

2. The description of GALL AMP XI.E1 states that the technical basis for the sample of cables and connections selected for inspection is to be provided. However, the staff noted that the description of the Accessible Non-EQ Cables and Connections Inspection Program in the LRA does not address the rationale for selecting the sample of cables and connections to be inspected.

   The applicant stated, as documented in the staff's audit and review report, that a representative sample of accessible, insulated cables and connections within the scope of license renewal will be visually inspected in adverse localized environments as identified by a review of operating experience. Selected cables and connections from accessible areas (the inspection sample) will represent, with reasonable assurance, all cables and connections in adverse localized environments.

Need to discuss scope of program as discussed in RAI 3.6-6 response letter dated Dec. 9, 2004

Operating Experience: The applicant stated in the LRA that the Accessible Non-EQ Cables and Connections Inspection Program is a new program for which there is no operating experience. The operating experience data associated with implementing this program will be addressed in the applicant's Corrective Action Program. In evaluating the element, the applicant stated that the implementation of the Accessible Non-EQ Cables and Connections Inspection Program will provide reasonable assurance that the applicable aging effects will be effectively managed so that the structures and components within the scope of this program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

UFSAR Supplement. In LRA Section A.1.1, the applicant provided the UFSAR supplement for the Accessible Non-EQ Cables and Connections Inspection Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement sufficient, as required by 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

The staff's evaluation of the quality assurance program is discussed in SER Section 3.0.4. The remaining seven elements are discussed below (please see GALL AMP XI.E.3 for program elements). delete period

1. Scope of Program - In its response to the staff RAI 3.6-3 as above and by letter dated December 9, 2004, the applicant stated that medium voltage cables that are installed in underground conduit duct banks and that perform an in-scope intended function (such as the medium-voltage cables to RHRSW pumps) will also be included in this program. The staff finds the above response to be acceptable since the Non-EQ Inaccessible Medium-Voltage Cable Program will require testing of all in-scope cables included in the program.

2. Preventive Actions - Periodic actions, such as inspecting for water collection in cable manholes and conduit, and draining water, as needed, will be taken to prevent cables from being exposed to significant moisture. These actions will be performed as part of the testing described in Parameters Monitored or Inspected. The staff finds that the inspection of water collection in cable manholes and conduit at a ten year frequency is not adequate. The staff indicated that the frequency of inspection for water collection in cable manholes and conduit should be yearly. The staff asked the applicant to explain why every ten years inspection is sufficient. On January 18, 2005, the applicant stated that inspection for water collection for in-scope cable manholes and conduits will be adjusted to be performed annually. Based on the above, the staff's concern is resolved.

3. Parameters Monitored or Inspected - This program will test those inaccessible medium-voltage cables identified as in scope to determine the condition of the conductor insulation by testing the cables. The specific type of test performed will be determined prior to the initial test, and is to be a proven test for detecting deterioration of the insulation system, such as power factor, partial discharge, or polarization index, as described in EPRI TR-103834-P1-2, or other testing that is state-of-art at the time. The staff finds this to be acceptable since this is consistent with the GALL XI.E3 program.

4. Detection of Aging Effects - Affected cables will be tested before the current 40-year licensing term has concluded for each unit and at least once every 10 years thereafter. The staff finds this to be acceptable since this is consistent with the GALL XI.E3 program.

5. Monitoring and Trending - Trending actions are not included as part of this program because the ability to trend test results is dependent on the specific type of test chosen. Test results that are trendable may be trended to provide additional information on the rate of degradation. The staff finds this to be acceptable since this is consistent with GALL XI.E3 program.

6. Acceptance Criteria - During testing, cables shall meet the acceptance criteria of the test being performed. The staff finds this to be acceptable since this is consistent with the GALL XI.E3 program.

7. Operating Experience - Industry operating experience was incorporated into the license renewal process through a review of industry documents to identify aging effects and mechanisms that could challenge the intended function of components within the scope

3.0.3.1.10 10 CFR 50 Appendix J Program

Summary of Technical Information in the Application. The applicant's 10 CFR 50 Appendix J Program is described in LRA Section B.2.1.34, "10 CFR 50 Appendix J Program." In the LRA, the applicant stated that this is an existing program. This program is consistent with GALL AMP XI.S4, "10 CFR Part 50, Appendix J."

The 10 CFR 50 Appendix J Program monitors leakage rates through the containment pressure boundary (including the drywell and torus, penetrations, fittings, and other access openings) in order to detect degradation of the primary containment pressure boundary. Seals, gaskets, and bolted connections are also monitored. Type A and Type B containment leak-rate tests are performed in accordance with the regulations in 10 CFR 50 Appendix J Option B; and the guidance provided in RG 1.163, "Performance-Based Containment Leak-Testing Program"; NEI 94-01, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50 Appendix J." The 10 CFR 50 Appendix J Program requirements are mandated by Technical Specification (TS) 5.5.12, Primary Containment Leakage Rate Testing Program. Additional requirements for testing the containment are mandated by the following TS surveillance requirements: SR 3.6.1.1.1, SR 3.6.1.2.1, SR 3.6.1.~~2~~3.10, and SR 3.6.1.~~2~~3.11.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's evaluation of this AMP are documented in the BFN audit and review report. The staff determined that this AMP is consistent with the AMP described in the GALL Report, including the associated operating experience attribute.

Operating Experience. In LRA Section B.2.1.34, the applicant evaluated the program element operating experience and stated that testing in accordance with 10 CFR 50 Appendix J has been effective in monitoring the pressure integrity of the primary containment boundaries industry-wide and at BFN. The staff concurred with the applicant's evaluation.

UFSAR Supplement. In LRA Section A.1.~~34~~31, the applicant provided the UFSAR supplement for the 10 CFR 50 Appendix J Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

RAI 2.5-2. During the audit, the staff also noted that the applicant's AMP is limited to managing the neutron monitoring local power range monitoring circuits. Not included in the scope of Electrical Cables Not Subject to 10 CFR 50.49 EQ Requirements Used In Instrumentation Circuits Program are nuclear instrumentation cables used in circuits for the SRM, intermediate range monitor (IRM), average power range monitor (APRM), rod block monitor (RBM), and traversing in-core probe (TIP). The staff considers the IRM system to be safety-related (SR) at all BWRs and the IRM is part of the plant's TSs. The staff pursued this issue with the applicant and requested additional clarifications in RAI 2.5-2, see SER Section 2.5.1.2

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Based on its response and additional discussions with the staff, the applicant concurred that the IRM instrumentation circuit cables should be within the scope of license renewal because they are part of the TS. Because of this inclusion, the applicant confirmed that their aging effects should be managed by the Electrical Cables Not Subject to 10 CFR 50.49 EQ Requirements Used in Instrumentation Circuits Program. The applicant also agreed that other accessible neutron monitoring subsystem cables and connections will be managed by the Accessible Non-EQ Cables and Connections Inspection Program. This inclusion impacts the scope of the two AMP elements "Program Description" and "NUREG-1801 Consistency." These changes have been added to the SER Appendix A commitment table, and the applicant will modify the UFSAR supplement to reflect these changes. The details of the staff evaluation on RAI 2.5-2 are shown in SER Section 2.5.1.2.

In LRA Section B.2.1.2, the applicant stated an exception to GALL AMP XI.E2. The staff evaluation of the affected GALL elements (Parameters Monitored/Inspected and Detection of Aging Effects) for the acceptability of the exception is as follows:

Exception - In LRA Section B.2.1.2, the applicant takes an exception to GALL AMP XI.E2 and states that it performs a calibration procedure that implements TS requirements. The procedure is not a normal loop calibration. The procedure utilizes actual detector signals during normal operation for calibration inputs. This exception impacts the following program elements, which are evaluated as follows.

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Parameters Monitored/Inspected (Element 3) - The parameters monitored are determined from the plant TSs and are specific to the instrumentation loop being calibrated, as documented in the surveillance test procedure. The applicant in evaluating the element stated that this program will monitor parameters that are required by TSs and are specific to the LPRM cable system being calibrated.

This program will monitor parameters that are required by TSs and are specific to the LPRM cable system being calibrated. In evaluating the exception regarding Parameters Monitored/Inspected, the applicant stated, as documented in the staff's audit and review report, that the applicant performs a specific calibration procedure as determined from plant TSs on LPRM circuits. The applicant stated that cables are part of the calibration procedure since the detector is in service when the calibration is performed. In this program, review of routine calibration results by appropriate personnel provide sufficient indication of the need for corrective actions by monitoring key parameters related to LPRM cable system performance. The normal calibration frequency specified in BFN TSs provides reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function.

The staff found that this exception acceptable in that it will not adversely impact the ability of the AMP to manage the affects of aging since the only difference between the applicant's program and GALL AMP XI.E2 is that the applicant utilizes actual detector signals during operation to calibrate the LPRM. The parameters monitored in the applicant's program are determined from the plant TSs and, therefore, the staff found this exception to be acceptable for the program element.

Detection of Aging Effects (Element 4) - Calibration provides sufficient indication of the need for corrective actions by monitoring key parameters and providing trending data based on acceptance criteria related to instrumentation-loop performance. The normal calibration frequency specified in the plant TSs provides reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function. The first tests for license renewal are to be completed before the period of extended operation.

In evaluating the exception regarding Detection of Aging Effects, the applicant stated that routine calibration results will provide adequate and timely indication of the need for corrective actions by monitoring key parameters related to LPRM cable system performance. The normal calibration frequency specified in TSs provides reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function. Calibrations will continue through the period of extended operation at the required frequency as specified in the TSs.

As discussed above, in response to the staff's inquiry regarding the difference between the applicant's calibration procedure and that specified in GALL AMP XI.E2, the applicant stated that it performs a specific calibration procedure as determined from plant TSs on LPRM circuits. The normal calibration frequency specified in BFN TSs provides reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function.

The staff found that this exception will not adversely impact the ability of this AMP to manage the effects of aging since the only difference between the applicant's program and GALL AMP XI.E2 is that the applicant utilizes actual detector signals during operation to calibrate the LPRM and does not perform a loop calibration. The normal calibration frequency specified in the plant TSs provides reasonable assurance that severe aging degradation will be detected prior to loss of the cable intended function, and the first tests for license renewal will be completed before the period of extended operation. Therefore, the staff found this exception to be acceptable.

Operating Experience. In LRA Section B.2.1.2, the applicant stated that industry operating experience was incorporated into the license renewal process through a review of industry documents to identify aging effects and mechanisms that could challenge the intended function of components, systems and structures within the scope of this program. Review of plant-specific operating experience was also performed to identify aging effects experienced. This review involved electronic database searches of plant information including problem evaluation reports, staff communications, RAIs, and WOs. As a result, no new aging effects were identified.

During the concurred audit, the staff noted that the applicant incorporates internal and external plant operating experience issues into the plant Corrective Action Program on a continuing basis. The staff concluded there is reasonable assurance that operating experience will

found

IGSCC." Monitoring and control of chemistry parameters is controlled by AMP B.2.1.5. The staff finds AMP B.2.1.5 acceptable because the program is based on updated industry experience and plant-specific and industry-wide operating experience confirms the effectiveness of the RCS chemistry program. The staff ~~found~~ that the applicant's proposed mitigation strategy would ensure that the aging effect due to IGSCC in the RV and its components can be managed effectively during the extended period of operation.

In RAI B.2.1.10-1(C), the staff requested that the applicant provide information concerning whether any NMCA and HWC is applied at BFN. The staff requested that the applicant confirm the method of controlling HWC and any NMCA in the RV. The staff requested the applicant to provide details on the methods for determining the effectiveness of HWC and NMCA by using the following parameters:

(1) Electro Chemical Potential (ECP)
(2) Feedwater hydrogen flow
(3) Main steam oxygen content
(4) Hydrogen/oxygen molar ratio.

In its response to RAI B.2.1.10-1(C), by letter dated January 31, 2005, the applicant stated that BFN currently utilizes zinc addition, NMCA and HWC as part of the reactor water chemistry control program. BFN does not utilize ECP probes and, therefore, alternate means are used to monitor NMCA/HWC control. The acceptable alternate means are described in Section 5.4 of EPRI-103515-R2. These guidelines are implemented in BFN procedure CI-13.1, Chemistry Program, which specifies that the reactor water H2/O2 molar ratio must be greater than 4 during power operation to effectively mitigate IGSCC.

The staff agrees that implementation of HWC/NMCA should effectively mitigate IGSCC because these additions reduce the oxygen potential in RCS water. With reduced oxygen levels in the RCS water the occurrence of IGSCC is minimized. The effectiveness of HWC/NMCA can be maintained by using H2/O2 molar ratio of greater than 4, which is acceptable to the staff because this molar ratio provides adequate margin in maintaining hydrogen availability for the RV and RVIs. AMP recommended by the GALL report for managing IGSCC for the RVIs is XI.M.7, "BWR Stress Corrosion Cracking."

UFSAR Supplement. In LRA Section A.1.10, the applicant provided the UFSAR supplement for the Boiling Water Reactor Stress Corrosion Cracking Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the enhancement and confirmed that the implementation of the enhancement prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also

would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.7 Boiling Water Reactor Vessel Internals Program

Summary of Technical Information in the Application. The applicant's BWR Vessel Internals Program is described in LRA Section B.2.1.12, "Boiling Water Reactor Vessel Internals Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with the enhancement, with GALL AMP XI.M9, "BWR Vessel Internals."

These words were not in the LRA

In the LRA, the applicant stated that the purpose of BWR Vessel Internals Program is to manage the effects of crack initiation and growth due to SCC, IGSCC, or irradiation-assisted stress corrosion cracking (IASCC) in vessel internals components. The program contains preventive measures to mitigate SCC or IGSCC. The ASME boiler and pressure vessel (B&PV), Section XI, inservice inspection programs implement the BWRVIP guidelines associated with BWR vessel internal components, to monitor the effects of cracking on their intended functions.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the audit and review report. Furthermore, the staff reviewed the enhancements and their justifications to determine whether the AMP, with enhancements, remains adequate to manage the aging effects for which it is credited.

In the LRA, the applicant stated that BWR Vessel Internals Program is consistent with GALL AMP XI.M9. The staff reviewed the program elements (see SER Section 3.0.2.1) contained in the AMP and associated bases documents, and compared them to those listed for GALL AMP XI.M9 for consistency.

In accordance with NEDP-23, Revision 0, "BWR Reactor Pressure Vessel Internals Inspections (RPVII)," the applicant stated that the staff-approved BWRVIP documents identified in the GALL Report for this AMP are applicable to all units.

The staff identified a difference in the program description, as well as in the program element for preventive action, as discussed below.

The GALL AMP XI.M~~X~~8 recommends that BWR water chemistry control be performed in accordance with BWRVIP-29, which references the 1993 revision of EPRI TR-103515, "BWR Water Chemistry Guidelines." However, the BFN water chemistry programs are based on BWRVIP-79, which references the 2000 revision of EPRI TR-103515-R2 and uses HWC with NMCA to control both the detrimental impurities and crack initiation and growth. In the LRA, the applicant stated that BFN has not applied for any relief for vessel internals component weld inspections in accordance with BWRVIP-62, which allows relief for welds exposed to hydrogen water chemistry. The staff found this difference acceptable, since BWRVIP-79 is the current revision to industry practice.

experiences with visual inspections are discussed in IN 94-42. Most of the BWR reactors, including BFN, have experienced cracking of RPV internal components.

The staff concluded that implementation of the applicable BWRVIP guidelines provides reasonable assurance that cracking of BWR RPV internal components is being adequately managed, such that there is no loss of intended function.

During the concurred audit, the staff noted that the applicant incorporates internal and external plant operating experience issues into the plant Corrective Action Program on a continuing basis. The staff concluded there is reasonable assurance that operating experience will continue to be reviewed in the future to ensure that the effects of aging will be adequately managed.

UFSAR Supplement. In LRA Section A.1.12, the applicant provided the UFSAR supplement for the BWR Vessel Internals Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the enhancement and confirmed that the implementation of the enhancement prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.8 Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel Program

This program was deleted in January 30, 2005 response to RAI 3.1.2.2-9. See discussion of RAI response in 3.1.2.2-9 on p3-167

~~Summary of Technical Information in the Application. The applicant's Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is described in LRA Section B.2.1.14, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with enhancement, with GALL AMP XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of CASS."~~

~~The applicant stated that the Thermal Aging and Neutron Irradiation Embrittlement of CASS Program monitors the effects of loss of fracture toughness on the intended function of the component by performing supplemental examinations of CASS reactor vessel internals components. The reactor vessel internals receive a visual inspection in accordance with the ASME Code Section XI Subsection IWB, Category B-N-3 requirements.~~

~~Additional enhanced visual inspections that incorporate the requirements of the BWR Vessel Internals Program are performed to detect the effects of loss of fracture toughness due to thermal aging and neutron irradiation embrittlement of CASS reactor vessel internals.~~

The enhanced visual inspections include the ability to achieve a 0.0005-inch resolution, with the conditions (e.g., lighting and surface cleanliness) of the inservice examination bounded by those used to demonstrate the resolution of the inspection technique.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the BFN audit and review report. Furthermore, the staff reviewed the enhancement and its justifications to determine whether the AMP, with enhancement, remains adequate to manage the aging effects for which it is credited.

In the LRA, the applicant stated that the Thermal Aging and Neutron Irradiation Embrittlement of CASS Program is consistent with the GALL AMP XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)." The staff reviewed the program elements (see SER Section 3.0.2.1) contained in the AMP basis document and compared them against GALL AMP XI.M13 for consistency. The staff noted a difference in the program element for the scope of the program, as discussed below.

The GALL AMP XI.M13 recommendations state that the scope of the program should specify the guidelines for identification of susceptible components determined to be limiting from the standpoint of thermal aging susceptibility (i.e., ferrite and molybdenum contents, casting process, and operating temperature) and/or neutron irradiation embrittlement (neutron fluence). Either a supplemental examination of the affected component based on the neutron fluence or a component-specific evaluation to determine its susceptibility to loss of fracture toughness is to be performed. The staff noted that the Thermal Aging and Neutron Irradiation Embrittlement of CASS Program does not address this screening process. In response to a question from the staff, the applicant stated that the scope of the Thermal Aging and Neutron Irradiation Embrittlement of CASS Program includes supplemental examination of all CASS reactor vessel internal components. Since screening is not used, there is no need to define a screening process. The staff found this acceptable.

The staff determined that all other program elements are consistent with GALL, with one enhancement related to the program element "Scope of Program." The applicant stated in the LRA Appendix B that the enhancement to the Thermal Aging and Neutron Irradiation Embrittlement of CASS AMP will be implemented on Unit 1. The enhancement is scheduled for implementation prior to the period of extended operation.

Staff Evaluation. In LRA Section B.2.1.14, the applicant identified one enhancement to make this AMP consistent with GALL AMP XI.M13. This AMP will be implemented on Unit 1 prior to the period of extended operation. The staff found that with the implementation of this enhancement, BFN will be consistent with the affected program element for all three units.

Operating Experience. In the LRA, the applicant stated that cracking had been detected in the reactor vessel internals at several domestic and overseas boiling water reactors. In June 1994, the BWRVIP was formed to address integrity issues arising from inservice degradation of reactor vessel internals. Since that time, the BWRVIP has published several reports that present guidelines for inspecting, evaluating, and repairing reactor vessel internals.

The staff concluded that implementation of the BWRVIP guidelines for inspecting, evaluating, and repairing reactor vessel internals provides reasonable assurance that loss of fracture

toughness of CASS reactor pressure vessel internal components is being adequately managed, such that there is no loss of intended function.

In GALL AMP XI.M13, void swelling is also identified as an aging mechanism leading to loss of fracture toughness in CASS reactor vessel internals. The applicant evaluated this program element "operating experience" in section LRA B.2.1.14 on page B-48 and concluded as follows:

> The continued implementation of the Thermal Aging and Neutron Irradiation Embrittlement of CASS aging management program provides reasonable assurance that the aging effects will be managed so that the systems and components within the scope of this program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.

The BFN Reactor Vessel Internals Program is based on research data obtained from both laboratory-aged and service-aged materials. EPRI TR-107521 addresses data gathered from liquid-metal-cooled fast breeder reactors, and how it may possibly be related to a pressurized water reactor (PWR) component (baffle former bolt) that is in almost direct contact with the fuel in a PWR. Since a BWR does not have components in a similar location and thus can reasonably be expected to experience less fluence, the staff concludes that is not a concern with BFN. Past studies of void swelling by ANL, ORNL, HEDL, and GE have shown that the threshold fluence for void swelling is approximately 10^{22} n/cm^2, which is well in excess of the fluence experienced by typical boiling water reactor CASS components. Secondly, the EPRI report notes that field experience does not suggest that void swelling is a significant issue. The lowest temperature for which this phenomenon is conjectured to occur is 300 °C (572 °F), which is higher than the temperature experienced by BWR reactor vessel internals. Hence the staff concluded that void swelling is not an aging effect applicable to BFN.

During the onsite audit, the staff noted that the applicant incorporates internal and external plant operating experience issues into the plant Corrective Action Program on a continuing basis. The staff concluded there is reasonable assurance that operating experience will continue to be reviewed in the future to ensure that the effects of aging will be adequately managed.

UFSAR Supplement. In LRA Section A.1.14, the applicant provided the UFSAR supplement for the Thermal Aging and Neutron Irradiation Embrittlement of CASS Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the enhancement and confirmed that the implementation of the enhancement prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

The CCCW System Program includes preventive measures to minimize corrosion and surveillance testing and inspection to monitor the effects of corrosion on the intended function of the component. The program relies on maintenance of system corrosion inhibitor concentrations within specified limits of EPRI TR-107396, "Closed Cooling Water Chemistry Guideline," to minimize corrosion. Surveillance testing and inspection in accordance with standards in EPRI TR-107396 for CCCW systems is performed to evaluate system and component performance. These measures will ensure that the CCCW system and components serviced by the CCCW system are performing their functions acceptably.

CCCW System Program will be enhanced to implement EPRI TR-107396 for Unit 1 prior to the period of extended operation.

<u>Staff Evaluation</u>. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the BFN audit and review report. Furthermore, the staff reviewed the enhancement and its justifications to determine whether the AMP, with the enhancement, remains adequate to manage the aging effects for which it is credited.

The staff reviewed the program elements (see SER Section 3.0.2.1) contained in the CCCW System Program and associated bases documents, and compared them to those listed for GALL AMP XI.M21 for consistency.

remove parentheses

The staff also reviewed the applicant's implementing procedures, including Browns Ferry Chemical Instruction (CI)-13.1, and "Browns Ferry Nuclear Plant Chemistry Program," Revision 17, which incorporates EPRI TR-107396, "Closed Cooling Water Chemistry Guidelines." Appendix A of that procedure provides water quality control specifications for the reactor building remove CR
closed-cooling water system, drywell outage chiller (when inservice), off-gas chiller systems, closed-building heating, generator stator cooling water, diesel generator cooling water, and control bay chiller systems. The parameter monitored, monitoring frequency, administrative goal, and action levels for corrective actions are identified for each system.

The staff's review determined that the applicant's CCCW systems program monitors the effects of corrosion by system chemistry sampling, chemical treatment and water chemistry trending in accordance with the Water Chemistry Program. The chemistry parameters are monitored and maintained in accordance with the BFN chemistry specifications and recommendations of EPRI TR-107396. The parameters monitored include nitrate, pH, conductivity, tolyltriazole, bacteria (aerobic and SRBs), sulfates, metals (iron, copper), ammonia, chloride, calcium, molybate, and glycol (weight percent). If parameter limits are exceeded, the chemistry control procedures require corrective action to be taken to restore parameters to within the acceptable range. Maintenance of water chemistry and corrosion inhibitor levels within the chemistry parameters mitigate loss of material, cracking, and reduction of heat transfer. In addition, regular scheduled system flow balances, pump suction and discharge pressure, heat exchanger flows, and temperatures and maintenance inspections are performed on system/components to detect, monitor, control, and minimize corrosion aging effects. The system heat exchangers are also cleaned and inspected to detect, monitor, control, and minimize corrosion aging effects that could cause a reduction of heat transfer.

UFSAR Supplement. In LRA Section A.1.22, the applicant provided the UFSAR supplement for the Fire Water System Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exception and the associated justifications and determined that the AMP, with exceptions, is adequate to manage the aging effects for which it is credited. Also, the staff reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.18 Fuel Oil Chemistry Program

add space

Summary of Technical Information in the Application. The applicant's Fuel Oil Chemistry Program is described in LRA Section B.2.1.27, "Fuel Oil Chemistry Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with an exception, with GALL AMP XI.M30, "Fuel Oil Chemistry Program."

will need to be revised based on changes provided in cover letter.

In LRA Section B.2.1.27, the applicant stated that the fuel oil chemistry program consists of surveillance and maintenance procedures to mitigate corrosion, and measures to verify the effectiveness of the AMP and to confirm the absence of an aging effect. Fuel oil quality is maintained by monitoring and controlling fuel oil contamination in accordance with the guidelines of the American Society for Testing Materials (ASTM) Standards D 1796, D 2276, and D 4057. Exposure to fuel oil contaminants, such as water and microbiological organisms, is minimized by periodic draining of water or cleaning of tanks and by verifying the quality of new oil before its introduction into the storage tanks. Procedures require performance of fuel oil tank bottom and multi-level sampling on a quarterly basis to detect and remove water and sediment from each tank. In addition, each 7-day diesel oil supply tank is cleaned and inspected at intervals of approximately 10 years. A one-time inspection in accordance with the One-Time Inspection Program (B.2.1.29) will be performed prior to entering the period of extended operation and will consist of thickness measurements of the 7-day diesel oil supply tanks' and diesel driven fire pump fuel oil tank bottom surface. delete

Portions of the Fuel Oil Chemistry Program are mandated by TS 5.5.9, "Diesel Fuel Oil Testing Program," that requires a diesel fuel oil testing program to implement required testing of the fuel oil in each 7-day fuel oil tank. The purpose of the program is to establish that the quality of the fuel oil in each 7-day fuel oil tank is within the acceptable limits specified in Table 1 of ASTM D-975-1989 when tested every 92 days; and total particulate concentration of the fuel oil in each 7-day fuel oil tank is less than 10 mg/l, when tested every 92 days in accordance with ASTM D-2276, Method A-2 or A-3.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in its BFN audit and review report. Furthermore, the staff reviewed the exception and justification to determine whether the AMP, with the exception, remains adequate to manage the aging effects for which it is credited.

The staff reviewed the program elements (see SER Section 3.0.2.1) contained in the Fuel Oil Chemistry Program and associated bases documents, and compared them to those listed for AMP XI.M30 in the GALL Report for consistency.

The staff also reviewed BFN Procedure CI-130, "Diesel Fuel and Lube Oil Monitoring Program," and Procedure 0-SR-3.8.3.3 "Quarterly Fuel Oil Quality Determination of Unit 0 Diesel Generator's 7-Day Storage Tank." Suppl 4

Exception. In LRA Section B.2.1.27, the applicant identified an exception to GALL AMP XI.M30 that affects three program elements. The applicant does not use ASTM Standard D 2709 for guidance on the determination of water and sediment contamination in diesel fuel, as specified in GALL AMP XI.M30. The applicant does implement ASTM Standard D 1796 guidance on the determination of water and sediment contamination, which is also specified in GALL AMP XI.M30.

The staff evaluation of the affected GALL Report program elements, "Scope of Program" (Element 1), "Parameters Monitored or Inspected" (Element 3), and "Acceptance Criteria" (Element 6), for the acceptability of the exceptions is as follows:

Scope of Program - The program is focused on managing the conditions that cause general pitting and MIC of the diesel fuel tank internal surfaces. The program serves to reduce the potential of exposure of the tank internal surface to fuel oil contaminated with water and microbiological organisms.

Parameters Monitored or Inspected - The Fuel Oil Chemistry Program monitors fuel oil quality and the levels of water and microbiological organisms in the fuel oil, which cause the loss of material of the tank internal surfaces. The ASTM Standard D 4057 is used for guidance on oil sampling. The ASTM Standards D 1796 and D 2709 are used for determination of water and sediment contamination in diesel fuel. For determination of particulates, modified ASTM D 2276, Method A, is used. The modification consists of using a filter with a pore size of 3.0 microns, instead of 0.8 microns. These are the principal parameters relevant to tank structural integrity.

Acceptance Criteria - The ASTM Standard D 4057 is used for guidance on oil sampling. The ASTM Standards D 1796 and D 2709 are used for guidance on the determination of water and sediment contamination in diesel fuel. Modified ASTM D 2276, Method A is used for determination of particulates. The modification consists of using a filter with a pore size of 3.0 microns, instead of 0.8 microns.

Based on the description of the program, the applicant, in its evaluation of the AMP, concluded that the continued implementation of the ASME Code Section XI Subsection IWE Inservice Inspection Program provides reasonable assurance that the aging effects will be managed so that the structures within the scope of this program will continue to perform their intended functions consistent with the CLB for the period of extended operation.

The existing program is not consistent since it takes exceptions

Staff Evaluation. During its review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the BFN audit and review report. Furthermore, the staff reviewed the exceptions and their justifications to determine whether the AMP, with exceptions, remains adequate to manage the aging effects for which it is credited.

The staff evaluation consists of identifying and accepting departures from the provisions of the GALL Report. In the program description, the applicant takes three exceptions, which are discussed as follows.

Need to address that these exceptions are applicable to Unit 1 per annual update letter of Jan 31, 2006

Exception 1. The ASME Code Section XI, 1992 Edition, 1992 Addenda requires visual examination VT-3 of containment seals and gaskets. In lieu of a visual examination, BFN takes an exception to this requirement and requests exception that the test be performed in accordance with the 10 CFR 50 Appendix J Program to determine degradation of seals and gaskets. The applicant, in evaluating this exception, stated that examination of most seals and gaskets require the joints to be disassembled. When the airlocks, hatches, electrical penetrations, and flanged connections are tested in accordance with 10 CFR 50 Appendix J, degradation of the seal or gasket material is revealed by an increase in the leakage rate. Corrective measures can then be applied and the component re-tested. The applicant received a relief from these requirements for Units 2 and 3 for the current interval.

Exception 2. The applicant seeks a second exception to the ASME Code of record for BFN, which requires torque or tension testing on pressure-retaining bolted connections that have not been disassembled and reassembled during the inspection interval. The applicant, however, seeks to perform a test conforming to 10 CFR 50 Appendix J testing in lieu of a bolt torque or tension test as required by the Code for these bolted connections. There is current relief that authorizes this for Units 2 and 3 for the current interval.

Exception 3. The applicant seeks a third exception to the ASME Code, which requires that, when component examination results require evaluation of flaws, areas of degradation, or repairs in accordance with article IWE-3000, and the component is found to be acceptable for continued service, the areas containing such flaws, degradation, or repairs shall be reexamined during the next inspection period listed in the schedule of the inspections program. When the reexaminations reveal that the flaws, areas of degradation, or repairs remain essentially unchanged for three consecutive inspection periods, the areas containing such flaws, degradation, or repairs no longer require augmented examination in accordance with Table IWE-2500-1 Examination Category E-C. At BFN, if the repair has restored the component to an acceptable condition, reexaminations during subsequent inspection periods are not performed.

Introduction paragraph needed to describe the purpose of the following evaluations:

Indent may not be appropriate since this is not a quote, Comment applies to pp. 3-81 to 3-83 also

(1) Scope of Program - In the LRA, the scope of the program is as described in IWE-1000 of Subsection IWE, of the ASME Code together with the exemptions as identified in IWE-1220, and additional requirements for inaccessible areas as promulgated in 10 CFR 50.55a(b)(2)(ix). The staff found that the plant-specific program scope is in conformance with Section XI.S1 of the GALL Report. Therefore, the staff found the program element acceptable.

(2) Preventive Action - The applicant does not take exception to the program element.

(3) Parameters Monitored or Inspected - The staff evaluated this program element and studied the impacts on Exceptions 1 and 2.

Staff evaluation: Exception 1 - ASME Code Examination Category E-D of Table IWE-2500-1 requires visual examination of pressure boundary seals and gaskets. The applicant stated in Exception 1 that it utilizes tests performed in accordance with 10 CFR 50 Appendix J, in lieu of a visual examination, to determine degradation of seals and gaskets. In order to evaluate the exception, the staff needed additional information.

In RAI 3.5-2, dated December 10, 2004, the staff inquired about the aging management of containment penetration seals and gaskets by pointing out that seals and gaskets related to containment penetrations (in Item Number 3.5.1-6 of Table 3.5.1) are proposed to be managed by the containment inservice inspection (AMP B.2.1.32) and the containment leak rate testing (AMP B.2.1.34). As a result of Exception 1 to AMP B.2.1.32, the staff questioned whether the AMP will be applicable for aging management of containment seals and gaskets. The staff said that for equipment hatches and air-locks at BFN, the approach is that the leak rate testing program will monitor aging degradation of seals and gaskets, as they are leak rate tested after every opening. The staff wanted the applicant to clarify whether the assumptions are correct. The staff also requested information for mechanical and electrical penetrations with seals and gaskets, if the Type B leak rate testing and frequency was adequate to monitor aging degradation of seals and gaskets of containment drywell. The staff also requested the status of inspection and conditions of the seals and gaskets of these penetrations at Unit 1.

In its response, dated January 31, 2005, the applicant noted that, according to ASME Code Section XI, 1992 Edition, with 1992 Addenda, Category E-D, Item Numbers E5.10 (seals), and E5.20 (gaskets) require a visual examination, VT-3, of containment seals and gaskets. Examination of most seals and gaskets requires the joints to be disassembled. When the airlocks, hatches, electrical penetrations, and flanged connections are tested in accordance with 10 CFR 50 Appendix J, degradation of the seal or gasket material would be revealed by an increase in the leakage rate, and corrective measures would be applied and the component retested. In its response, the applicant stated that the staff previously granted relief request CISI-1 for containment seals and gaskets in BFN, which allows it to perform the Appendix J test in lieu of the VT-3 visual examination. The applicant also stated that the moisture barriers continue to receive a visual VT-3 examination in accordance with ASME B&VP category E-D for all three units. The scope of the 10 CFR 50 Appendix J Program includes all pressure-

retaining components, the containment shell (drywell and torus) and penetrations which include all the components within the scope of the program (see staff SER Section 3.5-2).

The applicant also stated that O-ring seals (flanges, hatches, etc.) for Units 2 and 3 are tested on 30- or 60-month intervals. In reporting the status of these items, the applicant said that seal failures have occurred sporadically since restart. The Units 2 and 3 drywell heads have experienced failures and are currently classified as Maintenance Rule (a)(1) for corrective actions items. The applicant also said that currently there are no electrical penetration-related performance problems at Unit 2 and that all electrical penetrations in Unit 2 are currently on a 120-month test interval. Testing of these has identified only minor problems such as gauge, tubing, and root valve leaks. Unit 3 electrical penetrations are on 30-, 60-, or 72-month frequency test intervals, and the applicant reported that, in general, these tests have identified only minor problems such as gauge, tubing, and root valve leaks. However, one electrical penetration (3-EPEN-100-0101C) on Unit 3 experienced a failure, which the applicant said was repaired, and is currently put on a 30-month test interval. Other electrical penetrations are tested at a 60-month interval. The remainder of the Unit 3 electrical penetrations are on a 72-month test interval.

test

With regard to Unit 1, the applicant said that the applicant will perform a Type B ~~testing~~ as part of the Unit 1 restart effort and will continue to test at a frequency of 30 months until sufficient test performance data are available to justify an extended test interval under Option B.

The staff found the above response to RAI 3.5-2 acceptable, therefore the staff's concerns described in RAI 3.5-2 is resolved.

The staff in evaluating the applicant response concluded that the applicant satisfactorily described the existing process used in identifying degradation of the primary containment penetration seals and gaskets. Also, since the applicant plans to continue with the testing and corrective action process during the period of extended operation, the staff finds the applicant's process of managing the aging of the pressure-retaining seals and gaskets of primary containments and the exception under this program element acceptable.

Staff evaluation of Exception 2 - ASME Code requires torque testing of pressure-retaining bolts of Examination Category E-G, item E8.2 of Table IWE-2500-1. The applicant in exception 2, takes exception from the ASME requirement and requests to perform a test conforming to 10 CFR Part 50, Appendix J testing in lieu of a bolt torque or tension test. The staff has provided relief to this IWE requirement to a number of PWR licensees; however, in the case of BWR containments, the staff has a concern about the adequacy of Type A, Appendix J, leak rate testing to monitor the aging degradation of drywell head bolts, particularly as the Type A testing interval has been extended to 10 and 15 years. During the AMR results review, staff developed RAI 3.5-3 for the applicant's response.

In RAI 3.5-3, dated December 10, 2004, the staff requested information about the testing and inspection of drywell-head components by noting that the containment drywell-head to drywell joint consists of a pressure unseating containment boundary with pre-loaded bolts. Loosened bolts and deteriorated gasket and/or seal can breach containment pressure boundary. The staff felt that

Exceptions 1 and 2, taken in the containment ISI program will preclude examinations of seals and bolts of this joint. The staff contended that only Type A leak rate testing and associated visual examination requirements of Appendix J Pprogram can be relied upon to detect defects and degradation of this joint, whose test interval can be 10 to 15 years. The applicant was requested to provide information regarding the plans and programs that are used to ensure the integrity of this joint for each containment. The staff also requested the applicant to provide the status of the components (O-rings and bolts) at this joint for Unit 1.

In its response to RAI 3.5-3, dated January 31, 2005, the applicant stated that these containment pressure boundary components will continue to be inspected consistent with the BFN CLB under 10 CFR Part 50, Appendix J Program requirements. On Units 2 and 3 the Type A test frequency is currently on a 10-year interval. There have been no performance-based Type A test failures on Units 2 or 3. The applicant in its response stated that a Type A Integrated Leak Rate Test will be performed ~~as part of the~~ on Unit 1 prior-to-restart. Type B testing is also performed on the drywell-head seal every refueling outage for all three units. Therefore, with the combination of the Type A tests and Type B tests, integrity for this joint for each containment is assured. Exception 2 pertains to bolt torque or tension testing. Pressure-retaining bolting associated with the containment drywell-head to drywell joint is examined in accordance with ASME Code Section XI, Subsection IWE. The applicant also stated that BFN performs Type B testing of drywell-head seal every outage, and examines the pressure-retaining bolts of the drywell-head in accordance with Subsection IWE of the ASME Section XI Code. The staff is satisfied that these two activities together with periodic Type A testing will ensure the integrity of this joint.

Delete, not needed and not related to exception 2 being discussed in previous sentence.

Therefore, the staff found the applicant's practice of ensuring the integrity of this joint acceptable and the exception 2 as proposed is acceptable.

(4) Detection of Aging Effects - The applicant does not take exception to the program element.

(5) Monitoring and Trending - The staff evaluated this program element and studied the impacts of exception 3 on it. This exception concerns component examination results that require evaluation of flaws, areas of degradation, or repairs in accordance with Article IWE-3000, of ASME B&PV code (see above). The applicant in performing a plant-specific evaluation of this element stated that the staff previously granted the applicant a relief request (~~CISI-319~~ CISI-3) for Units 2 and 3 for its current inspection intervals from the requirement of Paragraphs IWE-2420(b) and IWE-2420(c) to perform reexaminations during subsequent inspection periods of the repaired areas if the repair has restored the component to an acceptable condition. In evaluating the exception, the staff took the position that if flaws and degradations had been repaired and restored in accordance with the requirements of IWA-4000, the staff provided relief to a number of licensees (and applicants) from the requirements of IWE-2420(b) and (c). In granting that relief, staff considered the requirements as an unnecessary burden without a commensurate safety benefit. Therefore, the staff found the exception as it impacted this program element acceptable.

(6) Acceptance Criteria - Acceptable, as no exception taken to GALL AMP X1.S1.

(7) Corrective Actions - The applicant does not take exception to the program element.

(8) Confirmation Process - Acceptable, as no exception taken to GALL AMP X1.S1.

(9) Administrative Controls - Acceptable, as no exception taken to GALL AMP X1.S1.

(10) Operating Experience - The applicant reviewed plant-specific ASME Section XI, Inservice Inspection Program performance results that have been generally effective in managing aging effects in ASME components. In LRA Section B.2.1.32, the applicant provided the following description of plant-specific operating experience.

The drywell steel containment vessel is inaccessible (except for the drywell head) for visual examination from the outside surface. There has been evidence of water leaking from the sand bed drains on both Units 2 and 3. Since there is a horizontal weld connecting the first and second course of drywell liner plates approximately 8 inches above the drywell concrete floor, UT thickness measurements from the drywell floor up to this weld around the drywell circumference would conservatively bound the sand pocket area. UT thickness measurements of this area were obtained during the U2C10 and U3C8 refueling outages for Units 2 and 3, respectively, and in 1999 and 2002 for Unit 1. The data indicated that the condition of the drywell steel liner plate in this area is good, and that this area did not require augmented examination.

The internal drywell steel containment vessel embedment zone is subject to corrosion if the drywell floor-to-containment vessel moisture barrier fails, allowing moisture intrusion; or if the concrete floor of the drywell cracks, allowing moisture seepage through to the steel liner. During the Unit 2 U2C9 outage, a portion of the moisture barrier was replaced. Inspection of the exposed drywell steel containment vessel area below the moisture seal indicated some minor pitting and localized rust, but there was not a challenge to nominal wall thickness. No propagation of iron oxide to the concrete surface was noted; its presence would have indicated steel containment vessel corrosion below the concrete. The concrete floor above the embedded steel containment vessel is examined as part of the Structures Monitoring Program (B.2.1.36). Based on existing inspection documentation and maintenance practices, this area has not exhibited signs of accelerated degradation.

The penetration bellows at BFN have no documented failures as a result of routine testing by the BFN Appendix J program or inspections conducted by the Containment Inservice Inspection Program.

Inspections conducted under the Containment Inservice Inspection Program identified some damaged areas of the moisture seal barrier (gaps, cracks, low areas/spots, or other surface irregularities) in Units 2 and 3 that required repair.

<u>Operating experience related to containment structure components</u>: The staff pursued some of the performance results in staff RAI 3.5-5 as a part of the AMR of containment structure components. The staff evaluated this item in the above AMR item, which also impacts the

Should this be 3.5-4 or should refer to 3.5-4 here also.

ASME Code Section XI subsection IWE Program and the inspection procedure used to detect deterioration of the concrete structures inside drywell. In a final response to the staff RAI 3.5-5, dated May ~~25~~ 24, 2005, the applicant comprehensively addressed all the staff issues. In closing out RAI 3.5-5, the staff concluded that the applicant's program was adequate and acceptable. The disposition and resolution of RAI 3.5-5 can be found in SER Section 3.5.2.3.1.

<u>Operating experience related to torus shells:</u> NRC IN 88-82, "Torus Shells with Corrosion and Degraded Coatings in BWR Containments," describes and discusses the problems associated with corrosion of torus shells. In RAI B.2.1.32-~~3~~1, dated December 10, 2004, the staff asked the applicant to provide information regarding the status of torus shells. In applying NRC IN 88-82, the staff requested the applicant to provide operating experience related to inspection of torus shells at BFN. since the quality of torus water in Unit 1 torus may not have been monitored during its long layup period, the staff requested additional discussion of the condition of the torus for Unit 1.

In its response, dated January ~~25~~ 31, 2005, the applicant stated that the torus interior surfaces at the waterline were subject to corrosion due to moisture and repeated wetting and drying in the waterline region. Accessible portions of the torus inside surface were inspected each refueling outage. UT thickness measurements taken in torus underwater areas of both Units 2 and 3 revealed no evidence of excessive degradation (all readings were within 10 percent of nominal wall thickness). The applicant confirmed that previous inspections had documented evidence of minor coating degradation at the waterline region. Based on the above, the applicant concluded that the underwater region of the torus had not been subjected to accelerated degradation.

The applicant, furthermore, stated that, since evidence of repeated loss of coatings had been documented in the waterline region, augmented examination of this area was warranted as a conservative measure on Units 2 and Unit 3.

Regarding Unit 1, the applicant stated that during its layup period, the water in the Unit 1 torus (pressure suppression pool) was maintained by ~~its~~ the site "chemistry program." The torus was drained in the summer of 2003 for coating repair, which will be completed as a part of the Unit 1 recovery effort. The applicant also stated that a VT-3 visual examination was performed on the Unit 1 torus in August 2003. This examination included 100 percent of the Code Class MC boundary inside the torus, which included shell and ring girders, and both sides of the vent system to include main vent line, vent header, and downcomers. The visual examination found light-to-medium rust or discoloration in several areas and heavy rust in smaller, less frequent areas. There were also some instances of base metal encroachment, such as gouges, scratches, and tool marks. Engineering evaluation of the examination results determined that the torus structural condition was acceptable as is, with no base metal repairs required.

Moreover, the applicant emphasized that the requirements of ASME Section XI Inservice Inspection Subsection IWE, 1992 Edition with the 1992 Addenda will be implemented on Unit 1. Type A, B, and C leak rate testing required by 10 CFR 50, Appendix J will also be performed prior to Unit 1 restart.

The applicant reviewed site-specific work history data to confirm that an adequate number of inspection opportunities are afforded by the IWE program. The applicant also stated in the LRA that the plant Corrective Action Program, which captures internal and external plant operating experience issues, provides reasonable assurance that operating experience will be reviewed in

need to provide where this year came from.

the future to provide objective evidence to support the conclusion that the effects of aging will be managed adequately.

The staff found the applicant's process of monitoring the condition of the torus in Units 2 and 3 acceptable, as its continuation during the period of extended operation provides adequate assurance regarding the ability of the torus to perform their intended function. The applicant has monitored the quality of water and condition of torus surfaces in the immediate past (since 2003) and plans to continue the ISI activities in accordance with this AMP. Therefore, the staff found the applicant's procedures acceptable, as it will ensure the ability of the torus to perform its pressure-retaining function during the period of extended operation.

UFSAR Supplement. In LRA Section A.1.29, the applicant provided the UFSAR supplement for the ASME Code Section XI Subsection IWE Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review, RAI responses, and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the exceptions and the associated justifications and determined that the AMP, with exceptions, is adequate to manage the aging effects for which it is credited. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.21 ASME Section XI Subsection IWF Program

Summary of Technical Information in the Application. The applicant's ASME Code Section XI Subsection IWF Program is described in LRA Section B.2.1.33, "ASME Section XI Subsection IWF Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with an exception, with GALL AMP XI.S3, "ASME Section XI Subsection IWF."

The LRA states that 10 CFR 50.55a imposes the inservice inspection requirements of the ASME B&PV code Section XI for Class 1, 2, and 3 piping and component supports. Inspection of equivalent Class 1, 2, and 3 piping and component supports covered in subsection IWF is performed in accordance with the 1995 edition through the 1996 addenda for the Units 1 and 2 current inspection interval. Inspection of equivalent Class 1, 2, and 3 piping and component supports covered in subsection IWF is performed in accordance with the 1989 edition and Code Case N-491 "Alternative Rules for Examination of Class 1, 2, 3, and MC Component Supports of Light-Water Power Plants, Section XI Division 1," for the Unit 3 current inspection interval.

This program is not consistent since it takes exceptions

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the BFN audit and review report. Furthermore, the staff reviewed the exception and its justifications to determine whether the AMP, with an exception, remains adequate to manage the aging effects for which it is credited.

The staff considers the applicant's IWF program to be consistent with GALL, except for the element of "Scope." GALL presents a generic evaluation of the IWF Program, which serves as a mandated program for inspection of ASME Class 1, 2, 3, and MC supports. The applicant's existing IWF program is not consistent with GALL in that it does not include the inspection of Class MC supports. There is no discussion in LRA Section B.2.1.33 of the inspection performed for the supports on MC piping and components. In RAI B.2.1.33-1, the staff requested the applicant to provide a description of the supports of MC piping and components in BFN. By letter dated January 18, 2005, the applicant stated that:

The RAI requested information on inspections. It did not request a description of the supports.

> The Class MC boundaries include the steel containment vessel (SCV), which is comprised of the drywell, pressure suppression chamber or torus and associated vent piping, including vertical and circumferential structural stiffeners; penetrations, reinforcement structure, the portion of the SCV embedded in the drywell concrete floor slab, and attachment welds between structural attachments and the SCV pressure retaining boundary or reinforcing structure.

The applicant stated that there is no Class MC piping at BFN. Piping in the scope of license renewal located in the containment that is not ASME equivalent Class 1, 2, or 3 is evaluated as non-ASME piping, and covered in its AMR. The staff considered the above classification of the MC component supports to be acceptable. Therefore, the staff's concern described in RAI B.2.1.33-1 is resolved.

RAI B.2.1.33-2. As an exception to the GALL Report, LRA Section B.2.1.33 states that the aging effects for supports on MC components will be managed by the Structures Monitoring Program (B.2.1.36), or Chemistry Control Program (B.2.1.5) with associated One-Time Inspection Program (B.2.1.29) for submerged supports during the period of extended operation. The staff found this exception to be unacceptable. This is because ASME Code Section XI, Subsection IWF constitutes an existing mandated program applicable to managing aging of ASME Class 1, 2, 3, and MC supports for license renewal. In RAI B.2.1.33-2, the staff requested the applicant to revise LRA Section B.2.1.33 to include within its scope the aging management of supports of Class MC components. By letter dated May 31, 2005, the applicant stated that the IWF Program will be revised to include the supports of the drywell, torus, and vent system in the scope of the program. This is a acceptable to the staff, and RAI B.2.1.33-2 is closed.
except submerged supports

The applicant's discussion of the IWF Program is focused on accessible supports on MC components. There is no discussion of components in inaccessible areas. In RAI B.2.1.33-3, the staff requested the applicant to describe the method by which the supports on Class MC components in inaccessible areas will be managed during the period of extended operation. By letter dated January 18, 2005, the applicant stated that none of the torus cradles, downcomer supports, or vent header supports located in containment air or inside air environments are inaccessible. For the vent downcomer and vent header supports that are submerged in a torus water environment, the applicant stated that the Chemistry Control Program and One-Time Inspection Program will be used to manage the aging effects. The staff considered the applicant's response to have adequately addressed its concern on the aging management of inaccessible supports of MC components. RAI B.2.1.33-3 is, therefore, closed.

Based on the information provided in the LRA and the applicant's responses to the RAIs, the staff finds that the applicant's IWF Program is acceptable. The supports of MC components will be adequately managed during the period of extended operation.

adverse

Operating Experience. The applicant did not indicate any operating experience for this program.

UFSAR Supplement. In LRA Section A.1.30, the applicant provided the UFSAR supplement for the IWF Inspection Program The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review, the staff found that the applicant's IWF program is consistent with Section XI.S3 of the GALL. Based on the information provided by the applicant, the staff concluded that the accessible supports of the MC components will be adequately inspected by the IWF Program during the period of extended operation. The staff concluded that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR Supplement program summary for the IWF Program and concluded that, it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.22 Masonry Wall Program

Summary of Technical Information in the Application.The applicant's Masonry Wall Program is described in LRA Section B.2.1.35, "Masonry Wall Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with an enhancement, with GALL AMP XI.S5, "Masonry Wall Program."

In LRA Section B.2.1.35, the applicant stated that the Masonry Wall Program provides for condition monitoring of masonry walls. The program is included in the Structures Monitoring Program that implements the structures monitoring requirements of 10 CFR 50.65 Maintenance Rule. Masonry wall condition monitoring is based on guidance provided in NRC Bulletin 80-11 "Masonry Wall Design" and IN 87-67 "Lessons Learned from Regional Inspections of Licensee Actions in Response to I.E. Bulletin 80-11." Visual inspections are performed consistent with techniques identified in industry codes and standards such as American Concrete Institute (ACI) 349.3 R-96, "Evaluation of Existing Nuclear Safety-Related Concrete Structures," and ANSI/American Society of Civil Engineers (ASCE) 11-90, "Guideline for Structural Condition Assessment of Existing Buildings."

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the BFN audit and review report. Furthermore, the staff reviewed the enhancement and its justifications to determine whether the AMP, with enhancement, remains adequate to manage the aging effects for which it is credited.

The staff reviewed the program elements (see SER Section 3.0.2.1) for the Masonry Wall Program and its associated bases documents, and compared them to those listed for AMP XI.S5 in the GALL Report for consistency.

Enhancement. In the LRA Section B.2.1.35, the applicant identified an enhancement to make this AMP consistent with GALL AMP XI.S5. Program procedures will be revised so that structures with masonry walls within the scope of license renewal are clearly identified and the qualification requirements for personnel who perform masonry wall walkdowns within the scope

review report, the applicant confirmed that protective coatings are not credited to manage aging effects for license renewal.

Use of capitalizan of building names should be consistent

The staff noted that the program is being expanded to include the inspection of piles and asked the applicant to clarify the types of inspections that will be performed for piles. The applicant stated that piles associated with Gate Structure Number 3 and the diesel high-pressure fire protection (HPFP) house will be visually inspected by the Structures Monitoring Program. The portion of the piles exposed to the submerged and outside air environments will be visually inspected by the Structures Monitoring Program. The staff concluded that the AMP would not require any further enhancements to perform the inspections of piles as described by the applicant.

In LRA Section B.2.1.36, the applicant identified three enhancements to make this AMP consistent with GALL AMP XI.S6.

~~Enhancement 1.~~ The staff evaluation of the affected GALL program elements "Scope of Program" (Element 1) and "Parameters Monitored or Inspected" (Element 3), for the acceptability of the first enhancement is as follows:

> Scope of Program. The applicant specifies the structure/aging effect combinations that are managed by its Structures Monitoring Program.
>
> Parameters Monitored or Inspected. For each structure/aging effect combination, the specific parameters monitored or inspected are selected to ensure that aging degradation leading to loss of intended functions will be detected and the extent of degradation can be determined. Parameters monitored or inspected are to be commensurate with industry codes, standards and guidelines, and are to also consider industry and plant-specific operating experience. Although not required, ACI 349.3R-96 and American National Standards Institute (ANSI)/ASCE 11-90 provide an acceptable basis for selection of parameters to be monitored or inspected for concrete and steel structural elements and for steel liners, joints, coatings, and waterproofing membranes (if applicable). If necessary for managing settlement and erosion of porous concrete subfoundations, the continued functionality of a site dewatering system is to be monitored. The plant-specific Structures Monitoring Program is to contain sufficient detail on parameters monitored or inspected to conclude that this program attribute is satisfied.

Enhancement 1 - The applicant will enhance procedures implementing the 10 CFR 50.65 Maintenance Rule Program to identify all structures and structural components within the scope of license renewal and all aging effects and associated mechanisms for inspection.

The staff asked the applicant how the structural components and supports that are identified as an enhancement to the scope of the AMP are currently being managed and if a baseline inspection of these structural components and supports will be performed prior to the period of extended operation.

The applicant, as documented in the staff's audit and review report, stated that the identified structural component supports that are to be added to the Structures Monitoring Program are currently being managed by the plant work control procedures and the Corrective Action

Program. The applicant further stated that all Structures Monitoring Program enhancements required to document structural components and structural support inspections will receive a baseline inspection prior to the period of extended operation. Structures Monitoring Program baseline inspections are currently required by Section 5.1 of LCEI-CI-C9.

The staff noted that the AMP evaluation states that procedures in BFN Technical Instruction 0-TI-346 and LCEI-CI-C9 will be enhanced to identify all aging effects and associated aging mechanisms to be inspected. Aging effects and mechanisms considered will be consistent with the GALL Report and Section 4 of ACI 349.3R-96. BFN operating experience is considered for selecting each structure/aging effect combination. The aging effects for structures monitored and inspected that will be identified in 0-TI-346 and LCEI-CI-C9 enhancements are documented in the staff's BFN audit and review report.

The staff concurred that this enhancement is consistent with the GALL Report.

Enhancement 2. The staff evaluation of the affected GALL program element "Detection of Aging Effects" (Element 4) for the acceptability of the second enhancement is as follows:

Detection of Aging Effects. For each structure/aging effect combination, the inspection methods, inspection schedule, and inspector qualifications are selected to ensure that aging degradation will be detected and quantified before there is loss of intended functions. Inspection methods, inspection schedule, and inspector qualifications are to be commensurate with industry codes, standards and guidelines, and are to also consider industry and plant-specific operating experience. Although not required, ACI 349.3R-96 and ANSI/ASCE 11-90 provide an acceptable basis for addressing detection of aging effects. The plant-specific structures monitoring program is to contain sufficient detail on detection to conclude that this program attribute is satisfied.

The applicant will enhance LCEI-CI-C9 implementing the 10 CFR 50.65 Maintenance Rule Program sampling approach to include examinations of representative samples of below-grade concrete when excavated for any reason.

The staff concurred that this enhancement is consistent with the GALL Report.

Enhancement 3. The staff evaluation of the affected GALL program element "Detection of Aging Effects" (Element 4) for the acceptability of the third enhancement is as follows:

Detection of Aging Effects. (See element description above)

The applicant will enhance LCEI-CI-C9 implementing 10 CFR 50.65, The Maintenance Rule Program, to include the guidance provided in ACI 349.3R-96 Chapter 7 to clarify the "suitably knowledgeable or trained" inspector qualifications to "training and proficiency demonstration of inspectors for structural aging effects and long term performance issues." The procedures will also be clarified to identify the "responsible engineer" as the "structures monitoring program engineer" to avoid confusion with industry guidance. LCEI-CI-C9 will also be clarified to identify the "Responsible Engineer" as the "Structures Monitoring Program Engineer" to avoid confusion with industry guidance.

The staff had a follow up question in a May 4, 2005 conference call regarding evaluation of inspection personnel qualification based on Industry Guidance American Concrete Institute (ACI) 349.3R-96 as stated in the Structures Monitoring Program. The staff stated that this industry guidance alone will not be adequate to qualify the inspectors for the examination of steel supports for the Structures Monitoring Program. The staff requested that the applicant reevaluate the program element from previous staff positions and submit the description for staff review. The applicant responded to the staff's question and committed to manage the aging effects of Class MC supports under ASME Code Section XI Subsection IWF. In its response to a follow up to RAI B.2.1.33-1, the applicant also agreed to include the inspector's qualification in accordance with the requirements of ASME Code Section XI Subsection IWF and not per the BFN Structures Monitoring Program. The applicant agreed to provide this in a docketed correspondence. This is CI-B.2.1.36.

Subject to the applicant's complying by submitting this resolution of this confirmatory item, the staff concurred that this enhancement is consistent with the GALL Report.

Operating Experience. In LRA Section B.2.1.36, the applicant stated that plant-specific performance results of the structures monitoring program had been reviewed. The program has been shown to be effective in managing aging effects of structural features and components. Examples of the plant-specific operating experience issues are documented in the staff's BFN audit and review report and were determined to be insignificant with respect to maintaining structural adequacy. Defects were identified as PERs and dispositioned in accordance with the Maintenance Rule program by methods such as repair, cause determination, cause mitigation, or monitoring to ensure the continued availability of the function.

In addition to the operating experience discussed in the AMP, the AMP evaluation stated that a baseline inspection for the Structures Monitoring Program was established in 1997 and is documented in calculation CD-Q0303-970086. Defect evaluations performed since the baseline inspection and inspection results from the 2002 Structures Monitoring Program are documented in calculation CDQ01 ~~CD-Q0~~303-2003-0260. Observed aging effects for structures in the scope of license renewal were evaluated not to significantly challenge the ability of structures to meet design requirements or perform their intended function.

During the onsite audit, the staff noted that the applicant incorporates internal and external plant operating experience issues into the plant Corrective Action Program on a continuing basis. The staff concluded there is reasonable assurance that operating experience will continue to be reviewed in the future to ensure that the effects of aging will be adequately managed, consistent with the guidance in the GALL Report.

UFSAR Supplement. In LRA Section A.1.33, the applicant provided the UFSAR supplement for the Structures Monitoring Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended

operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.24 Inspection of Water-Controlled Structures Program

Summary of Technical Information in the Application. The applicant's Inspection of Water-Controlled Structures Program is described in LRA Section B.2.1.37, "Inspection of Water-Controlled Structures Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with enhancements, with GALL AMP XI.S7, "RG 1.127, Inspection of Water-Controlled Structures Associated with Nuclear Power Plants."

In LRA Section B.2.1.37, the applicant stated that the Inspection of Water-control Structures Program manages age-related deterioration, degradation due to extreme environmental conditions, and the effects of natural phenomena that may affect water-control structures. BFN is not committed to RG 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants," but has a program in place that is consistent with the elements of RG 1.127, as evaluated in the GALL Report. The program is included in the Structures Monitoring Program (B.2.1.36), which implements the structures monitoring requirements of 10 CFR 50.65 "Maintenance Rule." The Inspection of Water-control Structures Program includes in-service inspection and surveillance activities for dams, slopes, canals, and other water-control structures.

Staff Evaluation. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the BFN audit and review report. Furthermore, the staff reviewed the enhancements and its justifications to determine whether the AMP, with enhancements, remains adequate to manage the aging effects for which it is credited.

The staff reviewed the program elements (see SER Section 3.0.2.1) contained in the AMP, associated bases documents, and the implementing documents, and compared them to those listed for AMP XI.S7 in the GALL Report for consistency. The staff did not request any clarifications or additional information from the applicant for this AMP.

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Enhancement 1. Although the LRA indicates that this enhancement affects GALL Report program element "Parameters Monitored or Inspected" (Element 3), the staff noted that the description of the enhancement in the LRA more appropriately pertains to GALL Report program element, "Scope of Program" (Element 1). Therefore, the staff evaluated this enhancement against the GALL Report element as follows.

> Scope of Program - RG 1.127 applies to water-control structures associated with emergency cooling water systems or flood protection of nuclear power plants. The water-control structures included in the RG 1.127 program are concrete structures; embankment structures; spillway structures and outlet works; reservoirs; cooling water channels and canals, and intake and discharge structures; and safety and performance instrumentation.

Move to previous page after Enhancement 1.

The applicant will enhance program documents to ensure that required structures and structural components within the scope of license renewal are identified.

The applicant's AMP basis document (AMP evaluation) states that the scope of the Inspection of Water-Controlled Structures Program includes the following list of structures identified in BFN Technical Instruction 0-TI-346, Attachment 38:

- intake pumping station
- gate structure No. 3
- intake channel
- north bank of cool water channel east of gate structure Number 2
- south dike of cool water channel between gate structure Number 2 and 3 (only that portion of the south dike over the RHRSW discharge piping)

delete

Procedures 0-TI-346 and LCEI-CI-C9 will be enhanced to identify all structures and structural components within the scope of license renewal. Component enhancements will expand the walkdown checklist of structural steel components to include items such as anchors, bolts, fasteners, and other miscellaneous steel and non-ferrous materials. Component enhancements will also require expanding the checklist for seismic gaps to include seals and caulking that are used to prevent flooding. Component enhancements will be based on the list of structural components within the scope of license renewal in the AMR.

BFN Technical Instruction 0-TI-246 augments LCEI-CI-C9 in that it provides the inspection requirements for water holding or transporting earthen structures. The scope of 0-TI-246 is identified in Appendix A and includes the intake channel, north bank of cool water channel east of gate structure Number 2, and the south dike of cool water channel between gate structure Numbers 2 and 3. Appendix A of BFN Technical Instruction 0-TI-246 will be enhanced to indicate that the intake channel, north bank of cool water channel east of gate structure Number 2, and south dike of cool water channel between gate structure Numbers 2 and 3 (only that portion of the south dike over the RHRSW discharge piping) are within the scope of license renewal and require aging management. The staff concurred that this enhancement is consistent with the GALL Report.

> Parameters Monitored or Inspected. RG 1.127 identifies the parameters to be monitored and inspected for water-control structures. The parameters vary depending on the particular structure. Parameters to be monitored and inspected for concrete structures include cracking, movements (e.g., settlement, heaving, deflection), conditions at junctions with abutments and embankments, erosion, cavitation, seepage, and leakage. Parameters to be monitored and inspected for earthen embankment structures include settlement, depressions, sink holes, slope stability (e.g., irregularities in alignment and variances from originally constructed slopes), seepage, proper functioning of drainage systems, and degradation of slope protection features. Further details of parameters to be monitored and inspected for these and other water-control structures are specified in Section C.2 of RG 1.127.

The applicant's AMP basis document states that 0-TI-346 and LCE-CI-C9 provide for monitoring of concrete structures, structural steel, non-ferrous components, and earthen structures. BFN Technical Instruction 0-TI-246 augments LCEI-CI-C9 and provides the inspection requirements for water holding or transporting earthen structures such as ponds, channels, and associated

dikes. BFN Technical Instruction 0-TI-346 and LCEI-CI-C9 will be enhanced to identify aging effects and associated aging mechanisms to be inspected, consistent with GALL Chapter III for Group 6 structures, Section 4 of ACI 349-3R-96, and the EPRI Structural Tools document. The aging effects identified in the 0-TI-346 and LCEI-CI-C9 enhancements are included as enhancements to the Structures Monitoring Program. The staff concurred that these enhancements are consistent with the GALL Report.

Enhancement 2. The staff evaluation of the affected GALL Report program element "Detection of Aging Effects" (Element 4) for the acceptability of the second enhancement is as follows:

> Detection of Aging Effects. Visual inspections are primarily used to detect degradation of water-control structures. In some cases, instruments have been installed to measure the behavior of water-control structures. RG 1.127 indicates that the available records and readings of installed instruments are to be reviewed to detect any unusual performance or distress that may be indicative of degradation. RG 1.127 describes periodic inspections, to be performed at least once every five years. Similar intervals of five years are specified in ACI 349.3R for inspection of structures continually exposed to fluids or retaining fluids. Such intervals have been shown to be adequate to detect degradation of water-control structures before they have a significant effect on plant safety. RG 1.127 also describes special inspections immediately following the occurrence of significant natural phenomena, such as large floods, earthquakes, hurricanes, tornadoes, and intense local rainfalls.

The applicant's program will enhance the documents to include special inspections following the occurrence of large floods, earthquakes, tornadoes, and intense rainfall.

The applicant's AMP basis document states that 0-TI-246 Section 7.2 specifies a special inspection of water-holding or water-transporting earthen structures within 30 days following extreme environment or natural phenomena. LCEI-CI-C9 will be enhanced to include a special inspection for the intake pumping station and gate structure No. 3, following the occurrence of large floods, earthquakes, tornadoes, and intense rainfall. The staff concurred that this enhancement is consistent with the GALL Report.

Operating Experience. In LRA Section B.2.1.37, the applicant stated that plant-specific performance results of the Inspection of the Water-Control Structures Program, as implemented by the Structures Monitoring Program to meet the requirements of 10 CFR 50.65, were reviewed. The program has been shown to be effective in managing aging effects of structural features and components. The applicant identified two examples of plant-specific operating experience.

- Intake pumping station: very minor concrete surface cracks and platform grating clipped
- Gate structure No. 3: very minor concrete surface cracks and spalling

Neither was considered significant enough to affect the function of a structure.

In addition to the operating experience discussed in the LRA, the AMP evaluation stated that a review of the operating experience for water-control structures within the scope of license renewal did not identify any PERs (SPP-3.1 Corrective Action Program) related to RG 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants." A baseline

inspection for the Structures Monitoring Program was established in 1997 and is documented in Calculation CD-Q0303-970086. Defect evaluations performed since the baseline inspection and inspection results from the 2002 Structures Monitoring Program are documented in calculation CDQ0-303-2003-0260. The Structures Monitoring Program inspections noted the above aging effects and associated defect evaluations for water-control structures within the scope of license renewal. Observed aging effects for water-control structures in the scope of license renewal were evaluated not to significantly challenge the ability of water-control structures to meet design requirements or perform their intended function.

During the onsite audit, the staff noted that the applicant incorporates internal and external plant operating experience issues into the plant Corrective Action Program on a continuing basis. The staff concluded there is reasonable assurance that operating experience will continue to be reviewed in the future to ensure that the effects of aging will be adequately managed.

The staff found that the applicant adequately considered operating experience, consistent with the guidance in the GALL Report.

UFSAR Supplement. In LRA Section A.1.34, the applicant provided the UFSAR supplement for the Inspection of Water-Controlled Structures Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the enhancements and confirmed that the implementation of the enhancements prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplement for this AMP and concluded that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.25 Environmental Qualification Program

Summary of Technical Information in the Application. The applicant's EQ Program is described in LRA Section B.~~3.4~~ 3.1, "Environmental Qualification Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with enhancement, with GALL AMP X.E1, "Environmental Qualification of Electric Components."

LRA Section 4.4 affirms the applicant's compliance with generic safety issue (GSI)-168, "Environmental Qualification of Low-Voltage Instrumentation and Control Cables," and follow-up NRC Regulatory Issue Summary 2003-9, "Environmental Qualification of Low-Voltage Instrumentation and Control Cables," May 2, 2003, which the GALL Report cites as a currently open generic issue with ongoing research.

The applicant follows nuclear station EQ requirements in 10 CFR 50.49. The requirements are that each licensed facility establish an EQ Program to demonstrate that electrical components

The staff also noted that the LRA does not address the recommendation in GALL AMP X.E1 that any changes to material activation energy values as part of a re-analysis are to be justified on a plant-specific basis.

The applicant stated, as documented in the staff's audit and review report, that BFN currently has no plans to change activation energies as part of the evaluation to extend the life of EQ components. If during the evaluation process an activation energy is changed, the basis for changing the value will be documented in the EQ package. The staff found this acceptable.

Enhancement. In LRA Section B.3.1, the applicant identified one enhancement to make this AMP consistent with AMP ~~XI.E1~~ X.E1 in the GALL Report. The EQ Program will be implemented on Unit 1. The enhancement is scheduled for completion prior to Unit 1 re-start from its current extended outage. The staff found this enhancement acceptable since it will make the applicant's program consistent for all three units.

Operating Experience. In LRA Section B.3.1, the applicant stated that operating experience is a vital consideration in maintaining the current EQ Program and in modifying qualification bases and conclusions, including qualified life. The engineering, technical, and programmatic requirements and processes followed in establishing and maintaining the EQ Program include a review of licensing, industry, and other generic documentation for EQ applications and involvement in various utility groups.

Further, industry operating experience was incorporated into the license renewal process through a review of industry documents to identify aging effects and mechanisms that could challenge the intended function of SSCs within the scope of license renewal. A review of plant-specific operating experience was also performed to identify plant-specific aging effects and none were found.

During the onsite audit, the staff noted that the applicant incorporates internal and external plant operating experience issues into the plant Corrective Action Program on a continuing basis. The staff concluded there is reasonable assurance that operating experience will continue to be reviewed in the future to ensure that the effects of aging will be adequately managed.

The staff found that the applicant adequately considered operating experience, consistent with the guidance in the GALL Report.

UFSAR Supplement. In LRA Section A.1.35, the applicant provided the UFSAR supplement for the EQ Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review and audit of the applicant's program, the staff determined that those program elements for which the applicant claimed consistency with the GALL Report are consistent with the GALL Report. In addition, the staff reviewed the enhancement and confirmed that the implementation of the enhancement prior to the period of extended operation would result in the existing AMP being consistent with the GALL Report AMP to which it was compared. The staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also

reviewed the UFSAR supplement for this AMP and concluded that it provides an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.2.26 Fatigue Monitoring Program

<u>Summary of Technical Information in the Application</u>. The applicant's Fatigue Monitoring Program is described in LRA Section B.3.2, "Fatigue ~~Monitorig~~ Program." In the LRA, the applicant stated that this is an existing program. This program is consistent, with enhancements, with GALL AMP X.M1, "Metal Fatigue of Reactor Coolant Pressure Boundary."
Monitoring

In the LRA, the applicant stated that the Fatigue Monitoring Program is used for management of metal fatigue of select components in the reactor coolant pressure boundary and primary containment. The fatigue monitoring program provides for monitoring fatigue stress cycles to ensure that the design fatigue usage factor limit is not exceeded.

Aging evaluations for fatigue monitored components are considered TLAAs for license renewal. The staff's evaluation is included in SER Section 4 (see SER Section 4.3).

<u>Staff Evaluation</u>. During its audit and review, the staff confirmed the applicant's claim of consistency with the GALL Report. Details of the staff's audit evaluation are documented in the BFN audit and review report. Furthermore, the staff reviewed the enhancements and its justifications to determine whether the AMP, with enhancements, remains adequate to manage the aging effects for which it is credited.

The staff reviewed the program elements (see SER Section 3.0.2.1) contained in the AMP basis document and compared them to those listed for AMP X.M1 in the GALL Report for consistency. The staff concluded that the elements of the Fatigue Monitoring Program are consistent with the elements of the AMP in the GALL Report.

The staff during the GALL consistency audit questioned how the current (starting) fatigue cumulative usage factor (CUF) will be calculated for locations to be added to the scope of the Fatigue Monitoring Program, as identified under program enhancements. This is needed as initial input to either a manual or automated tracking system.

The applicant described two alternate fatigue monitoring approaches, (1) stress-based fatigue (SBF) and (2) cycle-based fatigue (CBF), each with a different procedure, used for calculating the starting CUF. The staff reviewed the two procedures and concluded that the procedure to be utilized with CBF, based on plant records of experienced transients, is reasonable and conservative, while the procedure to be utilized with SBF, based on linear projection, is potentially nonconservative. The staff asked the applicant to provide its technical basis for concluding that the procedure to be utilized with SBF is reasonable and conservative, especially in light of the industry operating experience cited by the applicant (i.e., "concerns that early-life operating experience, at some units, had caused CUF values to increase at a faster rate than anticipated in the original plant design").

The applicant, as documented in the staff's audit and review report, stated that the same procedure, based on plant records of experienced transients, will be used to calculate the starting CUF for both the SBF and CBF fatigue monitoring approaches. Detailed results of the staff's onsite audits are documented in "Audit Report for Plant Aging Management Programs

(1) Scope of Program - In LRA Section B.2.1.39, the applicant stated that the program requirements are for visual inspections to identify material condition (i.e., loss of material, corrosion etc) of surfaces and components within the scope of license renewal as identified in the AMRs. The staff found the scope of the program to be comprehensive and acceptable because it includes the components that credit this program, as identified in the AMR tables.

The staff confirmed that the scope of the program element satisfies the criterion defined in SRP-LR Section A.1.2.3.1. The staff concluded that this program attribute is acceptable.

(2) Preventive Actions - In LRA Section B.2.1.39, the applicant stated that the Systems Monitoring Program is a condition monitoring program; thus, there are no preventive actions. The staff concurred with this assessment and does not identify the need for any preventive actions associated with this program.

The staff confirmed that the preventive actions program element satisfies the criterion defined in SRP-LR Section.A.1.2.3.2. The staff concluded that this program attribute is acceptable.

(3) Parameters Monitored or Inspected - The LRA states that the System Monitoring Program includes visual inspections to identify material condition (i.e., loss of material, corrosion, etc.) of surfaces of systems and components prior to the loss of their intended function. The staff found that the parameters monitored or inspected will provide symptomatic evidence of potential degradation and, therefore, are acceptable.

The staff confirmed that the parameters monitored or inspected program element satisfies the criterion defined in SRP-LR Section A.1.2.3.3. The staff concluded that this program attribute is acceptable.

(4) Detection of Aging Effects - In LRA Section B.2.1.39, the applicant stated that the program includes visual inspections to identify material condition (i.e., loss of material, corrosion, etc.) of surfaces of systems and components prior to the loss of their intended function. The system visual inspections are performed on a periodic basis ~~(quarterly)~~ delete and provide for data collection on systems and components for monitoring and trending to ensure timely detection of aging effects. Visual inspection is a continuous process with results periodically reported in system health reports.

The staff's review of LRA Section B.2.1.39 identified an area in which additional information was necessary to complete the review of the applicant's program element. The applicant responded to the staff's RAI as discussed below.

<u>RAI B.2.1.39-1</u>. In RAI B.2.1.39-1, dated October 12, 2004, the staff asked the applicant if a sampling approach is used and, if so, to justify that the sample size is adequate. The applicant was also requested to clarify how external surfaces of systems that are covered by insulation, or are located in normally inaccessible areas, are to be visually inspected. Further, the applicant was requested to clarify how elastomer degradation would be detected by visual inspection and to clarify how external surface inspections would detect internal aging effects caused by exposure to treated water for the flexible connectors in the diesel generator system.

In its response by letter dated November 3, 2004, the applicant clarified that visual inspection is performed on accessible components during system walkdowns and that visual inspections should encompass all or part of the total accessible system, such that the entire system is covered over time. The applicant also clarified that the portions of the system that are inaccessible during power operation should be walked down during the refueling outages or forced outages. In regard to flexible connectors in the diesel generator system, the applicant explained that the AMP identified by the LRA is incorrect and that the internal aging effects are managed by the One-Time Inspection Program and the external effects are managed by the System Monitoring Program.

Delete

The staff found the applicant's response acceptable on the basis that there is reasonable assurance that visual inspections of accessible surfaces of systems and components ~~on a quarterly basis~~, combined with inspections during outages, are capable of detecting the aging effects that are covered by this program. The use of visual inspections to detect external degradation is consistent with industry practice.

The staff confirmed that the detection of aging effects program element satisfies the criterion defined in SRP-LR Section A.1.2.3.4. The staff concluded that this program attribute is acceptable.

Delete

(5) Monitoring and Trending - In LRA Section B.2.1.39, the applicant stated that the inspected systems and components are monitored, trended, and documented by the use of System Health Reports ~~(Quarterly)~~, the Corrective Action Program, and the Corrective Maintenance Program. The staff found that the overall monitoring and trending proposed by the applicant are acceptable because there is reasonable assurance that an effective walkdown program combined with the Corrective Action Program and the Corrective Maintenance Program will effectively manage the applicable aging effects.

The staff confirmed that the monitoring and trending program element satisfies the criteria defined in SRP-LR Section A.1.2.3.5. The staff concluded that this program attribute is acceptable.

(6) Acceptance Criteria - In LRA Section B.2.1.39, the applicant stated that during a system or component visual inspection, system engineers use their knowledge of the UFSAR, TSs, design basis documents, operating experience, and the plant operating, technical, and maintenance procedures to evaluate system physical attributes and operational characteristics. In RAI B.2.1.39-1, the applicant was also requested to clarify the acceptance criteria applied in the inspection or evaluation of degradation. In its response, the applicant provided guidance to the system engineer, which is that there should be no evidence of steam or water leakage and system wastage, and that surface condition of welds appear satisfactory. The staff found that a detailed look at the material condition and degraded components by a knowledgeable system engineer, combined with effective corrective actions, are a reasonable approach to detect and evaluate degradation in applying design basis acceptance criteria.

The staff confirmed that the acceptance criteria program element satisfies the criteria defined in SRP-LR Section A.1.2.3.6. The staff concluded that this program attribute is acceptable.

(7) Operating Experience - In LRA Section B.2.1.39, the applicant stated that the Systems Monitoring Program produces system health reports, which provide ~~a quarterly~~ review of systems and components' operating experience. The LRA also states that the effectiveness of the corrective actions have been evaluated and documented in system health reports. In RAI B.2.1.39-1, the staff further asked the applicant to identify specific operating experience that provides objective evidence to support the conclusion that the Systems Monitoring Program is effective in managing aging effects on the external surfaces of systems and components within the scope of the program. In the response dated, November 3, 2004, the applicant clarified that the System Monitoring Program, through the use of PERs and WOs, tracks and trends corrective actions and provides objective evidence to support a determination that the effects of aging will be adequately managed so that the systems and components intended function will be maintained during the period of extended operation. The staff found that there is reasonable assurance that the applicant's use of system health reports combined with PERs and WOs should provide objective evidence to support the conclusion that the program will adequately manage the aging effects in the systems and components that credit this program. Therefore, the staff's concerns described in RAI.2.1.39-1 are resolved. Delete

The staff confirmed that the operating experience program element satisfies the criteria defined in SRP-LR Section A.1.2.3.10. The staff concluded that this program attribute is acceptable.

UFSAR Supplement. In LRA Section A.2.1, the applicant provided the UFSAR supplement for the Systems Monitoring Program. The staff reviewed this section and determined that the information in the UFSAR supplement provides an adequate summary description of the program. The staff found this section of the UFSAR supplement met the requirements of 10 CFR 54.21(d).

Conclusion. On the basis of its review, RAI response, and audit of the applicant's program, the staff concluded that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3). The staff also reviewed the UFSAR supplements for this AMP and found that they provide an adequate summary description of the program, as required by 10 CFR 54.21(d).

3.0.3.3.2 Bus Inspection Program

Summary of Technical Information in the Application. The applicant's Bus Inspection Program is described in LRA Section B.2.1.40, "Bus Inspection Program." In the LRA, the applicant stated that this is a new plant-specific program.

In the LRA, the applicant stated that the Bus Inspection Program will be initiated prior to the period of extended operation. This commitment is identified on the applicant's license renewal commitment list ~~in the BFN, Appendix A of the LRA Commitment Item A4,~~ as item 38. The applicant stated that this is a non-GALL program and will provide reasonable assurance that the bus ducts will continue to perform their intended function consistent with the CLB through the period of extended operation.

The Bus Inspection Program will provide reasonable assurance that the intended functions of isolated and nonsegregated phase bus will be maintained consistent with the CLB through the period of extended operation. It will manage nonsegregated phase bus insulation exposed to adverse localized environments caused by heat in the presence of oxygen and loosening the hardware fastening associated with isolated and non-segregated phase bus due to cyclic loading resulting in thermal expansion and contraction. The program will also include inspection of the bus enclosure.

7

This program will manage all portions of isolated and non-segregated phase bus associated with the unit station service transformers, main transformers, and common station service transformers within the scope of license renewal.

The aging mechanisms managed by this program include degradation of the nonsegregated phase bus insulation caused by heat in the presence of oxygen and cyclic loading of isolated and non-segregated phase bus causing thermal expansion and contraction of the bus, which could loosen the bus connection fastening hardware. Any one of these conditions could lead to a failure, preventing the phase bus from performing its intended function.

The program will be performed in conjunction with routine maintenance activities. The program will include visual inspection and electrical testing of in-scope, non-segregated phase bus for evidence of loosened bolted bus connections and damage to bus insulation. The program will also include visual inspection and electrical testing of in-scope isolated phase bus for evidence of loosened bolted bus connections and visual inspection of the in-scope isolated and non-segregated phase bus enclosure for excessive dust build up, evidence of water intrusion, and debris.

Staff Evaluation. In accordance with 10 CFR 54.21(a)(3), the staff reviewed the information included in LRA Section B.2.1.40, regarding the applicant's demonstration of the Bus Inspection Program to ensure that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB throughout the period of extended operation.

The staff reviewed the Bus Inspection Program against the AMP elements found in SRP-LR Section A.1.2.3 and SRP-LR Table A.1-1, and focused on how the program manages aging effects through the effective incorporation of 10 elements (i.e., program scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience).

The applicant indicated that the corrective actions, confirmation process, and administrative controls are part of the site-controlled quality assurance program. The staff's evaluation of the quality assurance program is discussed in SER Section 3.0.4. The remaining seven elements are discussed below.

The staff's review of LRA Section B.2.1.40 identified an area in which additional information was necessary to complete the review of the applicant's program elements. The applicant responded to the staff's RAI, as discussed below.

In the onsite audit, the staff also conducted a technical review of the remaining AMRs that were not consistent with, or not addressed in, the GALL Report. The audit and technical review included evaluating whether all plausible aging effects were identified and evaluating whether the aging effects listed were appropriate for the combination of materials and environments specified. The staff's audit evaluations are documented in the BFN audit and review report and are summarized in SER Section 3.1.2.3. The staff's evaluation of its technical review is also documented in SER Section 3.1.2.3.

Finally, the staff reviewed the AMP summary descriptions in the UFSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the reactor vessel, internals, and reactor coolant system components.

Table 3.1-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.1, that are addressed in the GALL Report.

Table 3.1-1 Staff Evaluation for Reactor Vessel, Internals, and Reactor Coolant System Components in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Reactor coolant pressure boundary components (Item Number 3.1.1.1)	Cumulative fatigue damage	TLAA, evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.3, Metal Fatigue
Isolation condenser (Item Number 3.1.1.3)	Loss of material due to general, pitting, and crevice corrosion	Inservice Inspection Program; Water Chemistry Program	~~Plant specific~~ N/A	Not applicable BFN does not have isolation condenser The isolation condenser function is performed by the RCIC system
Pressure vessel ferritic materials that have a neutron fluence greater than 10^{17} n/cm^2 (E > 1 MeV) (Item Number 3.1.1.4)	Loss of fracture toughness due to neutron irradiation embrittlement	TLAA, evaluated in accordance with Appendix G of 10 CFR 50 and RG 1.99	Reactor Vessel Surveillance Program TLAA	Consistent with GALL which recommends further evaluation (See Section 3.1.2.2.3) This TLAA is evaluated in Section 4.2, Neutron Embrittlement of Reactor Vessel and Internals

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Reactor vessel beltline shell and welds (Item Number 3.1.1.5)	Loss of fracture toughness due to neutron irradiation embrittlement	Reactor Vessel Surveillance Program	Reactor Vessel Surveillance Program	Consistent with GALL which recommends further evaluation (See Section 3.1.2.2.3)
Small-bore reactor coolant system and connected systems piping (Item Number 3.1.1.7)	Crack initiation and growth due to stress corrosion cracking (SCC), intergranular stress corrosion cracking (IGSCC), and thermal and mechanical loading	Inservice Inspection Program; Water Chemistry Program; One-Time Inspection Program	Inservice Inspection Program; Chemistry Control Program; One-Time Inspection Program	Consistent with GALL which recommends further evaluation (See Section 3.1.2.2.4)
Jet pump sensing line and reactor vessel flange leak detection line (Item Number 3.1.1.8)	Crack initiation and growth due to SCC, IGSCC, or cyclic loading	Plant-specific	Stress Corrosion Cracking Program; Inservice Inspection Program; Chemistry Control Program; One-Time Inspection Program	See Section 3.1.2.3.6
Isolation condenser (Item Number 3.1.1.9)	Crack initiation and growth due to SCC or cyclic loading	Inservice Inspection Program; Water Chemistry Program	N/A	Not applicable BFN does not have Isolation condenser The Isolation condenser function is performed by the RCIC system (See Section 3.1.2.2.4)
Reactor vessel closure studs and stud assembly (Item Number 3.1.1.22)	Crack initiation and growth due to SCC an/or IGSCC	Reactor Head Closure Studs Program	Reactor Head Closure Studs Program	Consistent with GALL which recommends no further evaluation (See Section 3.1.2.1.12)
CASS pump casing and valve body (Item Number 3.1.1.23)	Loss of fracture toughness due to thermal aging embrittlement	Inservice Inspection Program	Inservice Inspection Program	Consistent with GALL which recommends no further evaluation (See Section 3.1.2.3.17)
CASS piping (Item Number 3.1.1.24)	Loss of fracture toughness due to thermal aging embrittlement	Thermal Aging Embrittlement of CASS Program	N/A	Not applicable No RCPB CASS piping and fittings are used in BFN (See Section 3.1.2.3.17)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Core shroud and core plate, support structure, top guide, core spray lines and spargers, jet pump assemblies, control rod drive housing, nuclear instrument guide tubes (Item Number 3.1.1.31)	Crack initiation and growth due to SCC, IGSCC, and/or irradiation assisted stress corrosion cracking (IASCC)	BWR Vessel Internals Program; Water Chemistry Program	BWR Vessel Internals Program; Chemistry Control Program	Consistent with GALL which recommends further evaluation (See Section 3.1.2.3.16)
Core shroud and core plate access hole cover (welded and mechanical covres) (Item Number 3.1.1.32)	Crack initiation and growth due to SCC, IGSCC, and/or IASCC	ASME Section XI Inservice Inspection Program; Water Chemistry Program	ASME Section XI Inservice Inspection Program; Chemistry Control Program	Consistent with GALL which recommends further evaluation (See Section 3.1.2.3.2)
Jet pump assembly castings and orificed fuel support (Item Number 3.1.1.33)	Loss of fracture toughness due to thermal aging and neutron irradiation embrittlement	Thermal Aging and Neutron Irradiation Embrittlement	~~Thermal Aging and Neutron Irradiation Embrittlement~~ N/A	Not required for BFN ~~Consistent with GALL which recommends no further evaluation~~ (See Section 3.1.2.3.17)
Unclad top head and nozzles (Item Number 3.1.1.34)	Loss of material due to general, pitting, and crevice corrosion	Inservice Inspection Program; Water Chemistry Program	Inservice Inspection Program; Chemistry Control Program	Consistent with GALL which recommends further evaluation (See Section 3.1.2.3.18)

The staff's review of the BFN component groups followed one of several approaches. One approach, documented in SER Section 3.1.2.1, involves the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant system that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.1.2.2, involves the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant system that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.1.2.3, involves the staff's review of the AMR results for components in the reactor vessel, internals, and reactor coolant system that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the reactor vessel, internals, and reactor coolant system components is documented in SER Section 3.0.3.

3.1.2.1 AMR Results that are Consistent with the GALL Report, for Which Further Evaluation is Not Recommended

Summary of Technical Information in the Application. In LRA Section 3.1.2.1, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the reactor vessel, internals, and reactor coolant system components:

- ASME Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program
- BWR Control Rod Drive Return Line Nozzle Program
- BWR Feedwater Nozzle Program
- BWR Penetrations Program
- BWR Vessel ID Attachment Welds Program
- BWR Stress Corrosion Cracking Program
- Chemistry Control Program
- One-time Inspection Program
- Reactor Head Closure Studs Program
- Reactor Vessel Surveillance Program
- BWR Vessel Internals Program
- Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program
- Bolting Integrity Program
- Flow-Accelerated Corrosion Program
- Systems Monitoring Program
- Open-Cycle Cooling Water System Program
- Selective Leaching of Materials Program

Staff Evaluation. In LRA Tables 3.1.2-1 through 3.1.2-4, the applicant provided a summary of AMRs for the reactor vessel, internals, and reactor coolant system components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated the AMR was consistent with the GALL Report.

The staff reviewed the LRA to confirm that the applicant: (1) provided a brief description of the system, components, materials, and environment, (2) stated that the applicable aging effects had been reviewed and are evaluated in the GALL Report, and (3) identified those aging effects for the reactor vessel, internals, and RCS system components that are subject to an AMR.

A review of the Table 2s identified the following issues:

The staff identified that LRA Table 3.1.2.2 presents the AMR for the reactor vessel internals core shroud and core plate (row 1). The corresponding GALL item IV.B1.1-d indicates that the access hole cover (AHC) welds would require an augmented inspection (UT or other demonstrated acceptable inspection) to manage crack initiation due to SCC in the crevice regions of the access hole covers which are not amenable to visual inspections. This issue has been addressed in GE Service Information Letter (SIL) 462 (1988) after circumferential SCC was found in a creviced AHC fabricated from nickel alloy 600. BFN Technical Justification Number TJ-2004-02, dated 3-02-2004, provides justification for variance from GE SIL 462, revision 1, that provides guidance on inspection of core shroud AHCs. BFN has implemented the GE SIL requirements for Units 2 and 3, and they will be applicable to all three units upon re-start of Unit 1. ~~To bring the state of Unit 1 AHCs to those for Units 2 and 3, the applicant stated that Unit 1 hole covers would be replaced before re-start in accordance with 0-TI-365, RPVII Unit 1, 2, and 3, dated July 2, 2004.~~ The staff found this acceptable. Unit 1 AHC will be replaced with a bolted design prior to restart and does not require ~~de~~ enhanced inspection. (See Question 7 response in May 25 letter)

The staff identified that LRA Table 3.1.2.2, is not consistent with the GALL Report, Item IVB1.4-d, and asked the applicant for an explanation. By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that the GALL Report item should have been IVB1.6-a instead of IVB1.4-d and the table will be corrected. The staff found this acceptable because it is consistent with the GALL Report.

LRA Table 3.1.2.3, row 51, presents the AMR for the stainless steel valves in treated water internal environment for the reactor vessel vents and drains systems. The staff identified a difference in crediting AMPs for this commodity group. The table includes the Chemistry Control Program, BWR Stress Corrosion Cracking Program, and One-Time Inspection Program to manage crack initiation and growth due to SCC, and cross-references LRA Table 3.1.1, Item 3.1.1.29. However, LRA Table 3.1.1, Item 3.1.1.29, does not specify the One-Time Inspection Program. During the onsite audit, the staff asked the applicant to explain this difference. By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that the One-Time Inspection Program will be removed from LRA Table 3.1.2.3, row 51. The staff found this acceptable because it is consistent with the GALL Report.

LRA Table 3.1.2.4, row 48, presents the AMR for the stainless steel fittings, including flow restrictors, in treated water internal environment for the reactor recirculation system. The staff identified a difference in crediting AMPs for this commodity group. The table does not identify the Chemistry Control Program to manage crack initiation and growth due to SCC. However, the referenced GALL Report Item IV.C1.1-I identified the Chemistry Control Program. During the onsite audit, the staff asked the applicant to explain this difference. By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that the Chemistry Control Program will be added to LRA Table 3.1.2.4, row 48. The staff found this acceptable because it is consistent with the GALL Report.

In its letter, dated October 8, 2004, in response to the staff's question, the applicant stated:

> NUREG 1801, Aging Management Program AMP XI.M32, One-Time Inspection, Evaluation and Technical Basis Section, Detection of Aging Effects, states:
>
> > The program will rely on established NDE techniques, including visual, ultrasonic, and surface techniques that are performed by qualified personnel following procedures consistent with the ASME Code and 10 CFR 50, Appendix B. For small-bore piping less than NPS 4 in., including pipe, fittings, and branch connections, a plant-specific destructive examination of piping replaced in the course of plant modifications or NDE that permits inspection of the inside surfaces of the piping is to be conducted to ensure that cracking has not occurred.
>
> As noted from this paragraph, either destructive examination or NDE that is capable of detecting inside surface cracking is required. Since there are UT-inspectable, full penetration butt welds within scope of license renewal, the applicant has chosen the second method for its program and no destructive examination of socket welds will be performed. Once this inspection methodology was selected, the possible sample population is full penetration butt welds. The applicant has not identified butt welds in ASME Code Class 1 piping 1-inch NPS and less. Therefore, 1-inch NPS and less piping will not be selected for small-bore piping NDE examination. This sample population provides adequate indication of whether inside diameter cracking is occurring in small-bore piping.

this is not an exact quote. It does however represent the response provided to NRC

By letter dated October 8, 2004, the applicant formally submitted its final response to the staff.

The staff disagreed with the applicant's response in that socket-welded piping, 1-inch NPS and less, is adequately represented by the applicant's sample selection criteria for small bore piping included in the scope of the One-Time Inspection Program. Staff disputed that historically, piping 1-inch NPS and less, is more susceptible to failure. The geometry of and joining methods for socket welds make them more susceptible to cracking than full penetration butt welds. But, the staff would be willing to accept NDE of full penetration butt welds in piping greater than 1-inch NPS as being representative of socket-welded piping, 1-inch NPS 1 and less.

The staff raised the issue with the applicant in RAI 3.1.2.4-7 and questioned why the applicant was not complying with the GALL Report recommendation that a plant-specific destructive examination or a nondestructive examination (NDE) that permits inspection of the inside surfaces of the piping be conducted to ensure that cracking has not occurred and the component intended function will be maintained during the extended period.

The applicant's response, dated April 5, 2005, is as follows:

> The BFN One-Time Inspection Program will evaluate a sample of welds in small-bore piping less than 4 inches NPS for internal surface cracking by NDE as specified by NUREG 1800,
> Aging Management Program XI.M32, "One-Time Inspection." The BFN One-Time Inspection Program sample will be selected from full penetration butt welds where ultrasonic testing can be

~~[illegible]~~ see next sheet

Move to ~~complet~~ previous paragraph

performed. The basis for this sample population is:

- This sample will evaluate the welds with the most susceptibility to the aging effects of stress corrosion cracking and thermal fatigue;
- This sample will evaluate the welds with the most significant consequences and risks; and
- This sample will allow the welds to be identified, scheduled, and performed in a systematic manner.

Socket weld cracking generally occurs due to weld defect propagation by vibrational fatigue. SCC and thermal fatigue rarely cause socket weld failures. Vibration-induced socket weld failure is a design issue that has been observed in the nuclear power industry and can result in crack initiation and growth. Vibration-induced fatigue is fast acting and is typically detected early in a component's life. Corrective measures typically include actions to preclude recurrence of the failure mechanism. Corrective actions to preclude recurrence may involve modifications to the plant, such as addition of supplemental restraints to a piping system, shortening the vent piping, or replacement of tubing with flexible hose. Based on these measures, cracking due to vibration-induced fatigue is not considered an aging effect for the period of extended operation.

Previously, plants have excluded piping based strictly on consequences of the potential pipe failure. Although this was not done in the BFN Risk Informed ISI Program, a plant-specific calculation demonstrates that BFN can tolerate NPS 2 and smaller breaks with normal makeup. At BFN, all Class 1 piping was included in the BFN Risk Informed ISI Program. No welds less than NPS 4 were identified as high risk. The BFN One-Time Inspection Program sample will select full penetration butt welds where ultrasonic testing can be performed. The butt welds are more susceptible to stress corrosion cracking and thermal fatigue, which are the primary crack initiation and growth aging mechanisms. This sample also allows a selection of the most risk-significant small-bore piping locations (i.e., locations with the highest susceptibility to cracking and highest consequences of failure) to be identified, scheduled, and performed in a systematic manner, rather than attempting to track modifications for 20 years while awaiting the possible removal of a piece of small-bore piping containing a weld for destructive testing.

Staff Evaluation. The staff evaluated the applicant's response and concurred with the evaluation. The staff RAI 3.1.2.4-7 was resolved.

In LRA Section 3.1.2.2.4, the applicant proposed the BWR Stress Corrosion Cracking Program instead of the ASME Code Section XI ISI program and Chemistry Control Program to mitigate SCC. The staff requested the applicant to provide reasons for this proposed AMP. By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that the Section 3.1.2.2.4.1 reference to the BWR Stress Corrosion Cracking Program is incorrect and will be deleted. The staff found this response acceptable.

The staff also asked the applicant where GALL Report Volume 1, Table 1, Item 3.1.1.8, jet pump sensing line and reactor vessel flange detection line, as stated in LRA Section 3.1.2.2.4, are addressed in the AMR. By letter dated October 8, 2004, the applicant submitted its formal response to the staff. The applicant stated:

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Seals in standby gas treatment system (Item Number 3.2.1.7)	Changes in properties due to elastomer degradation	Plant-specific	N/A	See Section 3.2.2.2.5
Drywell and suppression chamber spray system nozzles and flow orifices (Item Number 3.2.1.9)	Plugging of nozzles and flow orifices by general corrosion products	Plant-specific	N/A	See Section 3.2.2.2.7
External surface of carbon steel components (Item Number 3.2.1.10)	Loss of material due to general corrosion	Plant-specific	One-Time Inspection Program; Chemistry Control Program; Systems Monitoring Program	See Section 3.2.2.2.2
Piping and fittings of CASS in emergency core cooling systems (Item Number 3.2.1.11)	Loss of fracture toughness due to thermal aging embrittlement	Thermal Aging Embrittlement of CASS Program	N/A	Not Applicable BFN does not require a thermal aging embrittlement of CASS AMP
Components serviced by open-cycle cooling system (Item Number 3.2.1.12)	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling; buildup of deposit due to biofouling	Open-Cycle Cooling Water System Program	Open-Cycle Cooling Water System Program	Consistent with GALL which recommends no further evaluation (See Section 3.2.2.1)
Components serviced by closed-cycle cooling system (Item Number 3.2.1.13)	Loss of material due to general, pitting, and crevice corrosion	Closed-Cycle Cooling Water System Program	Closed-Cycle Cooling Water System Program	Consistent with GALL which recommends no further evaluation (See Section 3.2.2.1)
Emergency core cooling system valves and lines to and from high pressure coolant injection and reactor core isolation cooling pump turbines (Item Number 3.2.1.14)	Wall-thinning due to flow-accelerated corrosion	Flow Accelerated Corrosion Program	Flow Accelerated Corrosion Program	(See Section 3.2.2.1) Consistent with GALL which recommends no further evaluation

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Components in reactor coolant pump oil collect system of fire protection (Item Number 3.3.1.6)	Loss of material due to galvanic, general, pitting, and crevice corrosion	One-Time Inspection	N/A	Not applicable BFN does not have an oil collection system for its reactor recirculation pumps
Diesel fuel oil tanks in diesel fuel oil system and emergency diesel generator system (Item Number 3.3.1.7)	Loss of material due to general, pitting, and crevice corrosion, MIC, and biofouling	Fuel Oil Chemistry Program; One-Time Inspection Program	Fuel Oil Chemistry Program; One-Time Inspection Program	Consistent with GALL, which recommends further evaluation (See Section 3.3.2.2.7)
Piping, pump casing, and valve body and bonnets in shutdown cooling system (older BWR) (Item Number 3.3.1.8)	Loss of material due to pitting and crevice corrosion	Chemistry Control Program; One-Time Inspection Program .	Chemistry Control Program; One-Time Inspection Program	Not applicable BFN is not an older BWR with a shutdown cooling system The shutdown cooling system is performed by the RHR system (See Section 3.3.2.3.3)
Neutron absorbing sheets in spent fuel storage racks (Item Number 3.3.1.10)	Reduction of neutron absorbing capacity and loss of material due to general corrosion (Boral, boron steel)	Plant-specific	Chemistry Control Program	See Section 3.3.2.2.10
New fuel rack assembly (Item Number 3.3.1.11)	Loss of material due to general, pitting, and crevice corrosion	Structures Monitoring Program	Structures Monitoring Program	Consistent with GALL, which recommend no further evaluation (See Section 3.3.2.1)
Neutron absorbing sheets in spent fuel storage racks (Item Number 3.3.1.12)	Reduction of neutron absorbing capacity due to Boraflex degradation	Boraflex Monitoring Program	N/A	Not applicable BFN uses Boral as the spent fuel storage rack neutron absorber
Spent fuel storage racks and valves in spent fuel pool cooling and cleanup (Item Number 3.3.1.13)	Crack initiation and growth due to stress corrosion cracking	Chemistry Control Program	Chemistry Control Program	Consistent with GALL, which recommends no further evaluation (See Section 3.3.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Components in shutdown cooling system (older BWR) (Item Number 3.3.1.27)	Crack Initiation and growth due to SCC	BWR Stress Corrosion Cracking Program; Chemistry Control Program	~~None~~ N/A	Not applicable BFN is not an older BWR with a shutdown cooling system. The shutdown cooling function is performed by the RHR system (See Section 3.3.2.3.3)
Components in shutdown cooling system (older BWR) (Item Number 3.3.1.28)	Loss of material due to pitting and crevice corrosion, and MIC	Closed-Cycle Cooling Water System	~~None~~ N/A	Not applicable BFN is not an older BWR with a shutdown cooling system. The shutdown cooling function is performed by the RHR system (See Section 3.3.2.3.3)
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 Program	Selective Leaching of Materials Program	Consistent with GALL, which recommend no further evaluation (See Section 3.3.2.1)
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 System; Structures Monitoring System	Fire Protection System; Structures Monitoring System	Consistent with GALL, with exceptions, which recommends no further evaluation (See Section 3.3.2.1)

The staff's review of the BFN component groups followed one of several approaches. One approach, documented in SER Section 3.3.2.1, involves the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.3.2.2, involves the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.3.2.3, involves the staff's review of the AMR results for components in the auxiliary systems that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of

managements programs for all carbon steel and low alloy steel components in the Fuel Oil System with a fuel oil internal environment. The staff concurred with the licensee's assessment that MIC is the predominant aging effect for carbon and low alloy steel in fuel oil where there is no potential for water accumulation. The staff also noted that the inspections performed on this system will identify the AERMs in the GALL Report, if they are present. Therefore, the staff found that the applicant had identified the appropriate aging effects.

On the basis of its review of the information provided in the LRA and the additional information included in the applicant's response to the above RAIs, the staff found the aging effects of the above AMR items are consistent with industry experience for these combinations of materials and environments. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the materials and environments associated with the above components in the fuel oil system.

LRA Table 3.3.2.2 identifies the following AMPs for managing the aging effects described above: Fuel Oil Chemistry Program, One-Time Inspection Program, and the System Monitoring Program. The staff's detailed reviews of these AMPs are found in SER Sections 3.0.3.2.18, 3.0.3.1.7, and 3.0.3.3.1, respectively.

RAI 3.3.2.2-1. LRA Section 3.3.2.2. implies that the one-time inspections will be limited to the system locations were contaminants are expected to accumulate; however, AERMs (particularly MIC) are identified for a larger population of components. In RAI 3.3.2.2-1, dated October 12, 2004, the staff requested the applicant to clarify the use of the one-time inspections. In its response, dated November 3, 2004, the applicant stated that the Fuel Oil Chemistry Program and the One-Time Inspection Program are credited as AMPs for all components in the fuel oil system with a fuel oil internal environment where aging effects were identified. These programs are being applied to all components with identified AERMs; therefore, the staff found this acceptable.

For the flexible hoses made of elastomer (rubber) in a fuel oil environment, the LRA credits the One-Time Inspection Program to manage the aging effect of elastomer degradation due to oxidation. The One-Time Inspection Program is typically used to verify that an aging effect is not occurring or when an aging effect is expected to occur slowly, such that the component intended function can be maintained for the extended period of operation. For these same hoses, the LRA credits the System Monitoring Program to manage the aging effect of elastomer degradation due to ultraviolet radiation. The System Monitoring Program provides for ~~quarterly~~ delete visual inspections of the hoses. The staff found the periodic inspections, combined with the one-time inspection of the hose internal surface, adequate for managing the aging of the flexible hoses. Therefore, the staff found the management of these hoses to be acceptable.

The staff reviewed LRA Table 3.3.2.2, which summarized the results of AMR evaluations for the fuel oil system component groups. The applicant identified no aging effect or AMP for components constructed of cast iron and cast iron alloy, as well as carbon or low alloy steel in an air/gas environment on their internal surface. During the onsite audit, the staff inquired as to the technical justification for concluding that there are no aging effects for these material/environment combinations for components in this system. By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that components in the fuel oil system are exposed to a fuel oil vapor environment. This fuel oil vapor environment protects the component surfaces and prevents internal corrosion.

- Even assuming thermal aging for valves is a CLB concern, the conclusion from the NRC's bounding fracture analysis for valves less than 4 inches NPS was that "a CASS valve loaded to the maximum anticipated stress can sustain a through wall crack well in excess of its wall thickness without fracturing" and "that requirements for licensees to either (a) inspect . . . of these components would represent an unnecessary duplication of effort."

However, to resolve this issue, the applicant stated that thermal aging will be identified in the LRA as being an AERM for these 1 inch NPS non-Class 1 valves, and that the Systems Monitoring Program will be identified as the AMP to perform an external visual inspection.

The staff concluded that the applicant's response is acceptable on the basis that: (1) the valves have operating lives less than 40 years; (2) NRC-sponsored fracture mechanics analyses demonstrate a high degree of flaw tolerance, including through-wall cracking; and (3) periodic ~~(quarterly)~~ external visual examination conducted as part of the Systems Monitoring Program delete will detect through-wall cracking, in the unlikely event that it should occur.

During the onsite audit, the staff also asked why the BWR Stress Corrosion Cracking Program is not credited for this aging effect in all cases. By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that Table 3.3.2.21, lines 24 and 54 refer to fittings and piping that are less than 4" NPS. The corresponding GALL Report Volume 2, Item IV.C1.1-i, references the ASME Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program, the Chemistry Control Program, and the One-Time Inspection Program. For fittings and piping greater than or equal to 4" NPS, line items 27 and 56 specify the BRW Stress Corrosion Cracking Program and the Chemistry Control Program, which is consistent with Item IV.C1.1-f. Table 3.3.2.21, line 102 credits the BWR Stress Corrosion Cracking Program and the chemistry control program for aging management of Valves-RCPB, which is consistent with IV.C1.3-c. Note that the BWR Stress Corrosion Cracking Program invokes the ASME Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program for inspection and flaw evaluation to monitor IGSCC.

The applicant further stated that LRA Table 3.3.2.21, rows 20, 49, and 93, for non-reactor coolant pressure boundary fittings, piping, and valves, respectively, incorrectly listed the ASME Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program and/or BWR Stress Corrosion Cracking Program. The correct AMPs for rows 20, 49, and 93 are the Chemistry Control Program and One-Time Inspection Program.

The staff found that the applicant's use of the ASME Code Section XI Program for components less than 4" NPS is consistent with the GALL Report, and also concurred with the applicant's corrections to LRA Table 3.3.2.21. The staff found the applicant's response to be acceptable.

3.3.2.3.22 Reactor Building Closed Cooling Water System – Summary of Aging Management Evaluation – Table 3.3.2.22

The staff reviewed LRA Table 3.3.2.22, which summarizes the results of AMR evaluations for the reactor building closed cooling water system component groups.

In LRA Table 3.3.2.22, the applicant identifies the aging effects of the reactor building closed cooling water system components within the scope of license renewal and subject to AMR. The

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Carbon steel piping and valve bodies to main steam system (Item Number 3.4.1.7)	Loss of material due to pitting and crevice corrosion	Chemistry Control Program	Chemistry Control Program	Consistent with GALL, with exceptions, which recommends no further evaluation (See Section 3.4.2.1)
Closure bolting in high-pressure or high-temperature systems (Item Number 3.4.1.8)	Loss of material due to general corrosion; crack initiation and growth due to cyclic loading and/or SCC	Bolting Integrity Program	Bolting Integrity Program	Consistent with GALL with exceptions, which recommends no further evaluation (See Section 3.4.2.1)
Heat exchangers and coolers/condensers serviced by open-cycle cooling water (Item Number 3.4.1.9)	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 Program	Open-Cycle Cooling Water System Program	Consistent with GALL which recommends no further evaluation (See Section 3.4.2.1)
Heat exchangers and coolers/condensers serviced by closed-cycle cooling water (Item Number 3.4.1.10)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Closed-Cycle Cooling Water System Program	Closed-Cycle Cooling Water System Program	Consistent with GALL which recommends no further evaluation (See Section 3.4.2.1)
External surface of aboveground condensate storage tank (Item Number 3.4.1.11)	Loss of material due to general (carbon steel only), pitting, and crevice corrosion	Aboveground Carbon Steel Tanks Program	Aboveground Carbon Steel Tanks Program	Consistent with GALL which recommends no further evaluation (See Section 3.4.2.1)
External surface of buried condensate storage tank and AFW piping (Item Number 3.4.1.12)	Loss of material due to general, pitting, and crevice corrosion; MIC	Buried piping and tanks surveillance Buried piping and tanks inspection	N/A	Not applicable At BFN, the condensate storage tanks and piping and fittings associated with the condensate storage tank are not located underground

The staff's review of the BFN component groups followed one of several approaches. One approach, documented in SER Section 3.4.2.1, involves the staff's review of the AMR results for

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

The staff reviewed the LRA Section 3.4.2.2.2 against the criteria in SRP-LR Section 3.4.2.2.2.

SRP-LR Section 3.4.2.2.2 states that loss of material due to general, pitting, and crevice corrosion should be evaluated further for carbon steel piping and fittings, valve bodies and bonnets, pump casings, pump suction and discharge lines, tanks, tubesheets, channel heads, and shells except for main steam system components; and that loss of material due to pitting and crevice corrosion should be evaluated further for stainless steel tanks and heat exchanger/cooler tubes. The Chemistry Control Program relies on monitoring and control of water chemistry based on the guidelines in BWRVIP-29 (EPRI TR-103515) for water chemistry 7
in BWRs; however, corrosion may occur at locations of stagnant flow conditions. Therefore, the effectiveness of the Chemistry Control Program should be verified to ensure that corrosion is not occurring. The GALL Report recommends further evaluation of programs to manage loss of material due to general, pitting, and crevice corrosion to verify the effectiveness of the Chemistry Control Program. A one-time inspection of selected components and susceptible locations is an acceptable method to ensure that corrosion is not occurring and that the components' intended function will be maintained during the period of extended operation. The AMP recommended by the GALL Report is XI.M32, "One-Time Inspection."

In LRA Section 3.4.2.2.2, the applicant credits the Chemistry Control Program to manage loss of material for the components requiring further evaluation. The applicant addressed the GALL Report recommendation for further evaluation to verify the effectiveness of the chemistry control through the One-Time Inspection Program. The staff reviewed the Chemical Instruction (CI) 13.1, Chemistry Program, Revision 20, which implements chemistry control of primary water used in the steam and power conversion system. The implementing procedure recommends that the effectiveness of the Chemistry Control Program should be verified by means of tools like plant action levels at cut-off points established for contaminant concentrations recommended by industry guidance to ensure that corrosion is not occurring, with corrective actions if these are exceeded. The staff did not find any instances of exceeding action level II or III in the past five years of operation (i.e., levels exceeding $O_2 > 100$ ppb or chlorides > 150 ppb or sulfates > 150 ppb). The staff concluded that the applicant had satisfactorily complied with GALL recommendations in managing this aging effect and demonstrated that the effects of aging for loss of material will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.4.2.2.3 Loss of Material due to General, Pitting, and Crevice Corrosion, Microbiologically Influenced Corrosion, and Biofouling

Consistent with the SRP-LR, this further evaluation only applies to PWRs. Therefore, it is not applicable to BFN.

3.4.2.2.4 General Corrosion

The staff reviewed the LRA Section 3.4.2.2.4 against the criteria in SRP-LR Section 3.4.2.2.4.

SRP-LR Section 3.4.2.2.4 states that loss of material due to general corrosion could occur on the external surfaces of all carbon steel SCs, including closure bolting exposed to operating

In its response, by letter dated December 16, 2004, the applicant stated that the carbon and low-alloy steel components in LRA Table 3.4.2.3 for the feedwater system are exposed to an air/gas--moist air environment in two applications. The first application is the small segment between the dual isolation valves on system vents and drains, and the second application is valve packing leakoff lines on Unit 1 feedwater isolation valves. These leakoff lines will be removed prior to Unit 1 restart, and will not be applicable to the LRA.

The small segment of piping/fittings between the dual isolation valves on system vents and drains is exposed to feedwater quality water when the valves are open to support maintenance activities and has trapped air with varying amount of feedwater, based on how the valves are closed (i.e., the sequence and time between valve closings). The applicant stated that the safety consequences for this short segment of piping failing are minimal as this line is downstream of a closed isolation valve that is manually opened only to support maintenance activities. Minimal degradation is expected based on the quality of the water potentially in these components. For completeness, however, and using the One-Time Inspection Program the applicant will perform inspections to verify that these lines are not degrading. Based on the expected minimal degradation as stated in the above, the staff considered the applicant's proposed use of the One-Time Inspection Program to be acceptable.

In LRA Table 3.4.2.6, for the condenser circulating water system, carbon and low-alloy steel and cast iron and cast iron-alloy components in raw water (internal) environments are identified as being susceptible to loss of material due to biofouling, MIC, crevice, general, and pitting corrosion. The in-scope components in the condenser circulating water system are those components that provide the anti-siphon vacuum breaker function. The applicant stated that upon re-reviewing the license renewal scope for the condenser circulating water system, it was determined that raw water was inadvertently specified as the internal environment for the anti-siphon vacuum breaker components. The applicable internal environment (air/gas) has already been evaluated for this system and is included in the LRA. The raw water environment will be deleted from this system.

Based on the above information provided by the applicant, the staff's concern described in RAI 3.4-4 is resolved.

RAI 3.4-5. In LRA Tables 3.4.2.1 and 3.4.2.3, bolting made of carbon and low-alloy steel, nickel alloy, and stainless steel in inside air (external) environments are identified as being susceptible to loss of bolting function due to wear. The Bolting Integrity Program is credited as the AMP. The staff noted that LRA Section B.2.1.16 does not specifically address "loss of bolting function" due to wear as an aging effect to be managed by the AMP. In RAI 3.4-5, dated November 18, 2004, the staff requested the applicant to discuss how the identified aging effect will be managed by the program.

In its response, by letter dated December 16, 2004, the applicant stated that bolting degradation due to wear (fretting) could occur at locations of repeated relative motion of mechanical component bolted joints. Wear of bolted joint components is generally not a concern; however, for license renewal purposes, wear is being assumed as a potential mechanism for "critical bolting applications." "Critical bolting applications" constitute reactor coolant pressure boundary components where closure bolting failure could result in loss of reactor coolant and jeopardize safe operation of the plant. Loss of material function due to wear is managed by the Bolting Integrity Program. This program specifies inspection requirements in accordance with ASME

experience of galvanic corrosion failures in treated water systems. A review of BFN PERs and work orders did not identify instances where galvanic corrosion was a failure mechanism.

The staff found that the applicant demonstrated that the effects of aging for loss of material due to galvanic corrosion will be adequately managed so that the intended functions will be maintained consistent with the CLB during the period of extended operation, as required by 10 CFR 54.21(a)(3).

In LRA Table 3.4.2.2, aluminum-alloy fittings in a treated-water environment are identified as being susceptible to crack initiation/growth due to SCC and loss of material due to crevice, galvanic, and pitting corrosion. Since this material was not listed in the GALL Report, the staff needed some additional explanation to justify the Chemistry Control Program and One-Time Inspection Program to manage the effect.

The applicant stated that the aging effects identified for aluminum alloys are consistent with EPRI Report 1003056, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 3." Aluminum alloys were evaluated using the guidelines given in the report. BFN utilizes the Chemistry Control Program and One-Time Inspection Program to manage the effect, which is also the industry standard; based on past precedents review of similar applications for managing the aging effects of aluminum alloys in treated-water environments, the staff found the response acceptable.

In LRA Table 3.4.2.2, for carbon and low-alloy steel piping in air/gas environment (internal) the applicant mentions only one time inspection for aging management due to general corrosion. GALL Table VIII.E.1, Condensate System, does not address the air/gas environment identified in the LRA. insert -

The applicant clarified that the row 35 environment in LRA Table 3.4.2.2 referred to the area between the two isolation valves on condensate system vents and drains. This small segment of piping is exposed to condensate flow when the valves are open and has air trapped with varying amount of condensate based on how the valves are closed, that is, the sequence and time between valve closings. The safety consequences for this short segment of piping failing are non-existent, because this line is downstream of a closed isolation valve. However, for completeness and to verify that these lines are not degrading, the applicant will perform some inspections using the One-Time Inspection Program, even though the GALL Report does not address the air/gas environment.

3.4.2.3.3 Feedwater System – Summary of Aging Management Evaluation – Table 3.4.2.3

The staff reviewed LRA Table 3.4.2.3, which summarizes the results of AMR evaluations for the feedwater system component groups.

In LRA Table 3.4.2.3, stainless steel fittings (item 11) in a treated water environment are identified as being susceptible to crack initiation and SCC, which is not identified in GALL Report (VIIID2.1.1-b) for this item.

The applicant stated in Mechanical Evaluation Report - Feedwater System 003 that the shape of components in this system made from stainless steel material may present high ~~a~~ stress environment, and the treated water may contain contaminants such as chlorides and sulfides. a

Finally, the staff reviewed the AMP summary descriptions in the UFSAR supplement to ensure that they provided an adequate description of the programs credited with managing or monitoring aging for the containments, structures, and component supports components.

Table 3.5-1 below provides a summary of the staff's evaluation of components, aging effects/mechanisms, and AMPs listed in LRA Section 3.5 that are addressed in the GALL Report.

Table 3.5-1 Staff Evaluation for Containments, Structures, and Component Supports in the GALL Report

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Penetration sleeves, penetration bellows, and dissimilar metal welds (Item Number 3.5.1.1)	Cumulative fatigue damage	TLAA evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.6, Primary Containment Fatigue
Penetration sleeves, bellows, and dissimilar metal welds (Item Number 3.5.1.2)	Cracking due to cyclic loading, crack initiation and growth due to SCC	Containment Inservice Inspection (ISI) Program; Containment Leak Rate Test Program	Containment ISI Program; Containment Leak Rate Test Program	Consistent with GALL, with exceptions, which recommends no further evaluation (See Section 3.5.2.1) ~~TLAA is evaluated in Section 4.6~~ Delete
Penetration sleeves, penetration bellows, and dissimilar metal welds (Item Number 3.5.1.3)	Loss of material due to corrosion	Containment ISI Program; Containment Leak Rate Test Program	Containment ISI Program; Containment Leak Rate Test Program	Consistent with GALL, which recommends no further evaluation (See Section 3.5.2.1)
Personnel airlock and equipment hatch (Item Number 3.5.1.4)	Loss of material due to corrosion	Containment ISI Program; Containment Leak Rate Test Program	Containment ISI Program; Containment Leak Rate Test Program	Consistent with GALL, which recommends no further evaluation (See Section 3.5.2.1)
Personnel airlock and equipment hatch (Item Number 3.5.1.5)	Loss of leak tightness in closed position due to mechanical wear of locks, hinges, and closure mechanisms	Containment Leak Rate Test Program; Plant Technical Specifications Program	Containment Leak Rate Test Program; Plant Technical Specifications Program	Consistent with GALL, which recommends no further evaluation (See Section 3.5.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Seals, gaskets, and moisture barriers (Item Number 3.5.1.6)	Loss of sealant and leakage through containment due to deterioration of joint seals gaskets, and moisture barriers	Containment ISI Program; Containment Leak Rate Test Program	Containment ISI Program; Containment Leak Rate Test Program	Consistent with GALL, which recommends no further evaluation (See Section 3.5.2.1)
Concrete elements: foundation, dome, and wall (Item Number 3.5.1.7)	Aging of accessible and inaccessible concrete areas due to leaching of calcium hydroxide, aggressive chemical attack, and corrosion of embedded steel	Containment ISI Program	N/A	Not applicable BFN has a Mark I steel containment
Concrete elements: foundation (Item Number 3.5.1.8)	Cracks, distortion, and increases in components stress level due to settlement	Structures Monitoring Program	N/A	Not applicable BFN has a Mark I steel containment
Concrete elements: foundation (Item Number 3.5.1.9)	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring Program	N/A	Not applicable BFN has a Mark I steel containment
Concrete elements: foundation, dome, and wall (Item Number 3.5.1.10)	Reduction of strength and modulus due to elevated temperature)	Plant-specific	N/A	Not applicable BFN has a Mark I steel containment
Prestressed containment: tendons and anchorage components (Item Number 3.5.1.11)	Loss of prestress due to relaxation, shrinkage, creep, and elevated temperature	TLAA evaluated in accordance with 10 CFR 54.21(c)	TLAA	Not applicable BFN has a Mark I steel containment and not prestressed concrete with tendons
Steel elements: liner plate, containment shell (Item Number 3.5.1.12)	Loss of material due to corrosion in accessible and inaccessible areas	Containment ISI Program; Containment Leak Rate Test Program	Containment ISI Program; Containment Leak Rate Test Program	Consistent with GALL which recommends further evaluation (See 3.5.2.1)
Steel elements: vent header, drywell head, torus, downcomers, and pool sheel (Item Number 3.5.1.13)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.6, Primary Containment Fatigue

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Steel elements: protected by coating (Item Number 3.5.1.14)	Loss of material due to corrosion in accessible areas only	Protective Coating Monitoring and Maintenance Program	N/A	Not applicable BFN does not credit coatings to prevent general corrosion
Prestressed containment: tendons and anchorage components (Item Number 3.5.1.15)	Loss of material due to corrosion of prestressing tendons and anchorage components	Containment ISI Program	N/A	Not applicable BFN has a Mark I steel containment and not prestressed concrete with tendons
Concrete elements: foundation, dome, and wall (Item Number 3.5.1.16)	Scaling, cracking, and spalling due to freeze-thaw; expansion and cracking due to reaction with aggregate	Containment ISI Program	N/A	Not applicable BFN has a Mark I steel containment
Steel elements: vent line bellows, vent headers, and downcomers (Item Number 3.5.1.17)	Cracking due to cyclic loads; crack initiation and growth due to SCC	Containment ISI Program; Containment Leak Rate Test Program	Containment ISI Program; Containment Leak Rate Test Program	Consistent with GALL, which recommends further evaluation (See 3.5.2.1)
Steel elements: suppression chamber liner (Item Number 3.5.1.18)	Crack initiation and growth due to SCC	Containment ISI Program; Containment Leak Rate Test Program	Containment ISI Program; Containment Leak Rate Test Program	Consistent with GALL, with exceptions, which recommends no further evaluation (See Section 3.5.2.1)
Steel elements: drywell head and downcomer pipes (Item Number 3.5.1.19)	Fretting and lock up due to wear	Containment ISI Program	Containment ISI Program	Consistent with GALL, with exceptions, which recommends no further evaluation (See 3.5.2.1)
All Groups except Group 6: accessible interior/exterior concrete and steel components (Item Number 3.5.1.20)	All types of aging effects	Structures Monitoring Program	Structures Monitoring Program	Consistent with GALL, which recommends further evaluation (See Section 3.5.2.1)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Groups 1-3, 5, 7-9: inaccessible concrete components, such as exterior walls below grade and foundation (Item Number 3.5.1.21)	Aging of inaccessible concrete areas due to aggressive chemical attack, and corrosion of embedded steel	Plant-specific		Consistent with GALL, which recommends further evaluation if an aggressive below-grade environment exists (See Section 3.5.2.2.1)
Group 6: all accessible/ inaccessible concrete, steel, and earthen components (Item Number 3.5.1.22)	All types of aging effects, including loss of material due to abrasion, cavitation, and corrosion	Inspection of Water-Control Structures; FERC/US Army Corps of Engineers Dam Inspection and Maintenance Program	Inspection of Water-Control Structures; FERC/US Army Corps of Engineers Dam Inspection and Maintenance Program	Consistent with GALL which recommends further evaluation (See Section 3.5.2.2.8)
Group 5: liners (Item Number 3.5.1.23)	Crack initiation and growth due to SCC; loss of material due to crevice corrosion	Chemistry Control Program; Monitoring of Spent Fuel Pool Water Level Program	Chemistry Control Program; Monitoring of Spent Fuel Pool Water Level Program	Consistent with GALL, with exceptions, which recommends no further evaluation (See Section 3.5.2.1)
Groups 1-3, 5, 6: all masonry block walls (Item Number 3.5.1.24)	Cracking due to restraint, shrinkage, creep, and aggressive environment	Masonry Wall Program	Masonry Wall Program	Consistent with GALL, which recommends no further evaluation (See Section 3.5.2.1)
Groups 1-3, 5, 7-9: foundation (Item Number 3.5.1.25)	Cracks, distortion, and increases in component stress level due to settlement	Structures Monitoring Program	Structures Monitoring Program	Consistent with GALL, which recommends further evaluation (See Section 3.5.2.2.2)
Groups 1-3, 5-9: foundation (Item Number 3.5.1.26)	Reduction in foundation strength due to erosion of porous concrete subfoundation	Structures Monitoring Program	N/A	Not applicable BFN does not use porous concrete subfoundations
Groups 1-5: concrete (Item Number 3.5.1.27)	Reduction of strength and modulus due to elevated temperature	Plant-specific	Structures Monitoring Program	Consistent with GALL, which recommends further evaluation (See 3.5.2.2.3)

Component Group	Aging Effect/ Mechanism	AMP in GALL Report	AMP in LRA	Staff Evaluation
Groups 4, 8: liners (Item Number 3.5.1.28)	Crack initiation and growth due to SCC; loss of material due to crevice corrosion	Plant-specific	N/A	Not applicable BFN does not have any Group 7 structues BFN does not have in-scope stainless steel liners in an exposed-to-fluid environment for any Group 8 structure
All groups: support members, anchor bolts, concrete surrounding anchor bolts, welds, grout pad, bolted connections, etc. (Item Number 3.5.1.29)	Aging of component supports	Structures Monitoring Program	Structures Monitoring Program	Consistent with GALL, which recommends no further evaluation if within the scope of the applicant's Structures Monitoring Program (See Section 3.5.2.1)
Groups B1.1, B1.2, and B1.3: support members, anchor bolts, and welds (Item Number 3.5.1.30)	Cumulative fatigue damage (CLB fatigue analysis exists)	TLAA evaluated in accordance with 10 CFR 54.21(c)	TLAA	This TLAA is evaluated in Section 4.6, Primary Containment Fatigue
Groups B1.1, B1.2, and B1.3: support members, anchor bolts, welds, spring hangers, guides, stops, and vibration isolators (Item Number 3.5.1.32)	Loss of material due to environmental corrosion; loss of mechanical function due to corrosion, distortion, dirt, overload, etc.	ISI Program	ISI Program	Consistent with GALL, which recommends no further evaluation (See Section 3.5.2.1)
Group B1.1: high-strength low-alloy bolts (Item Number 3.5.1.33)	Crack initiation and growth due to SCC	Bolting integrity Program		Exception to GALL (See Section 3.5.2.3.26)

The staff's review of the BFN component groups followed one of several approaches. One approach, documented in SER Section 3.5.2.1, involves the staff's review of the AMR results for components in the containments, structures, and component supports that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.5.2.2, involves the staff's review of the AMR results for components in the containments, structures, and component supports that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.5.2.3, involves the staff's review of the AMR

- loss of material due to corrosion in inaccessible areas of steel containment shell or liner plate
- loss of prestress due to relaxation, shrinkage, creep, and elevated temperature
- cumulative fatigue damage
- cracking due to cyclic loading and stress corrosion cracking
- aging of structures not covered by Structures Monitoring Program
- aging management of inaccessible areas
- aging of supports not covered by Structures Monitoring Program
- cumulative fatigue damage due to cyclic loading
- ~~quality assurance~~ for aging management of non-safety-related components
- TLAA

Staff Evaluation. For component groups evaluated in the GALL Report for which the applicant claimed consistency with the GALL Report, and for which the GALL Report recommends further evaluation, the staff audited and reviewed the applicant's evaluation to determine whether it had adequately addressed the issues that were further evaluated. In addition, the staff reviewed the applicant's further evaluations against the criteria contained in SRP-LR Section 3.5.2.2. Details of the staff's audit are documented in the staff's BFN audit and review report. The staff's evaluation of the aging effects is discussed in the following sections.

3.5.2.2.1 *Aging of Inaccessible Concrete Areas*

The discussion in SRP-LR Section 3.5.2.2.1.1 is not applicable to BFN since BFN is a BWR with a Mark I steel containment.

3.5.2.2.2 Cracking, Distortion, and Increase in Component Stress Level Due to Settlement; Reduction of Foundation Strength due to Erosion of Porous Concrete Subfoundations, if Not Covered by Structures Monitoring Program

The discussion in SRP-LR Section 3.5.2.2.1.2 is not applicable to BFN since BFN is a BWR with a Mark I steel containment.

3.5.2.2.3 Reduction of Strength and Modulus of Concrete Structures due to Elevated Temperature

The discussion in SRP-LR Section 3.5.2.2.1.3 is not applicable to BFN since BFN is a BWR with a Mark I steel containment.

3.5.2.2.4 Loss of Material due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate

The staff reviewed LRA Section 3.5.2.2.1.4 against the criteria in SRP-LR Section 3.5.2.2.1.4. In LRA Section 3.5.2.2.1.4, the applicant addressed loss of material due to corrosion in inaccessible areas of steel containment elements.

By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that in response to GL 87-05, which addressed the potential for corrosion of BWR Mark I steel drywells in the "sand pocket region," it had provided the staff with the results of the ultrasonic testing for corrosion degradation of drywell liner plate on Aug. 30, 1988. The results of the ultrasonic testing show that each unit's drywell had been ultrasonically tested near the sand cushion area during 1987. The tests showed that the nominal thickness was maintained on each drywell. Below, are the results of each unit's drywell ultrasonic testing. (Note: the following results are quoted from the applicant's letter to the staff dated August 30, 1988)

- Unit 1- No reading below the nominal thickness of one inch was measured, indicating that the integrity of the drywell liner plate is maintained. Periodic leakage from the sand cushion area has been observed. Corrosive species in the drainage are bases to suspect a higher rate of corrosion on Unit 1 drywell liner plate than on Unit 2 and 3. However, objective evidence of serious corrosion damage was not noted.
- Unit 2 - No reading below the nominal thickness of one inch was measured, indicating that no damage to the integrity of the drywell liner plate has occurred.
- Unit 3 - No reading below the nominal thickness of one inch was measured, indicating that no damage to the integrity of the drywell liner plate has occurred.

stand-alone

The applicant further stated that Procedure SPP-9.1, "ASME Section XI," is the applicant's standard to establish administrative controls and provide requirements, standard methods, guidance, and interfaces for preparation of ASME Code Section XI and augmented inservice inspection and testing programs at each nuclear site. In addition, this procedure allows for the control and dissemination of the site programs as ~~standalone~~ documents, as it is required to meet the individual site-specific requirements resulting from the physical plant differences. BFN Technical Instruction 0-TI-376, "ASME Section XI Containment Inservice Inspection Program Units 1, 2, and 3," is an administrative technical instruction employed to implement the inservice inspection provisions of SPP-9.1 relative to Class MC components at BFN. Appendix 9.7 to BFN Technical Instruction 0-TI-376 documents the Units 2 and 3 evaluation of Class MC components to determine augmented examination requirements in accordance with Table IWE-2500-1, Category E-C, Containment Surfaces Requiring Augmented Examination. Included as one of the areas to evaluate for augmented inspections was the "Drywell SCV at the sand bed region." The evaluation considered the potential degradation mechanisms of each area; the adequacy of existing programs and maintenance practices with respect to the monitoring, prevention, and correction of degradation; and industry experience applicable to the area; and provided a conclusion with respect to augmented examination requirements.

The applicant also stated that the drywell SCV at the sand bed region evaluation summarized the response to GL 87-05 and the need to obtain more data to conclude whether augmented inspections were warranted. UT thickness measurements of this area, in accordance with IWE-2500 (c)(2), (c)(3), and (c)(4), were obtained during the U3C8 and U2C10 refueling outages. The data indicate that the condition of the drywell steel liner plate in this area is good, and that this area should not be categorized for augmented examination for Units 2 and 3.

As part of the re-start activities for Unit 1, the applicant stated that a similar evaluation will be performed to determine if augmented inspections would be required. This evaluation and conclusion will be included in BFN Technical Instruction 0-TI-376 prior to Unit 1 re-start.

Structures Monitoring Program. The staff's evaluation for inaccessible areas is in SER Section 3.5.2.2.9.

(5) Settlement

SRP-LR Section 3.5.2.2.2.1 refers to SRP-LR Section 3.5.2.2.1.2 for discussion of settlement. SRP-LR Section 3.5.2.2.1.2 states that cracking, distortion, and increase in component stress level due to settlement could occur in Class 1 structures. Some plants may rely on a de-watering system to lower the site ground water level. If the plant's CLB credits a de-watering system, the GALL Report recommends verification of the continued functionality of the de-watering system during the period of extended operation. The GALL Report recommends no further evaluation if this activity is included in the scope of the applicant's Structures Monitoring Program.

In LRA Section 3.5.2.2.2.1, the applicant stated that cracks, distortion, and increase in component stress level due to settlement are not considered AERM for structures founded on rock or bearing piles. The following BFN structures are founded on rock or bearing piles: reactor buildings, primary containments, intake pumping station, reinforced concrete chimney, off-gas treatment building, equipment access lock, turbine buildings, gate structure Number 3, diesel HPFP house, transformer yard, and RHRSW tunnel. Based on industry experience, settlement of Class 1 structures founded on bedrock or bearing piles have not been noted to cause AERM.

n

For concrete structures founded on dense soil or backfill, the applicant stated that it can be concluded that cracking due to settlement is not significant if in the past 20 years of operating experience for a structure the total differential settlement experienced is well within the permissible limits for this type of structure and no settlement has manifested itself via cracked walls or cracked foundations. In this case, aging management for settlement would not be applicable for the structure during the period of extended operation. Prior settlement monitoring programs have revealed that soil settlement has stabilized and the structures will continue to perform their intended functions. However, due to prior operating history of settlement in the 1980s at BFN, cracking and distortion due to settlement of structures founded on soil or backfill will be monitored by the Structures Monitoring Program.

The staff concluded that the applicant's AMR for cracks, distortion, and increase in component stress level due to settlement is consistent with the GALL Report, and that the aging effects will be adequately managed by the Structures Monitoring Program.

(6) Erosion of porous concrete subfoundation

The GALL Report states that erosion of cement from porous concrete subfoundations beneath containment basemats is described in IN 97-11. IN 98-26 proposes Maintenance Rule structures monitoring for managing this aging effect, if applicable. If a dewatering system is relied upon for control of erosion of cement from porous concrete subfoundations, then the applicant is to ensure proper functioning of the dewatering system through the period of extended operation.

In LRA 3.5.2.2.2.1, the applicant stated that the evaluation of Information Notice 98-26 concluded that porous concrete subfoundations were not used at BFN. A dewatering system is not relied upon for control of erosion of cement from porous concrete

which performs a general visual examination each inspection period (3 periods per 10yr interval

leaktightness and structural integrity of the vent line bellows were maintained. The applicant was requested to provide the frequency at which the Type A testing is performed in each unit, and the process by which the integrity of the vent line bellows is maintained, including corresponding operating experience.

In its letter dated May 31, 2005, the applicant stated that it has been granted a one-time 5-year extension by the staff for performing the Type A test, and emphasized that there had been no performance-based Type A test failure on Units 2 or 3. The applicant plans to perform an Appendix J, Type A integrated leak rate test (ILRT) on Unit 1 prior to restart. The Unit 1 Appendix J, Type A test will be performed at least once every 48 months until test performance data are available to justify an extended test interval under Option B. Moreover, the applicant provided a detailed description of the history of the visual examinations performed under its plant procedures 2-TI-173 and 3-TI-173. Different from other BWR Mark 1 containments, the single-ply vent line bellows at the three BFN units are accessible for examination from the torus interior. The applicant emphasized that these examinations are thorough as they are performed by NDE-certified personnel with specific lighting and visual acuity requirements. Additionally, plant procedure 0-SI-4.7.A.2.K, "Primary Containment Drywell Surface Visual Examination," is performed each operating cycle.

TI

A VT-3 visual examination is performed each inspection interval in accordance with plant procedure 0-TI-376

Based on the detailed response regarding the detection of flaws in vent line bellows provided by the applicant, the staff found the applicant's process for ensuring the integrity of the vent line bellows acceptable. Therefore, the staff's concern described in RAI 3.5-1 is resolved.

RAI 3.5-2. In its review, the staff noted that, for seals and gaskets related to containment penetration, LRA Table 3.5.1, Item Number 3.5.1.6 and component type, "Compressible Joints and Seals," in LRA Table 3.5.2.1, the ASME Code Section XI Subsection IWE Program and the 10 CFR 50 Appendix J Program have been identified as AMPs. Based on Exception 1 in the ASME Code Section XI Subsection IWE Program, the AMP will not be applicable for aging management of containment seals and gaskets. For equipment hatches and air-locks, the assumption is that the leak rate testing program will monitor aging degradation of seals and gaskets, as they are leak rate tested after each opening. In RAI 3.5-2, dated December 10, 2004, the applicant was requested to clarify whether these assumptions are correct. For other penetrations (mechanical and electrical) with seals and gaskets, the applicant was requested to provide information regarding the adequacy of Type B leak rate testing frequency to monitor aging degradation of seals and gaskets of containment drywells. The applicant was also requested to provide the status of seals and gaskets of these penetrations at Unit 1.

In its response, by letter dated January 31, 2005, the applicant stated:

> ASME Section XI, 1992 Edition, 1992 Addenda, Category E-D, Item Numbers E5.10 (Seals), and E5.20 (Gaskets) requires a visual examination, VT-3, of containment seals and gaskets. Examination of most seals and gaskets requires the joints to be disassembled. When the airlocks, hatches, electrical penetrations, and flanged connections are tested in accordance with 10 CFR 50, Appendix J, degradation of the seal or gasket material would be revealed by an increase in the leakage rate. Corrective measures would be applied and the component retested.
>
> For Units 1, 2, and 3, Relief Request CISI-1 was granted to perform Appendix J test in lieu of the visual examination, VT-3, on the containment seals and gaskets. The

regarding the plans and programs that are used to ensure the integrity of this joint for each containment and (2) the status of the components (O-rings and bolts) at this joint for Unit 1.

In its response, by letter dated January 31, 2005, the applicant stated:

> These containment pressure boundary components will continue to be inspected consistent with the Browns Ferry CLB for 10 CFR Part 50, Appendix J requirements. On Units 2 and Unit 3 the Type A test frequency is currently on a 10-year interval. There have been no performance based Type A test failures on Unit 2 or Unit 3. A Type A Integrated Leak Rate Test will be performed as part of the Unit 1 restart effort. Type B testing is also performed on the drywell-head seal every refueling outage for all three units. Therefore, in combination of the Type A tests and Type B tests, integrity for this joint for each containment is assured. Exception 2 pertains to bolt torque or tension testing. Pressure retaining bolting associated with the Containment drywell-head to drywell joint is examined in accordance with ASME Section XI Subsection IWE.

The applicant performs Type B testing of the drywell-head seal every outage, and examines the pressure retaining bolts of the drywell head in accordance with Subsection IWE of the ASME Section XI Code. The staff accepts that these two activities together with periodic Type A testing will ensure the integrity of this joint. Therefore, the staff found the applicant's practice of ensuring the integrity of this joint acceptable. The staff's concern described in RAI 3.5-3 is resolved.

RAI 3.5-4. In its review of LRA Table 3.5.1, the staff noted that the water leakages from the sand drains have been found in Units 2 and 3, and the results of the UT examinations performed from the accessible areas of the drywells have indicated that the condition of the drywell shells were good, and these areas did not require augmented examination. The staff requested the applicant to provide the following additional information related to the drywell shell corrosion in this area for each containment drywell:

a ~~(A)~~ In other Mark 1 containments, the cause of water leakage from the sand-bed drains has been found as water leaking from the refueling cavity (see IN 86-99, "Degradation of Steel Containments)." As no water leakage has been indicated from Unit 1 (having no refueling activities during its long layup), it would appear that the cause of the water leakage in Units 2 and 3 could be the same as that described in the information notice. Provide a discussion of the root cause in this context.

b ~~(B)~~ If the water leakage is related to refueling operation, provide information regarding the corrosion susceptibility of the cylindrical part of the drywell shell on the insulation (inaccessible) side.

c ~~(C)~~ Item No. E4.12 of Examination Category E-C of Subsection IWE requires the owner to establish grid and measurement locations in the suspect areas identified for augmented examinations. Provide information regarding the methods used to establish a confidence level that no drywell shell corrosion exists in the sand-pocket areas.

d ~~(D)~~ Unless preventive actions are taken and conditions verified that no leakage and shell corrosion exists in the suspect areas, IWE will require continuation of UT measurements in the augmented examination areas. Provide justification for excluding the suspect areas from augmented examinations.

e (E) Based on the results of the UT examinations performed from the accessible areas of the drywells, BFN asserted that the condition of the drywell shells is good. Provide a discussion of BFN's criteria for judging that the condition of the drywell steel liner plate is good and the rationale for the criteria.

f (F) Provide a discussion of any degradation observed and/or repair work implemented as a result of past general visual inspection of the moisture barrier located at the junction of the steel drywell and the concrete floor.

In its response, by letter dated January, 31, 2005, the applicant stated:

a (A) See response to item "b."

b (B) A postulated failure of the drywell-to-reactor building refueling seal can result in water intrusion into the annulus space around the drywell. This leakage can occur only during refueling outages when the reactor cavity is flooded to allow movement of fuel between the reactor and the fuel pool. However, water intrusion does not cause failure of the drywell's intended function. Any water leakage resulting from a postulated failure of the drywell-to-reactor building refueling seal could not remain suspended in the annulus region for an indefinite period of time and would eventually be routed to the sandpocket area drains or would evaporate due to the heat generated in the drywell during operation. In TVA's response to NRC Generic Letter 87-05 dated August 30, 1988, which addressed the potential for corrosion of boiling water reactor (BWR) Mark I steel drywells in the "sand pocket region," TVA provided the NRC with the results of the *ultrasonic testing for corrosion degradation* of drywell liner plate. The results of the ultrasonic testing states: Each unit's drywell was ultrasonically tested near the sand cushion area during 1987. The results from these tests showed that the nominal thickness was maintained on each drywell. Below are the results of each unit's drywell ultrasonic testing:

- Unit 1 - No reading below the nominal thickness of one inch was measured indicating that the integrity of the drywell liner plate is maintained. Periodic leakage from the sand cushion area has been observed. Corrosive species in the drainage are bases to suspect a higher rate of corrosion on Unit 1 drywell liner plate than on Unit 2 and 3. However, objective evidence of serious corrosion damage was not noted.
- Unit 2 - No reading below the nominal thickness of one inch was measured indicating that no damage to the integrity of the drywell liner plate has occurred.
- Unit 3 - No reading below the nominal thickness of one inch was measured indicating that no damage to the integrity of the drywell liner plate has occurred.

(c) In response to NRC Generic Letter 87-05, TVA provided the NRC with the results of the ultrasonic testing for corrosion degradation of BFN Units 1, 2, and 3 drywell liner plates near the sand cushion area during 1987. The results from these tests showed that the nominal thickness was maintained on each drywell. Paragraph IWE-1242 of ASME Section XI requires the Owner to determine containment surface areas requiring augmented examination, in accordance with Paragraph IWE-1241. UT thickness measurements of this area were obtained during the U2C10 and U3C8 refueling outages for Units 2 and 3 respectively and in 1999 and 2002 for Unit 1 (0-TI-376 Appendix 9.7 page 4). The data indicate that the condition of the drywell steel liner plate in this area

meets code requirements, and that this area should not be categorized for augmented examination.

(d) See response to Item c.

(e) See response to Item c.

(f) The internal drywell steel containment vessel (SCV) embedment zone is subject to corrosion if the drywell floor-to containment vessel moisture barrier fails, allowing moisture intrusion, or if the concrete floor of the drywell cracks, allowing moisture seepage through to the steel liner. During the Unit 2 Cycle 9 outage, a portion of the moisture barrier was replaced (Problem Evaluation Report (PER) BFPER971516). Engineering personnel performed an examination of the exposed drywell SCV area below the moisture seal. This inspection indicated some minor pitting and localized rust, but nothing approximating a challenge to nominal wall thickness. No propagation of iron oxide to the concrete surface was noted, which would be indicative of steel containment vessel corrosion below the concrete. Inspections conducted by the Containment ISI Program during Unit 2 Cycle 10 refueling outage and Unit 3 Cycle 9 refueling outage also identified some damaged areas of the moisture barrier (gaps, cracks, low areas/spots, or other surface irregularities) that were evaluated by engineering and replaced or repaired. (PER 99-005254-000 for Unit 2 Drywell moisture seal barrier and PER 00-004163-000 for Unit 3 Drywell moisture seal barrier).

In Unit 1, the moisture barrier in areas that would be made inaccessible due to ductwork installation have been replaced. Visual examination of exposed drywell SCV area below the moisture barrier identified some minor pitting. Ultrasonic thickness and pit depth measurements were taken and evaluated by engineering which confirmed nominal wall thickness was not encroached. The entire Unit 1 moisture barrier will be replaced before restart.

The Structures Monitoring Program also monitors the concrete to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell. Research of plant history did not reveal any instances of water spills and water ponding on the containment concrete floor. A general visual inspection of the moisture barrier at the junction of the steel drywell shell and the concrete floor is performed once each inspection interval in accordance with the ASME Section XI, Subsection IWE aging management program.

Based on the responses, the staff understood that for each unit the applicant has taken actions to monitor corrosion of the outside surface of the drywell shell and the inside surface at the junction of the concrete floor and the drywell shell ~~during the CLB~~. However, the extent of monitoring the parameters associated with the degradation and the root cause(s) of the corrosion problems are not clear. Delete

The response to RAI 3.5-4 emphasizes that the existing degradation of the drywell shells (inside and outside) has not reached the minimum required thickness of one inch. However, the response does not address a number of parameters that are pertinent to the period of extended operation. In a follow-up letter, dated April 5, 2005, the applicant was requested to provide (1) a description of the type of degradation (e.g, a cluster of pits or general corrosion), (2) a description of preventive actions (e.g. stopping the leaks from the refueling cavity seals or monitoring of sand drains), (3) a description of corrective actions (repairing/cleaning and

The request was informal by email.

By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that ceramic and glass fiber used to seal fire barrier penetrations do not have any applicable aging effects requiring aging management. This is consistent with previous staff positions in that there are no applicable aging effects for glass used in a metal fire barrier penetration. This is also consistent with the NUREG-1769 "Safety Evaluation Report Related to License Renewal of Peach Bottom Atomic Power Station, Units 2 and 3," dated January 31, 2003,which concurred that insulation made of aluminum, stainless steel (mirror), calcium silicate, ceramic fiber, or fiberglass in a sheltered environment does not have any aging effects requiring aging management.

The applicant further stated that a review of BFN operating history did not reveal any loss of intended function due to aging effects for the following ceramic fiber components.

- reactor building fire barriers
- diesel generator building fire barriers

The staff concluded that the applicant had not credited an existing AMP (structures monitoring and/or fire protection) that already includes fire barriers in its scope, on the basis that its AMR did not identify any applicable aging effects.

→ Need to add conclusion on acceptability | See RAI 3.5-11 p. 3-319

Earthfill & Rock in a Buried Environment - This item indicates that the equipment supports and foundations are earth fill (rock and sand). The staff requested that the applicant explain the technical bases for concluding that there are no aging effects requiring management.

By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that the foundation for the condensate water storage tank (CWST) is comprised of a concrete ring foundation with the interior portion of the ring foundation filled with crushed rock and sand. The earthen materials (rock and sand) of the CWST foundation interior base are protected from environmental weathering conditions by the concrete perimeter ring and CWST tank bottom. There are no aging effects for the earthen materials of the CWST foundation interior base that require aging management. Aging management of the CWST concrete foundation ring is managed by the Structures Monitoring Program. Aging management of the CWST bottom will be performed by the One-Time Inspection Program.

The applicant also stated that a review of BFN operating history did not reveal any loss of intended function due to aging effects for earthen materials of the CWST foundation interior base.

Based on the additional information provided by the applicant, the staff concurred with the applicant's AMR results for the crushed rock and sand base of the CWST. The staff concluded that aging management is not required because these materials are adequately protected by the concrete perimeter ring and the CWST tank bottom.

This does not apply to reactor building.

Elastomers in an Embedded/Encased Environment - The staff requested the applicant to clarify whether the compressible joints and seals that are embedded/encased in concrete are accessible for monitoring. If not, the staff requested the applicant to explain how the Structures Monitoring Program is utilized to manage aging effects in inaccessible areas.

- pH ranges from 7.28 to 8.64 which are well above < 5.5
- Chlorides – maximum reading of 13.9 ppm which is well below the threshold of 500 ppm
- Sulfates – maximum reading of 15.5 ppm which is well below the threshold of 1500 ppm

Browns Ferry groundwater and Wheeler Reservoir sample measurements have confirmed that parameters are well below threshold limits that could cause concrete degradation (i.e., an aggressive environment does not exist).

Need to revise to be consistent with RAI 3.5-16 on p. 3-323

Based on the above test data, the staff found that both the Browns Ferry groundwater and the Wheeler Reservoir water are non-aggressive. Therefore, the concern described in RAI 3.~~6~~5-7 is resolved.

RAI 3.5-8. The staff noted that the AMR discussion provided in LRA Section 3.5.2.2.2.2 is rather general and brief, and requires more detailed elaboration to support BFN's conclusion that the conditions identified in the GALL Report, as revised by ISG-03, are satisfied and no aging management for below-grade inaccessible concrete is needed. In RAI 3.5-8, dated December 10, 2004, the staff requested the applicant to provide additional specific information, including: (1) concrete quality and test data for inaccessible concrete, (2) past operating experience regarding exposure of inaccessible concrete to aggressive chemical/fluid environment, and (3) past inaccessible concrete inspection findings and data related to concrete degradation and repairs.

In its response, by letter dated January 31, 2005, the applicant stated:

(1) The BFN concrete structures and concrete components are designed in accordance with ACI 318-63 and 71 and constructed using ingredients conforming to ACI and ASTM standards, which provide for a good quality, dense, well cured, and low permeability concrete. Cracking is controlled through proper arrangement and distribution of reinforcing bars. Concrete structures and concrete components are constructed of a dense, well-cured concrete with an amount of cement suitable for strength development, and achievement of a water-to-cement ratio that is characteristic of concrete having low permeability. This is consistent with the recommendations and guidance provided by ACI 201.2R-77.

(2) As noted in the response to RAI 3.5-7, Browns Ferry groundwater water and Wheeler Reservoir sample measurements have confirmed that parameters are well below threshold limits that could cause concrete degradation (an aggressive environment does not exist).

(3) A review of Browns Ferry operating history, the Browns Ferry Structures Monitoring Baseline inspection, and the results for the first Structures Monitoring inspection period did not reveal any loss of intended function due to aging effects when below-grade inaccessible concrete was excavated for other reasons.

Based on the plant-specific operating experience reported in item 3 and the fact that the applicant complied with applicable provisions of the GALL Report, the staff found the applicant's response acceptable, and the staff's ~~concern described~~ need for additional information in RAI 3.5-8 is resolved.

RAI 3.5-9. In LRA Table 3.5.2.2, no AERM and AMPs are identified for hatches/plugs, and electrical and I&C penetrations made of carbon and low-alloy steel that are embedded or encased in concrete; whereas, GALL Report Item III.A2.2-a calls for a Structures Monitoring Program to manage the loss of material and corrosion aging effects for steel components exposed to various environments. Additionally, the mechanical penetrations listed in Table 3.5.2.2 and the structural steel beams, columns, plates, and trusses that are embedded or encased in concrete are also identified as having no applicable aging effect that requires aging management; therefore, no AMP is designated for the components. This same BFN position is shown throughout the remainder of LRA Table 3.5.2.2. In RAI 3.5-9, dated December 10, 2004, the staff requested the applicant to discuss past operating experience and inspection results related to aging degradation of embedded or encased hatches, plugs, duct banks, manholes, mechanical penetrations, and electrical and I&C penetrations in order to provide an operating experience-based rationale to justify its assertion that these components require no AMP to manage their aging.

In its response, by letter dated January 31, 2005, the applicant stated:

> The BFN concrete structures and concrete components are designed in accordance with ACI 318-63 and 71 and constructed using materials conforming to ACI and ASTM standards, which provide for a good quality, dense, well cured, and low permeability concrete. Cracking is controlled through proper arrangement and distribution of reinforcing bars.
>
> Concrete structures and concrete components are constructed of a dense, well-cured concrete with an amount of cement suitable for strength development, and achievement of a water-to-cement ratio that is characteristic of concrete having low permeability. This is consistent with the recommendations and guidance provided by ACI 201.2R-77. As a minimum, all exposed portions of embedded carbon steel structural components are inspected for the following aging effects:
>
> - Outside Air Environments: Loss of material due to general and pitting corrosion
> - Inside Air Environments: Loss of material due to general corrosion
> - Containment Air Environments: Loss of material due to general corrosion
>
> A review of Browns Ferry operating history, the Browns Ferry Structures Monitoring Baseline inspection, and the results for the first Structures Monitoring inspection period did not reveal any loss of intended function due to aging effects for carbon steel components embedded/encased in concrete.

Based on the above plant-specific operating experience and the fact that concrete structures and concrete components are designed in accordance with ACI 318-63 and 71 and constructed using materials conforming to ACI and ASTM standards, which provide for a good quality, dense, well-cured, and low permeability concrete, the staff found that the applicant adequately justified its AMR results regarding the concrete elements listed in LRA Table 3.5.2.2. Therefore, the staff's ~~concern~~ need for additional information described in RAI 3.5-9 is resolved.

RAI 3.5-10. Non-ferrous aluminum electrical and I&C penetrations embedded or encased in concrete are listed in the second item of LRA Table 3.5.2.2 as components requiring no AMP to

program number 35486. This leak is contained within the leak channel beneath the fuel pool liner). The fuel pool liners are monitored on a monthly basis per operation instruction 1-OI-78. The leak is small (~0.06 gpm)and has been steady over time without an increasing trend over the last ten years.

The staff found the above applicant's justification reasonable and adequate because it was supported by the fact that the operating history, structures monitoring baseline inspection, and results from the first structures monitoring inspection period did not reveal any loss of intended function due to aging effects for aluminum and stainless steel embedded or encased within concrete. Therefore, the staff's concerns described in RAI 3.~~4~~5-10 are resolved.

RAI 3.5-14, The staff reviewed LRA Section 3.3.2.2 and LRA Table 3.3.1 with respect to the neutron-absorbing sheets in spent fuel storage racks. In LRA Section 3.3.2.2, the applicant stated that the Chemistry Control Program manages general corrosion and a one-time inspection of Boral coupon test specimens was performed at BFN that confirmed that no significant aging degradation had occurred, and that the neutron-absorbing capacity of the Boral had not been reduced. Since it is implied that some Boral aging degradations had occurred at the time of inspection of the test specimens, in RAI 3.5-14, dated December 10, 2004, the staff requested the applicant to discuss the basis for the above assertion that the neutron-absorbing capacity of the Boral will be maintained at an adequate level during the extended period of plant operation.

In its response, by letter dated January 31, 2005, the applicant stated:

> A total of 16 boral coupons were placed in the Unit 3 spent fuel storage pool (SFSP) in October 1983. The coupons supplied by the rack manufacturer are of the same metallurgical condition as the high density fuel storage racks (HDFSR) in thickness, chemistry, finish, and temper. For the first six years of the planned fifteen year surveillance program, examination was to have taken place at two-year intervals. Accordingly, two coupons were removed in October 1985. Blisters were found upon examination, and because of this unexpected anomaly, three additional coupons were analyzed not finding any blisters. As a result of blisters found on the coupons removed in 1985, the surveillance program has been expanded to include monitoring the formation and behavior of these blisters. These boral coupons are periodically removed from the fuel pool for testing and are evaluated for corrosion or other degradation of the neutron absorber plates by comparing various physical characteristics of the test coupons to baseline measurements taken when the coupons were installed. Also, a metallurgical engineer examines the coupons for general corrosion, local pitting, and bonding. No further blisters, corrosion, or degradation has been identified in coupons evaluated through 2003.

The above response states that these Boral coupons are periodically removed from the fuel pool for testing and are evaluated for corrosion or other degradation of the neutron absorber plates by comparing various physical characteristics of the test coupons to baseline measurements taken when the coupons were installed. The response also implies that a metallurgical engineer periodically examines the coupons for general corrosion, local pitting, and bonding. Also, no further blisters, corrosion, or degradation have been identified in coupons evaluated through 2003; however, it was not clear to the staff whether these periodic inspections are ongoing activities that are an extension of the 1983 One-Time Inspection

Program covering Boral coupon test specimens or a separate AMP in addition to the Chemistry Control Program mentioned above. The applicant was requested to clarify the key parameters of this periodic inspection program or activity including the objective, scope, frequency and inspection approach of the program.

In its response, dated May 24, 2005, the applicant stated that:

> The Boral coupon inspection program was initiated in 1983 to implement the inspection and testing requirements of UFSAR Section 10.3.6; this checks the long-term behavior of the material of the high density spent fuel racks. The inspection is performed per BFN Technical Instruction (TI) TI-116, "High Density Fuel Storage System Surveillance Program." When the TI is performed, Boral coupons are removed from the spent fuel storage pool and examined by the Metallurgical Engineer in their original condition to determine if sampling of surface corrosion products is appropriate. Thickness measurements are obtained of each coupon and documented in accordance with the TI. If degradation is such that further investigation is warranted, a minimum of one coupon is selected to be unsheathed or opened. Prior to the unsheathing process, a dye penetrant test for indications on the outer surfaces of the coupon will be performed and is examined by the Metallurgical Engineer. The Metallurgical Engineer decides if further unsheathing of the coupons is required. The visual examination by the Metallurgical Engineer is documented on the appropriate forms of the TI. The current frequency for performing this TI is two years. The surveillance frequency is re-evaluated each time the surveillance is performed and can be changed based on the trend of the historical data results. The inspection of the Boral coupons will continue until such time as the trend of the historical data results collected provides a basis to discontinue the inspections.

Based on its review, the staff found the applicant's response to RAI 3.5-14 acceptable. Therefore, the staff's ~~concern~~ described in RAI 3.5-14 is resolved.
need for additional information

RAI 4.7.4-1. LRA Table 3.5.2.2 lists the AMR results of expansion joint (elastomer, polyurethane foam) as a TLAA and refers the TLAA to LRA Section 4.7. LRA Section 4.7.4, "Radiation Degradation of Drywell Expansion Gap Foam," states that an analysis of the effect of dose on the foam showed the material properties will remain within the limits assumed by the original design analysis for the additional 20 years of extended operation. In RAI 4.7.4-1, dated December 10, 2004, the staff requested the applicant to provide a more detailed discussion of the analysis including a discussion of the assumptions adopted in the analysis, the type of data extrapolation applied, and the quantitative results obtained to justify the assertion that the requirements of 10 CFR 54.21(c)(1)(i) are fully met.

By letter dated January 31, 2005, the applicant provided its response to RAI 4.7.4-1. The staff evaluation of the applicant's response is provided in SER Section 4.7.4.

Does not apply to reactor building

RAI 3.5-17. LRA Table 3.5.2.29, Radwaste Building, has three separate rows of component type listings (i.e., reinforced concrete, beams, column, walls, and slabs) which make references to note I,1 (last column of the table) and are shown to be associated with NUREG-1801 Section III.A3.1-h, Volume 2. Note I,1 of the table implies that the radwaste building is founded on rock or bearing piles. The note also refers to LRA Section 3.5.2.2.2.1 for further evaluation. Item 5 of the section does not clearly indicate that the radwaste building is founded on rock or bearing piles. In RAI 3.5-17, dated March 25, 2005, the staff requested the applicant to provide

Does not apply to reactor building

the type of foundation medium that supports the building; and if the structure is not founded on rock or piles, to discuss the basis for asserting that the cracking, distortion, and increase in component stress level due to settlement are not aging effects requiring management. The applicant was also asked, as appropriate, to revise LRA Sections 3.5.2.1 and 3.5.2.2.2.1 to include the radwaste building within the scope of its discussion.

In its response, dated April 14, 2005, the applicant stated:

> The Radwaste Building is founded on piles as noted by the entry under "Component Type" - "Piles" in Table 2.4.7.8.
>
> LRA Section 3.5.2.2.2.1, Item 5, paragraph 1 on page 3.5-43 should be revised to read:
>
>> "Cracks, distortion, increase in component stress level due to settlement are not considered as aging effects requiring management for BFN structures founded on rock or bearing piles. The following BFN structures are founded on rock or bearing piles: Reactor Buildings, Primary Containments, Intake Pumping Station, Reinforced Concrete Chimney, Off-Gas Treatment Building, Equipment Access Lock, Turbine Buildings, Gate Structure Number 3, Diesel HPFP House, Transformer Yard, RHRSW Tunnel and Radwaste Building. Based on industry experience, settlement of Class 1 structures founded on bedrock or bearing piles have not been noted to cause aging effects requiring management."

Based on its review, the staff found the applicant's response to RAI 3.5-17 acceptable. Therefore, the staff's ~~concern~~ described in RAI 3.5-17 is resolved.

need for additional information

RAI 3.5-18. In its review of LRA Table 3.5.2.30, the staff was not clear as to whether the Group 5 category referred to includes the service building. In RAI 3.5-18, dated March 25, 2005, the staff requested the applicant to confirm that the service building, or portion of the service building, is clearly included within the scope addressed by LRA Section 3.5.2.2.2.1 and make any necessary revision to the LRA section to clarify its position.

In its response, by letter dated April 14, 2005, the applicant stated:

> The aging management review of the Service Building was performed to the requirements for Group 3 Structures of NUREG-1801, Vol. 2, Chapter III.A3. The Service Building is included within the scope addressed by LRA Section 3.5.2.2.2.1, Item 8 since it was considered as a Group 3 Structure and that section is applicable to Group 1 through Group 5 Structures of NUREG-1801, Vol. 2 Chapter 3.

need for additional information

The staff found the above response acceptable. Therefore, the staff's ~~concern~~ described in RAI 3.5-18 is resolved.

The staff also reviewed the information provided in LRA Section 3.5.2.1.2 and determined that the applicant had adequately identified applicable aging effects, and the AMPs credited for managing the aging effects, for the reactor buildings' components that are not addressed by the GALL Report. The staff found the applicant's AMR results for the reactor buildings' components acceptable.

This does apply to reactor building

3.5.2.3.3 Equipment Access Lock – Summary of Aging Management Evaluation – Table 3.5.2.3

The staff reviewed LRA Table 3.5.2.3, which summarizes the results of AMR evaluations for the equipment access lock component groups.

The staff also reviewed the information provided in LRA Section 3.5.2.1.3 and determined that the applicant adequately identified applicable aging effects, and the AMPs credited for managing the aging effects, for the equipment access lock components that are not addressed by the GALL Report. The staff found the applicant's AMR results for the equipment access lock components acceptable.

3.5.2.3.4 Earth Berm – Summary of Aging Management Evaluation – Table 3.5.2.4

The staff reviewed LRA Table 3.5.2.4, which summarizes the results of AMR evaluations for the earth berm component groups.

The staff also reviewed the information provided in LRA Section 3.5.2.1.4 and determined that the applicant had adequately identified applicable aging effects, and the AMPs credited for managing the aging effects, for the earth berm components that are not addressed by the GALL Report. The staff found the applicant's AMR results for the earth berm components acceptable.

3.5.2.3.5 Diesel Generator Buildings – Summary of Aging Management Evaluation – Table 3.5.2.5

The staff reviewed LRA Table 3.5.2.5, which summarizes the results of AMR evaluations for the diesel generator buildings component groups.

During the onsite audit, the staff reviewed selected items in LRA Table 3.5.2.~~26~~5, for MEAP combinations that are not consistent with the GALL Report. The staff requested clarifications for the following material/environment combinations and the corresponding LRA Table 2 items:

Ceramic Fiber in an Inside Air Environment - The staff requested that the applicant provide the BFN technical basis for concluding that no aging management is required for ceramic fiber fire barriers in an inside air environment.

The following list identifies ceramic fiber components in an inside air environment:

- reactor building fire barriers
- diesel generator building fire barriers

By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that ceramic and glass fiber used to seal fire barrier penetrations do not have any applicable aging effects requiring aging management. This is consistent with previous staff positions in LRA SER concurrences that there are no applicable aging effects for glass used in a metal fire barrier penetration. This is also consistent with the NUREG-1769 SER related to the license renewal of another plant which concurred that insulation made of aluminum, stainless steel (mirror), calcium silicate, ceramic fiber, or fiberglass in a sheltered environment does not have any aging effects requiring aging management.

The applicant further stated that a review of BFN operating history did not reveal any loss of intended function due to aging effects for the following ceramic fiber components.

- reactor building fire barriers
- diesel generator building fire barriers

The staff concluded that the applicant had not credited an existing AMP (structures monitoring and/or fire protection) that already included fire barriers in its scope on the basis that its AMR did not identify any applicable aging effects.

→ need conclusion on applicability

The staff's review of LRA Table 3.5.2.5 identified an area in which additional information was necessary to complete the review of the applicant's results. The applicant responded to the staff's RAI, as discussed below.

RAI 3.5-11. With respect to the fire barriers consisting of ceramic fiber listed in LRA Table 3.5.2.5, the applicant's AMR identified neither AERM nor AMP for the ceramic fiber fire barriers. In RAI 3.5-11, dated December 10, 2004, the staff requested the applicant to discuss past plant-specific inspection results of these fire barriers in order to provide an operating experience-based justification for the above AMR finding.

In its response, by letter dated January 31, 2005, the applicant stated:

> This same RAI was asked as RAI 3.3-2 for the Reactor Building. In the response to that RAI, the same material was also addressed for the Diesel Generator Building (Table 3.5.2.5, item number 10 on page 3.5-74). Refer to the TVA response to RAI 3.3-2 (TVA letter to NRC dated September 30, 2004).

The staff finds the response to RAI 3.5-11 provided in SER Section 3.3 acceptable; therefore the staff's concern expressed in RAI 3.5-11 is resolved.

The staff also reviewed the information provided in LRA Section 3.5.2.1.5 and determined that the applicant had adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the diesel generator buildings' components that are not addressed by the GALL Report. The staff found the applicant's AMR results for diesel generator buildings' components acceptable.

3.5.2.3.6 Standby Gas Treatment Building – Summary of Aging Management Evaluation – Table 3.5.2.6

The staff reviewed LRA Table 3.5.2.6, which summarizes the results of AMR evaluations for the standby gas treatment building component groups.

The staff also reviewed the information provided in LRA Section 3.5.2.1.6 and determined that the applicant had adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the standby gas treatment building components that are not addressed by the GALL Report. The staff found the applicant's AMR results for the standby gas treatment building components acceptable.

3.5.2.3.11 Underground Concrete Encased Structures – Summary of Aging Management Evaluation – Table 3.5.2.11

The staff reviewed LRA Table 3.5.2.11, which summarizes the results of AMR evaluations for the underground concrete-encased structures component groups.

The staff also reviewed the information provided in LRA Section 3.5.2.1.11 and determined that the applicant had adequately identified applicable aging effects and the AMPs credited for managing the aging effects for the underground concrete-encased structures components that are not addressed by the GALL Report. The staff found the applicant's AMR results for the underground concrete encased structures' components acceptable.

3.5.2.3.12 Intake Pumping Station – Summary of Aging Management Evaluation – Table 3.5.2.12

The staff reviewed LRA Table 3.5.2.12, which summarizes the results of AMR evaluations for the intake pumping station component groups.

In LRA Table 3.5.2.12, the applicant stated that no aging management is required for submerged reinforced concrete. Plant-specific Note 5 states that for cracking, loss of bond, loss of material (spalling, scaling) due to corrosion of embedded steel in concrete for inaccessible areas, no plant-specific aging management is required. Plant-specific Note 6 states that, for increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack of concrete for inaccessible areas, no plant-specific aging management is required.

Move text circled on pp. 3-322 to 3-326 Here

During the onsite audit, the staff reviewed other selected items in LRA Table 3.5.2.12, for MEAP combinations that are not consistent with the GALL Report. The staff requested clarifications for the following material/environment combinations and the corresponding LRA Table 2 items:

Aluminum in an Outside Air Environment – The staff requested the applicant to provide the technical basis for concluding that no aging management of aluminum components is required for an outside environment.

The following list identifies aluminum components in an outside air environment:

- electrical and I&C penetrations
- conduits and supports
- non-ASME equivalent supports

By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that aluminum alloys containing zinc are susceptible to corrosion in wetted, aggressive environments. The outside air environment does not have contaminants that would cause an aggressive environment. Additionally, rain would periodically wash any contaminant(s) from the material. The aluminum penetration sleeves and conduit at BFN are also constructed of 6063-T42 alloy material that is resistant to pitting, crevice corrosion, and SCC (Metals Handbook, Ninth Edition, Volume 13, "Corrosion," ASM International, 1987). Therefore, the potential for concentration of contaminates is not significant for aluminum components in an outside air environment and loss of function due to corrosion is not considered plausible.

The applicant also stated that EPRI structural tools document, "Aging Effects for Structures and Structural Components (Structural Tools)," EPRI 1002950 revision 1, August 2003, states that aging management is not required for structural aluminum and aluminum alloys in a non-aggressive ambient outside environment (general, galvanic, crevice and pitting corrosion, and SCC).

The applicant further stated that a review of BFN operating history did not reveal any loss of intended function due to aging effects for the following aluminum components:

- electrical and I&C penetrations
- conduits and supports
- non-ASME equivalent supports

The staff accepts the applicant's AMR results, that aging management is not required for these aluminum components in an outside environment, on the basis that (1) the material used is resistant to corrosion and SCC, and (2) concentration of contaminates in a non-aggressive ambient outside environment is not plausible

The staff also reviewed the information provided in LRA Section 3.5.2.4.12 and determined that the applicant had adequately identified applicable aging effects, and the AMPs credited for managing the aging effects, for the intake pumping station components that are not addressed by the GALL Report. The staff found the applicant's AMR results for the intake pumping station components acceptable.

Reinforced Concrete in a Submerged Environment - In LRA Table 3.5.2.12 (Intake Pumping Station - Summary of Aging Management Evaluation), rows 37 and 38, the applicant stated that no aging management is required for submerged reinforced concrete. Note 5 for row 37 states that for cracking, loss of bond, loss of material (spalling, scaling) due to corrosion of embedded steel in concrete for inaccessible areas, no plant-specific aging management is required. Note 6 for row 38 states that for increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack of concrete for inaccessible areas, no plant-specific aging is required.

The staff noted that a submerged component is not necessarily inaccessible. If the submerged component is accessible, it is expected that the component will be managed by the Inspection of Water Control Structures Program. The staff requested that the applicant identify all the submerged concrete components in the intake pumping station, and provide the technical basis for designating these components as being inaccessible. The staff also requested that the applicant identify all the submerged concrete structures that will be inspected under Water Control Structures Program, and describe the implementing details of the inspection of submerged structures included in the Water Control Structures Program.

By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that:

> Browns Ferry groundwater water and Wheeler Reservoir water sample measurements presented in the response to question 297 have confirmed that parameters are well below threshold limits that could cause concrete degradation (an aggressive

environment does not exist). It is not credible to postulate that some environmental event will occur in the future that would affect the quality of groundwater in the vicinity of Browns Ferry. A change in the environment due to a chemical release would be considered as an "abnormal event". NUREG-1800, "Standard Review Plan for the Review of License Renewal Applications for Nuclear Power Plants," states that aging effects from abnormal events need not be postulated specifically for license renewal.

In-scope submerged concrete exposed to Wheeler Reservoir water is not readily accessible for inspection. Several in-scope submerged concrete common areas outside of individual pump bays where continuous flow make diver entry unsafe would require a multiple unit outage to inspect. Browns Ferry will perform a one time inspection of the in-scope submerged concrete in one individual pump bay to confirm the absence of aggressive environmental aging effects and that a loss of intended function has not occurred due to aggressive environment aging effects.

Browns Ferry will also continue to perform periodic inspections of accessible concrete in an inside air environment and outside air environment for in-scope structures with the Structures Monitoring Program.

The staff concluded that the applicant's AMR is not consistent with the GALL Report and is not acceptable, because there is no commitment to conduct periodic inspection of accessible, submerged water control concrete structures. This issue was addressed in RAI 3.5-16 and is discussed below.

RAI 3.5-16. After review of the above response, including the facts that an aggressive environment does not exist for groundwater, and continuous water flow in several in-scope submerged concrete common areas outside of individual pump bays makes diver entry unsafe, the staff requested, in RAI 3.5-16 dated March 11, 2005, that the applicant provide the following additional information and a plant-specific commitment, as needed, in order to expedite staff closure of the issue raised by the audit team:

(1) A discussion of past inspection findings, and repairs and maintenance experience for submerged, reinforced concrete structures (e.g., intake structure).

(2) A discussion of the pertinent submerged, reinforced concrete test data (as available) which demonstrate that the conditions stated in the discussion columns of items III A6.1-b and III A6.1-d in GALL Report, Volume II, are fully met.

(3) A detailed description of the one-time inspection by the applicant, cited above, of the in-scope submerged concrete in one individual pump bay, including method of inspection; concrete elements and parameters or types of degradation to be inspected; criteria for judging the observed types, extent, and severity of reinforced concrete degradation that would trigger BFN's commitment to an AMP for submerged concrete with a periodic inspection provision, inspection frequency, and schedule for implementing the One-Time Inspection Program.

(4) A discussion of the methods (e.g., regular monitoring of the raw water for pH, chloride concentration, sulfate concentration, abrasive particulates, detrimental organic agents) that will be employed to ensure that the raw service water in close proximity to the intake

structure remains non-aggressive to the submerged concrete during the extended period of operation.

In its response, by letter dated April 5, 2005, the applicant stated:

(1) BFN's submerged concrete operating experience:

A baseline inspection for the BFN Structures Monitoring Program was established in 1997 and included the Intake Pumping Station and Gate Structure No. 3. Baseline inspections and subsequent BFN Structures Monitoring Program inspections included accessible interior and exterior concrete surfaces of the Intake Pumping Station and Gate Structure No. 3. Only the Intake Pumping Station has submerged concrete that is in the scope of license renewal. Although the Intake Pumping Station submerged concrete was not inspected, there is reasonable assurance that the submerged concrete results would be consistent due to a lack of an aggressive environment and use of the same concrete specifications for the construction as the accessible portions of the Intake Pumping Station.

Defect evaluations performed since the baseline inspection and subsequent inspections are documented in the 2002 Structures Monitoring Program results. Below is a highlight of plant-specific operating experience for concrete elements at the Intake Pumping Station and Gate Structure No. 3. None of the identified indications were considered significant or affected the function of the structure.

- Intake Pumping Station: Very minor concrete surface cracks
- Gate Structure No. 3: Very minor concrete surface cracks and spalling

Additionally, to capture plant operating experience for these structures, work orders (WOs), the site Correction Action Program and site Licensing Event Reports (LERs) were reviewed for various operating periods:

- Work Orders between 1991 and 2004 were reviewed to determine if any corrective maintenance or repairs were performed on the Intake Pumping Station (IPS). A total of 2633 WOs were reviewed for that period and no work activities were found involving the submerged concrete for this structure.
- The site's Correction Action Program was reviewed for the IPS to identify any adverse conditions of the structure, with emphasis on the submerged concrete. A total of 1790 reports were reviewed for a time period between 1994 and 2004, with none being identified for the IPS submerged concrete.
- Licensing Event Reports were reviewed for a period between 1985 and 2004 and none were identified affecting the IPS.

(2) GALL conditions for III A6.1-b (increase in porosity and permeability, loss of strength due to leaching of calcium hydroxide)& III A6.1-d (cracking, loss of bond, loss of material (spalling, scaling) due to corrosion of embedded steel):

See further evaluations in LRA Section 3.5.2.2.2.1, item 2 and LRA Section 3.5.2.2.2.2 for discussion on these issues.

(3) Submerged concrete one-time inspection:

The following elements apply to the one-time inspection for submerged concrete:

a. Scope of One-Time Inspection:

In-scope submerged concrete in one individual pump bay of the Intake Pumping Station. The submerged concrete surfaces will be inspected.

b. Preventative Measures:

The one-time inspection specifies no preventive actions.

c. Parameters Monitored or Inspected:

The following concrete aging effects will be inspected during the one-time inspection of submerged concrete at the intake pumping station (IPS).

- Increase in porosity and permeability, and loss of strength due to leaching of calcium hydroxide
- Expansion and cracking due to reaction with aggregates
- Cracking, loss of bond, and loss of material (spalling, scaling) due to corrosion of embedded steel
- Increase in porosity and permeability, cracking, loss of material (spalling, scaling) due to aggressive chemical attack

The Intake Pumping Station will be periodically inspected for loss of material (spalling, scaling)and cracking due to the effects of freeze-thaw at the waterline where icing conditions could occur(see GALL audit question 368). The periodic inspection for aging effects due to freeze thaw will be included in the BFN Structures Monitoring Program.

d. Detection of Aging Effects:

Visual inspections of structural conditions will be used as the method used to detect aging effects. An inspection checklist consistent with those used for Structures Monitoring Program will be used. All defects will be required to be identified and documented on the inspection checklists for review and evaluation by the Responsible Engineer (BFN Structures Monitoring Program Engineer). Individuals trained and experienced with the BFN Structures Monitoring Program will perform the inspections.

e. Monitoring and Trending:

The submerged concrete at the Intake Pumping Station will be inspected prior to the extended period of operation.

f. The acceptance criteria of the BFN Structures Monitoring Program will be used. BFN Structures Monitoring Program acceptance criteria are based upon Responsible Engineer (BFN Structures Monitoring Program Engineer) review and classification of the results as acceptable,

acceptable with deficiencies, and unacceptable respectively. These performance criteria ensure that the structure:

- remains capable of meeting its design basis and performing its intended function; and
- will not result in a loss of intended function due to a degraded condition or aging effect.

If the submerged concrete fails to meet the acceptance criteria, a cause determination evaluation will be performed. If acceptance criteria are not meet, two additional pump bays will be inspected prior to the extended period of operation. If one or more of the additional pump bays fails to meet its acceptance criteria, then submerged concrete at the intake pump station will be inspected periodically consistent with the Structures Monitoring Program requirements.

(4) Periodic monitoring of raw service water:

Prior to entering the period of extended operation, BFN will initiate periodic monitoring of the raw service water in close proximity to the Intake Pumping Station for the requirements of an aggressive environment as described in NUREG-1557. Periodic monitoring will be consistent with the BFN Structures Monitoring Program inspection frequency.

The staff reviewed the above response and found that the applicant fully had responded to RAI 3.5-16 with reasonable plant operation-based justifications. Therefore, the staff's concern described in RAI 3.5-16 is resolved.

3.5.2.3.13 Gate Structure No. 3 – Summary of Aging Management Evaluation – Table 3.5.2.13

The staff reviewed LRA Table 3.5.2.13, which summarizes the results of AMR evaluations for the gate structure No. 3 component groups.

The staff also reviewed the information provided in LRA Section 3.5.2.1.13 and determined that the applicant had adequately identified applicable aging effects and the AMPs credited for managing the aging effects for the gate structure No. 3 components that are not addressed by the GALL Report. The staff found the applicant's AMR results for the gate structure No. 3 components acceptable.

3.5.2.3.14 Intake Channel – Summary of Aging Management Evaluation – Table 3.5.2.14

The staff reviewed LRA Table 3.5.2.14, which summarizes the results of AMR evaluations for the intake channel component groups.

The staff also reviewed the information provided in LRA Section 3.5.2.1.14 and determined that the applicant had adequately identified applicable aging effects, and the AMPs credited for managing the aging effects for the intake channel components that are not addressed by the GALL Report. The staff found the applicant's AMR results for the intake channel components acceptable.

- non-ASME equivalent supports

The staff accepts the applicant's AMR results, that aging management is not required for these aluminum components in an outside environment, on the basis that (1) the material used is resistant to corrosion and SCC, and (2) concentration of contaminates in a non-aggressive ambient outside environment is not plausible

Carbon Steel in a Containment Air Environment – For the high-strength bolts included under this item, the staff requested that the applicant describe the bolting material, the nominal and as-built yield strengths, and the hardness of the material. The applicant was also requested to discuss the disposition of the recommendations for a comprehensive Bolting Integrity Program, as delineated in NUREG-1339, and industry recommendations, as delineated in EPRI NP-5769.

By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating:

> The only high strength structural bolting (ultimate tensile strength [UTS] > 150 ksi) material specified for use at BFN is ASTM A-490 (Ref. General Engineering Specification G-29BS01, PS 4.M.4.4, "ASME Section III and Non-ASME Section III (including AISC, ANSI B31.1, and ANSI B31.5) Bolting Material"). The ultimate tensile strength for A-490 bolting ½" to 1 ½" may vary between 150 to 170 ksi, a minimum yield strength of 130 ksi is specified and hardness may vary from 33 to 38 Rockwell C (ASTM A-490 Standard).
>
> The Bolting Integrity Program manages loss of material of mechanical component steel bolting within the scope of License Renewal. ASME Section XI manages aging of structural bolting (encompassed by 'Support members; welds; bolted connections; support anchorage to building structure') for ASME equivalent supports. Structures Monitoring Program manages ~~E-49~~ aging of structural bolting for the remaining structural supports within the scope of License Renewal. The support components, including the bolting, are periodically inspected for loss of material by these programs.
>
> Delete
>
> High strength bolting (UTS >150 ksi) is not considered susceptible to cracking due to stress corrosion cracking at BFN. For SCC to manifest in high strength bolting, an aggressive chemical or wetted environment is required in addition to susceptible material and high tensile stresses. High strength bolting (UTS >150 ksi) used in ASME equivalent supports at BFN are installed in indoor air environments that are not exposed to aggressive chemicals, periodic wetting, or splash zones. Additionally, high strength bolting is used for Unit 1 drywell floor steel framing and other structural purposes to connect the RPV skirt flange to the top flange of the ring girder in the drywell and these bolts are exposed to a containment atmosphere environment in the drywell not subject to aggressive chemicals, periodic wetting or splash zones. As noted below, thread lubricants are also controlled to eliminate corrosive environmental effects. Therefore an aggressive chemical or wetted environment does not exist.
>
> Per the EPRI Mechanical and Structural Tools and EPRI NP-5769, high strength bolting is considered susceptible to SCC in a corrosive environment with the use of thread lubricants containing molybdenum disulfide. Approved thread lubricants for use in bolted joints at BFN are specified in General Engineering Specification (GES) G-29B-S01 PS 4.M.1.1 and Section 3.9.2 notes that lubricants containing molybdenum disulfide shall not be used.

Based on the additional information provided by the applicant, the staff found the applicant's AMR results for lubrite plates to be acceptable. Prior staff evaluations of this issue have concluded that there are no aging effects requiring aging management.

Reinforced Concrete in a Buried Environment - This item applies to buried reinforced concrete equipment supports and foundations. The staff requested that the applicant explain how the Structures Monitoring Program is used to manage these buried (presumably inaccessible) components.

By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that Table 3.5.2.26, row 41 applies to transformer pads/foundations in the transformer yard, 161kV switchyard and 500kV switchyard in a buried environment. The electrical equipment concrete foundations are exposed to both the outside air environment and the inaccessible buried environment. The outside air environment is addressed in LRA Table 3.5.2.26, row 44. Reduction in concrete anchor capacity will manifest itself at the anchor locations which are located in the outside air environment. The Structures Monitoring Program will manage reduction of concrete anchor capacity for those portions of the equipment foundations exposed to the outside air environment. Aging management for below grade inaccessible concrete will be based on inspection of the accessible concrete in the outside air environment.

Based on the additional information provided by the applicant, the staff found the applicant's AMR results for the buried portions of the concrete transformer pads/foundations to be acceptable. Periodic inspection of the accessible concrete by the Structures Monitoring Program will provide an indication of the condition of the buried concrete.

Stainless Steel in a Submerged Environment - The staff requested the applicant to identify (1) the ASME-equivalent supports and components included in this item, (2) where they are located, and (3) the submerged environment. The applicant was also requested to provide the BFN AMR for this item and discuss the technical basis for not crediting ASME Section XI, Subsection IWF as the AMP.

By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that LRA Table 3.5.2.26, row 11 applies to the stainless steel ASME-equivalent Class 2 supports for the SRV discharge lines that are in the submerged environment of the suppression pool water. The Chemistry Control Program and a one-time inspection will manage loss of material for stainless steel ASME-equivalent Class 2 supports exposed in a submerged treated (suppression pool) water environment. These lines are exempt from inspection per ASME Section XI

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Based on the additional information provided by the applicant, the staff accepts the applicant's AMR results for stainless steel ASME Code equivalent Class 2 supports for the safety ~~relief~~ related valve (SRV) discharge lines that are in the submerged environment of the suppression pool water. The staff concurs that these supports are exempt from IWF inspection because of their location. The credited AMPs are consistent with the GALL Report recommendations for Class 1 stainless steel small-bore piping. The staff found this appropriate, in lieu of IWF.

LRA Table 3.5.2.26 - In LRA Table 3.5.2.26, rows 5, 6, 10, 14, 15, 16, and 18, the applicant indicated that no aging management is required in containment atmosphere, inside air and outside air environments for stainless steel and non-ferrous aluminum ASME Code equivalent supports and components. Note 3 to LRA Table 3.5.2.26, which applies to all of the cited row

not because of location but because they are not fluid filled.

numbers, states that there are no applicable aging effects for the material/environment combinations and that this is consistent with industry guidance. The applicant does not credit ASME Code AMP for license renewal.

It is the staff's understanding that the support components covered by the cited row numbers are required to be inspected under IWF during the current licensing term. Therefore, the staff requested that the applicant explain why this CLB commitment would not continue for the extended period of operation.

By letter dated October 8, 2004, the applicant submitted its formal response to the staff, stating that these ASME-equivalent supports and components will continue to be inspected consistent with the commitments contained in the CLB for the ASME Code Section XI Subsection IWF Program requirements in effect during the extended period of operation. The applicant further stated that the specific reference to row numbers noted in the audit team's question all had material and environmental combinations that, upon performance of the AMR, determined that there were no aging effects that required managing for license renewal.

The staff noted inconsistencies between the applicant's AMR for the cited row numbers, all of which are not susceptible to general corrosion, and the applicant's AMR for carbon steel ASME Code equivalent supports and components, which are susceptible to general corrosion. For the cited row numbers, the applicant considers corrosion to be the only age-related mechanism leading to loss of mechanical function. The applicant's position is that the other GALL Report listed mechanisms leading to loss of mechanical function (distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads; elastomer hardening) are not age-related. On this basis, the applicant has concluded that aging management for loss of mechanical function is not applicable to the cited row numbers. However, for carbon steel ASME Code equivalent supports and components, the applicant identified additional GALL Report listed mechanisms as leading to loss of mechanical function (see LRA Table 3.5.2.26, rows 2, 4, 12, and 13); and credits IWF as the AMP for license renewal.

The staff requested the applicant to (1) submit a detailed description of all supports covered by LRA Table 3.5.2.26, rows 5, 6, 10, 14, 15, 16, and 18; and (2) for each support, provide the technical basis for concluding that every GALL Report listed mechanism (corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads; elastomer hardening) leading to loss of mechanical function is not applicable. As an alternative, the applicant may credit IWF as an AMP for license renewal. See RAI 7.2.5-2 from Informal request March 8, 2005

By letter dated April 5, 2005, the applicant provided its formal response, which states:

> For row numbers 5, 6, 15, and 16 of Table 3.5.2.26, the table will be revised to credit IWF as the aging management program. The supports for row number 10 are the typical pipe supports comprised of steel structural shapes, welded or bolted together and attached to the concrete structure/building with base plates or attached to other steel structural shapes of the building. The aging effect for GALL III.B1.2.1-a is "Loss of Material" and not "Loss of Mechanical Function" as noted in the question. The AMR is consistent with the reference to Note 3 of Table 3.5.2.26. Additionally, this is consistent with the proposed revision to GALL for Item number III.B1.2-5 (TP-5) for this material and environment combination. The AMR conclusion for the proposed GALL revision to GALL for Item number

III.B1.2-5 (TP-5) is "no aging effects are applicable"; therefore, no AMP is required.

The supports in-scope for row number 14 of Table 3.5.2.26 are integral welded lugs to the process pipe. The lug material is the same as the process pipe (aluminum). Aluminum external surfaces are not susceptible to corrosion unless their surfaces are wetted or exposed to an aggressive environment. Since periodic wetting or exposure to aggressive environments of component external surfaces in an inside air environment will not occur, loss of mechanical function due to corrosion is not considered plausible and the other aging mechanisms (distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads; elastomer hardening) do not apply.

The supports in-scope for row number 18 of Table 3.5.2.26 are integral welded lugs to the process pipe. The lug material is the same as the process pipe (stainless steel). The in-scope piping system is located in the Residual Heat Removal Service Water (RHRSW) Tunnels (LRA Section 2.4.3.5). Since the piping and supports are located within the RHRSW Tunnels and are exposed to an inside air environment and are not exposed to an outside air environment as noted in the AMR table, Row 18 can be deleted. Row number 10 (applicable GALL item - III.B1.2.1-a) is the applicable AMR line item for the material and environment combinations of these stainless steel supports in the RHRSW Tunnel.

~~Replace Rows 1 through 18 of Table 3.5.2.26 in the LRA with the attached rows.~~ Delete

The staff reviewed the applicant's response and finds it acceptable since the AMRs are consistent with the GALL Report.

The staff's review of LRA Table 3.5.2.26 identified an area in which additional information was necessary to complete the review of the applicant's results. The applicant responded to the staff's RAI as discussed below.

RAI 3.5-12. Non-ferrous aluminum conduit and supports that are exposed to outside air are listed in LRA Table 3.5.2.26 as components having no applicable AERM; thus, no AMP is designated to manage their aging. Depending on the severity of the outside air environment to which the components are consistently exposed, some aluminum conduit and supports may experience loss of material aging effect. In RAI 3.5-12, dated December 10, 2004, the staff requested the applicant to discuss its past plant-specific inspection results of these supports in order to provide an operating experience-based justification for the above AMR finding.

In its response, by letter dated January 31, 2005, the applicant stated:

The following list identifies aluminum components in an outside air environment:

- electrical and I&C penetrations
- conduits and supports
- non-ASME equivalent supports

Aluminum alloys containing zinc are susceptible to corrosion in wetted aggressive environments. However, the outside air environment does not contain contaminants that would cause an aggressive environment. In addition, the aluminum conduit and conduit supports are also constructed of 6063-T42 alloy that is resistant to pitting, crevice corrosion, and SCC (Metals Handbook, Ninth Edition, Volume 13, "Corrosion," ASM International, 1987). Since the potential for concentration of contaminates is not significant, and the specific aluminum grade used in an outside air environment is more resistant to corrosion, loss of function due to corrosion is not considered plausible.

A review of BFN operating history, the structures monitoring baseline inspection, and the results for the first structures monitoring inspection period did not reveal any loss of intended function due to aging effects for the following aluminum components:

- electrical and I&C penetrations,
- conduits and supports
- non-ASME equivalent supports

additional information provided above

Based on the applicant's ~~assertion (above)~~ and operating experience that (1) the potential for concentration of contaminates at BFN site is not significant, and the specific aluminum grade used in an outside air environment is more resistant to corrosion, loss of function due to corrosion is not considered plausible, and (2) a review of operating history, the structures monitoring baseline inspection, and the results of the first structures monitoring inspection period did not reveal any loss of intended function due to aging effects for the aluminum components. The staff found the AMR results for its aluminum components adequate and acceptable. Therefore, the staff's concern described in RAI 3.5-12 is resolved.

RAI 3.5-13. LRA Table 3.5.2.26 lists equipment supports and foundations made of non-ferrous lubrite that are exposed to inside air environment as components having no AERM; therefore, no AMP is designated for the components. NUREG-1801, Table III.B1.1.3-a identifies loss of mechanical function, corrosion, distortion, dirt, overload, fatigue due to vibratory and cyclic thermal loads, and elastomer hardening as potentially applicable aging effects for the lubrite components, and designates ASME Code Section XI, Subsection IWF Program as the AMP to manage the listed aging effects. In RAI 3.5-13, dated December 10, 2005, the staff requested the applicant to discuss past plant-specific inspection and maintenance results of these lubrite supports in order to provide an operating experience-based justification for the LRA assessment.

In its response, by letter dated January 31, 2005, the applicant stated:

> The Table 3.5.2.26 entry applies to the lubrite plates used for the Core Spray and RHR pump equipment support plates. EPRI report 1002950, "Aging Effects for Structures and Structural Components (Structural Tools) Revision 1," states that lubrite material resists deformation, has a low coefficient of friction, resists softening at elevated temperatures, absorbs grit and abrasive particles, is not susceptible to corrosion, withstands high intensities of radiation, and will not score or mar. lubrite products are solid, permanent, completely self lubricating, and require no maintenance. The Browns Ferry reactor building environment at the location of the Core Spray and RHR pump equipment support plates is not an aggressive or wetted environment.

A search of Browns Ferry and industry operating experience did not identify any instances of Lubrite plate degradation or failure to perform its intended function due to aging effects. NUREG-1759, "Safety Evaluation Report Related to the License Renewal of Turkey Point Nuclear Plant, Units 3 and 4" and NUREG-1769, "Safety Evaluation Report Related to the License Renewal of Peach Bottom Atomic Power Station, Units 2 and 3," concur that there are no aging effects for lubrite plate that require aging management.

additional information provide above

Based on the applicant's ~~assertion (above)~~ that (1) the reactor building environment at the location of the core spray and RHR pump equipment support plates is not an aggressive or wetted environment, (2) lubrite products are solid, permanent, completely self lubricating, and require no maintenance, (3) a search of BFN and industry operating experience did not identify any instances of lubrite plate degradation or failure to perform its intended function due to aging effects, and (4) prior staff positions taken with respect to the aging management of lubrite plate under similar environmental conditions, as reported in NUREGs 1759 and 1769, the staff found the applicant's response to RAI 3.5-13 acceptable. Therefore the staff's concern described in RAI 3.5-13 is resolved.

Conclusion. On the basis of its review, the staff found that the applicant appropriately evaluated AMR results involving MEAP combinations that are not evaluated in the GALL Report. The staff found that the applicant demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.5.3 Conclusion

The staff concluded that the applicant provided sufficient information to demonstrate that the effects of aging of the containments, structures, and component supports components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program summaries and concluded that they adequately describe the AMPs credited for managing aging of the containments, structures, and component supports, as required by 10 CFR 54.21(d).

3.6 Aging Management of Electrical and Instrumentation and Controls

This section of the SER documents the staff's review of the applicant's AMR results for the electrical and instrumentation and controls (I&C) components and component groups.

3.6.1 Summary of Technical Information in the Application

In LRA Section 3.6, the applicant provided AMR results for components. In LRA Table 3.6.1, "Summary of Aging Management Evaluations for Electrical and Instrumentation and Control Systems Evaluated in Chapter VI of NUREG-1801," the applicant provided a summary comparison of its AMRs with the AMRs evaluated in the GALL Report for the electrical and I&C components and component groups.

The staff's review of the BFN component groups followed one of several approaches. One approach, documented in SER Section 3.6.2.1, involves the staff's review of the AMR results in the electrical and I&C components that the applicant indicated are consistent with the GALL Report and do not require further evaluation. Another approach, documented in SER Section 3.6.2.2, involves the staff's review of the AMR results for components in the electrical and I&C systems that the applicant indicated are consistent with the GALL Report and for which further evaluation is recommended. A third approach, documented in SER Section 3.6.2.3, involves the staff's review of the AMR results in the electrical and I&C components that the applicant indicated are not consistent with, or not addressed in, the GALL Report. The staff's review of AMPs that are credited to manage or monitor aging effects of the electrical and I&C components is documented in SER Section 3.0.3.

3.6.2.1 AMR Results that are Consistent with the GALL Report, for Which Further Evaluation Is Not Recommended

Summary of Technical Information in the Application. In LRA Section 3.6.2.1, the applicant identified the materials, environments, and AERMs. The applicant identified the following programs that manage the aging effects related to the electrical and I&C components:

- Accessible Non-EQ Cables and Connections Inspection Program
- Bus Inspection Program
- Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program
- EQ Program
- Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 EQ Requirements Program

Staff Evaluation. In LRA Table 3.6.2.1, the applicant provided a summary of AMRs for the electrical and I&C components, and identified which AMRs it considered to be consistent with the GALL Report.

For component groups evaluated in the GALL Report for which the applicant claimed consistency with the GALL Report, and for which the GALL Report does not recommend further evaluation, the staff performed an audit and review to determine whether the plant-specific components contained in these GALL Report component groups were bounded by the GALL Report evaluation.

The applicant provided a note for each AMR line item. The notes described how the information in the tables aligns with the information in the GALL Report. The staff audited those AMRs with Notes A through E, which indicated that the AMR was consistent with the GALL Report.

Note A indicated that the AMR line item is consistent with the GALL Report for component, material, environment, and aging effect. In addition, the AMP is consistent with the AMP identified in the GALL Report. The staff audited these line items to verify consistency with the GALL Report and the validity of the AMR for the site-specific conditions.

The staff concluded that the applicant had adequately addressed the aging management for high-voltage insulators and agreed that no AMP was required for high-voltage insulators.

will require revision based on response provided in cover letter

3.6.2.3.4 Aging Management Evaluations - Transmission Conductors and Connections

Transmission conductors are uninsulated, stranded electrical cables used in switchyards, switching stations, and transmission lines to connect two or more elements of an electrical power circuit, such as active disconnect switches, power circuit breakers and transformers, to a passive switchyard bus. Transmission conductor materials are aluminum conductor steel reinforced (ACSR). In LRA Section 3.6.2.3.4, the applicant identified for ACSR, aging and loss of conductor strength due to corrosion, which includes corrosion of the steel core and aluminum strand pitting. The applicant also identified loss of material (wear) and fatigue due to wind loading vibration or sway.

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In evaluating these aging effects, the applicant in the LRA said that maintenance activities on these conductors have not revealed any aging effects/mechanisms associated with transmission lines, for ACSR conductors, degradation begins as a loss of zinc from the galvanized steel core wires. Corrosion rates depend largely on air quality, precipitation, fog chemistry, and meteorological conditions. Corrosion of ACSR conductors at BFN is a very slow acting aging effect because of fewer suspended particles and lower sulfur dioxide (SO_2) concentrations in the air. Additionally, the applicant indicated in the LRA that tests performed by Ontario Hydro showed a 30 percent loss of composite conductor strength of an 80 year old ACSR conductor due to corrosion. In conclusion, there are no applicable aging effects that could cause loss of the intended function of the transmission conductors. Therefore, the applicant concluded that loss of conductor strength due to corrosion of transmission conductors is not an AERM for the period of extended operation.

Industry experience has shown that transmission conductors do not normally swing, and that when they do swing in substantial wind, they do not continue to swing for very long once the wind subsides. Therefore, loss of material (wear) and fatigue due to wind loading vibration or sway of transmission conductors are not applicable AERMs for the period of extended operation.

The applicant concluded that no AMP is required.

RAI 3.6-8. In RAI 3.6-8, dated November 4, 2004, the staff raised a concern regarding the torque relaxation for bolted connections for transmission conductor and switchyard bus connections.

In its response, by letter dated December 9, 2004, the applicant stated that bolted switchyard bus and transmission conductor connections at BFN utilize Belleville washers, which have torque applied until the Belleville washer is flat, not to exceed limits specified by bolt size. In accordance with industry guidance EPRI TR-104213, "Bolted Joint Maintenance & Application Guide," (Section 7.2.2), increased temperature difference in electrical bolted joints is due to high short circuit ratings or increased current duration. The temperature of an electrical bolted joint will rise and the stress will increase with increasing current duration. If this temperature increase is not taken into consideration, loose, failure-prone joints will result. Belleville washers selected to be flat or almost flat at the installation torque will be used to accommodate the temperature increase. At BFN, connections are routinely surveyed using infrared scan for hot spots, which

are indicative of a degraded connection. If a hot spot at a connection is discovered, corrective actions are taken to repair the connection.

In a supplemental letter, dated January 18, 2005, in response to a staff follow-up question, the applicant stated that the infrared scans are performed using Transmission Power Supply Routine Test Schedule. This schedule requires that 500 kV and 161 kV switchyard connections be surveyed after a modification and routinely surveyed every six months. A review of plant-specific operating experience did not reveal any age-related issues associated with bolted switchyard bus or transmission conductor connections; therefore, torque relaxation of bolted switchyard bus and transmission conductor connections is not a concern for BFN.

On the basis of its review, the staff's concern described in RAI 3.6-8 is resolved.

The staff concluded that corrosion of ~~ACSR~~ AAC conductors is a very slow-acting aging effect that is even slower for rural areas that have generally fewer suspended particles and lower sulphur dioxide concentrations in the air than urban areas. Also, based on the response to the staff concern regarding the torque relaxation for bolted connections, the concern raised in RAI 3.6-8 was resolved. The staff agreed with the applicant's evaluations and concluded that the applicant had adequately addressed the aging management for ~~high voltage insulators~~ Transmission conductors and connections. The staff also agreed that no AMP was required.

3.6.2.3.5 Aging Management Evaluations - ~~Phase and~~ Switchyard Bus

Switchyard buses electrically connect specified sections of an electrical circuit to deliver voltage or current to various equipment and components throughout the plant. The switchyard bus is used in switchyards to connect two or more elements of an electrical power circuit such as active disconnect switches and passive transmission conductors.

In LRA Section 3.6.2.3.5, the applicant identified cracking due to vibration and change in material properties leading to increased resistance and heating as a result of connection surface oxidation as potential aging effects for the high-voltage switchyard bus. In managing the aging effects, the applicant stated that switchyard buses connected to circuit breakers via flexible aluminum conductors, those supported by insulators and by structural supports such as concrete footing or steel structures, do not vibrate. Also, the design process for switchyard bus was engineered to dampen any vibrations that might be induced into the buses. Therefore, cracking due to vibration is not an applicable aging effect for switchyard buses, and an AMP is not required.

The applicant also identified aging effects due to change in material properties leading to increased resistance and heating as a result of connection surface oxidation in aluminum buses. Solid and flexible connectors and ground straps are highly conductive but do not make a good contact surface since pure aluminum exposed to air forms aluminum oxide on the surface, which is nonconductive. To prevent the formation of aluminum oxide on bolted connection surfaces, the connections have a silver plating and are covered with grease to prevent air from contacting the connection surface. The grease is a consumable item that is applied to the connection surface each time a bolted connection is made, thereby precluding oxidation of the connection surface and maintaining good conductivity at the bus connections. Therefore, change in material properties leading to increased resistance and heating as a result of

connection surface oxidation of aluminum buses is not an AERM for the period of extended operation.

RAI 3.6-7. In RAI 3.6-7, dated November 4, 2004, the staff requested the applicant to provide a discussion of the grease replacement program including the frequency.

In its response, dated December 9, 2004, the applicant stated that grease is a consumable item that is applied each time a bolted connection is made, and that it precludes oxidation of the connection surface and maintains good conductivity at the bus connections. Connections are routinely surveyed using infrared scan for hot spots, which are indicative of a degraded connection. In its response, the applicant stated that if a hot spot at a connection is discovered, corrective actions are taken to repair the connection. In a supplemental response, dated January 18, 2005, to a staff follow up-question, the applicant stated that the infrared scans are performed using the Transmission Power Supply Routine Test Schedule. The Transmission Power Supply Routine Test Schedule states that 500 kV and 161 kV switchyard connections are surveyed after a modification and routinely surveyed every six months. On the basis of its review, the staff found that its concern described in RAI 3.6-7 is resolved.

The staff concurred with the applicant's evaluation and concluded ~~had~~ that no AMP is required to manage these components. The staff also found that the applicant adequately addressed why these aging effects are not applicable aging effects at BFN. The staff agrees that there is reasonable assurance that the switchyard bus will perform its intended function for the period of extended operation.

Conclusion. On the basis of its review, the staff found that the applicant had appropriately evaluated AMR results involving MEAP combinations that are not evaluated in the GALL Report. The staff found that the applicant had demonstrated that the effects of aging will be adequately managed so that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

3.6.3 Conclusion

The staff concluded that the applicant had provided sufficient information to demonstrate that the effects of aging of the electrical and I&C components that are within the scope of license renewal and subject to an AMR will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

The staff also reviewed the applicable UFSAR supplement program summaries and concludes that they adequately describe the AMPs credited for managing aging of the electrical and I&C, components as required by 10 CFR 54.21(d).

3.7 Aging Management Review of Unit 1 Systems in Layup for Extended Outage

3.7.1 General Technical Concerns

In 1985, the applicant shut down all three units at BFN to address management and technical issues. Upon successful resolution of these issues, Unit 2 was restarted in 1991. Unit 3 was restarted in 1995. Ever since March 1985, Unit 1 has been on administrative hold and the applicant committed to not restarting Unit 1 without prior approval from the NRC. Unit 1 remains shut down with key systems and components placed in layup. However, the systems and components required to be in service to support the current defueled status of Unit 1, or to support the operation of Units 2 and 3, continue to be in operation. The applicant has initiated a restart plan to return Unit 1 to service. The applicant proposed a regulatory framework for the Unit 1 restart as part of this plan, which is discussed in SER Section 2.6. Discussed below are the AMRs of Unit 1 systems in layup during the extended outage.

LRA Section 3.0.1 of the initial LRA dated December 31, 2003, contains a summary of the evaluation of the Unit 1 layup and preservation program. By letter dated February 19, 2004, the applicant submitted a supplement to the LRA dedicated to the Unit 1 systems in layup during the extended outage. The staff reviewed this additional information entitled ~~"Submittal of~~ — Delete
"Evaluation of the BFN Unit 1 Layup and Preservation Program," and determined that additional information was needed to complete its review.

As part of its review of the applicant's LRA, the staff, by letter dated August 23, 2004, identified areas where additional information was needed to complete its review. The specific staff questions were from LRA Sections 3.1, 3.2, 3.3, and 3.4 and were related to aging of mechanical systems during the extended outage of Unit 1. Listed below are the specific staff requests for additional information, responses to a number of staff follow-ups, and the LRA. There were no additional aging effects because of the extended outage of Unit 1 and, consequently, the applicant claimed that there was no need for any additional aging management as a result of the extended outage on Unit 1. However, the staff, in its letter dated August 23, 2004, said that since the aging of the mechanical systems is highly dependent upon the environment that was maintained during the extended outage, the staff needed additional information to determine whether:

- Additional or more severe aging occurred during the extended outage.
- Additional aging has been properly identified, evaluated, and managed.
- The proposed aging management can distinguish the aging during the extended outage from the aging during future operation.

By the initial set of RAIs dated August 23, 2004, the staff issued general and system-specific RAIs on the aging of mechanical systems during the extended outage of Unit 1. The applicant responded to the initial RAIs by letter dated October 8, 2004. The staff reviewed the applicant's RAI responses and, by letter dated December 16, 2004, requested additional information in a set of follow-up RAIs. The applicant responded to these RAIs by letter dated January 20, and 31, 2005. Finally, the applicant resolved all the staff issues in its final response to the Unit 1 layup by its responses dated May 25, 2005, and May 27, 2005. RAIs (3.0-1 LP through 3.011 LP) are those that are applicable to all systems. System-specific RAIs are identified by a system-specific LRA prescript and a subscript "LP" to designate a layup RAI. Given below are

the safety evaluations of technical areas where the staff had specific concerns relative to the Unit 1 system in the extended layup and its rationale for acceptance.

3.7.1.1 *Wet Layup Program Chemistry Control*

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In the wet layup for Unit1 the applicant characterized chemistry for the wet layup water as flowing, air-saturated and demineralized. Since in the BFN plant only the systems carrying the reactor cooling water are included in the wet layup program, the chemistry of the demineralized water have the same chemistry as the cold shutdown reactor cooling water during normal plant outages.

The initial set of general RAIs that are referenced in the discussion that follows constitutes the staff request dated August 23, 2004. The applicant's responses are in its letter dated October 8, 2004.

In its response to RAI 3.0-1 LP by its letter dated October 8, 2004, the applicant stated that the other plant systems with different plant chemistries were not included in the wet layup program because during the Unit 1 outage they were maintained at the operating conditions, including water chemistries, found in Units 2 and 3 during their normal operations. The cold shutdown chemistry is specified in the BFN CI-13.1 chemistry program. In the response to the staff's question the applicant stated that the chemistry control limits implemented during wet layup are 1,5 μS/cm ~~1.5 S/cm~~ for water conductivity, and 15 ppb for the concentration of chloride and sulfate. These values are the same as the chemistry control limits utilized in Units 2 and 3 operating in the cold shutdown mode for refueling and maintenance outages. They are more restrictive than those in the EPRI Water Chemistry Guidelines specified in Boiling Water Reactor Vessel Internals Project (BWRVIP)-79 and, therefore, introduce conservatism to the values of the CI-13.1 chemistry program used to specify water chemistry during the wet layup.

Since water conductivity and concentration of chlorides and sulfates are the main parameters characterizing water chemistry, as long as they don't differ, the wet layup and cold shutdown chemistries are comparable. The staff concurred, therefore, with the applicant that the effect of chemistry on the components in wet layup and cold shutdown will be similar and the exposure of the components to the wet layup chemistries will be similar to the effect of the exposure to reactor water during the cold shutdown mode of operation.

3.7.1.2 *Replaced Components*

LRA Appendix F indicates that significant sections of piping and components have been or will be replaced prior to restart. It was not clear to the staff whether LRA Appendix F included all piping that had been or would be replaced prior to restart. The applicant's responses to staff RAI for LRA Section B.2.1.4, developed during the license renewal audit inspection during the weeks of June 21, 2004, and July 26, 2004, state that repaired or replaced components will receive a preservice examination in accordance with the requirements of IWB, IWC, or IWD of the component being repaired or replaced, and prior to returning the system to service. In this response, the applicant also stated that a re-baseline inspection will be performed on the remaining Class 1, 2, and 3 components that have not been repaired or replaced.

In RAI 3.0-9 LP (refurbished vs left in place), dated December 16, 2004, the applicant was requested to provide information to identify the basis, such as inspections or suspected

In its response to RAI 3.0-5 LP, dated October 8, 2004, the applicant stated that Table 2 Systems [RVIs, Feedwater (03), Reactor Vessel Vents and Drains (10), Reactor Recirculation (68), Reactor Water Cleanup (69) and Control Rod Drive (85)] and Table 3 Systems [Condenser Circulating Water (27), Gland Seal Water (37), Containment (64), Reactor Core Isolation Cooling (71), High Pressure Coolant Injection (73), and Core Spray (75)] address the portions of these systems laid up in a wet environment. Due to closure sequence, closure timing, and possible leakage past the double isolation valves or two drain valves for these systems, it is assumed that an air/gas environment with an uncertain amount of moisture was trapped between the double isolation valves. The trapped moisture between the double valves was considered the same, (i.e., treated water or raw water) as water flowing through the valves prior to closure. N/A (not applicable) denotes that this trapped air/gas environment will be evaluated under the corresponding raw or treated water evaluations.

The applicant further stated that during layup the temperature of the systems addressed in Tables 2 and 3 were less than 140 °F. Therefore, crack initiation and growth due to SCC is not a concern for stainless steels and nickel-based alloys in a wet layup environment.

The applicant clarified that the evaluation of these moist air environments for the systems addressed in Tables 2 and 3 identified no additional aging effects other than those identified for the corresponding raw or treated-water environment. The LRA identified these trapped air environments for one-time inspection because the extent of corrosion could be quantified. It was not the intent of this AMR to determine the rate of loss of material. The applicant stated that the one-time inspection described in the LRA will be performed prior to restart to verify the material condition.

In RAI 3.0-6 LP, dated August 23, 2004, the staff requested the following additional information on systems that were not part of the wet layup program and were exposed to stagnant treated (non-controlled) or raw water.

Table 3 of Evaluation of BFN Unit 1 Lay-up and Preservation Program (submittal dated February 19, 2004) identifies several systems that were not incorporated into the Unit 1 wet layup program. These systems were exposed to treated (non-controlled) or raw water during the extended outage. Table 3 concluded that there is no additional aging management for these systems. The staff required additional information on the following: (1) discussion of the results of any water samples, including pH, oxygen levels, aggressive chemical species, biological activity, and corrosion product levels, (2) discussion whether the systems were stagnant or periodically flowed, (3) discussion whether the plans for prestartup inspections to determine the loss of material due to general, pitting, and crevice corrosion, MIC, dealloying, and galvanic corrosion, or provide justification that such inspections are not needed, and (4) also, discussion of inspections for the degradation of other materials, such as elastomers and other non-metallic materials.

In its response to RAI 3.0-6 LP, dated October 8, 2004, the applicant stated:

> Condenser Circulating Water System (27) - System 27 was exposed to Tennessee River water which is the same environment it is exposed to during normal operation. Without the addition of foreign chemicals the aging effects during normal operation and during layup are the same.

Delete A

Gland Seal Water System (37) - The system was drained (ambient air present) with the gland seal tank in component layup per AMPI-1-000-TNK002. However, it was assumed that the secondary containment loop seal as well as other low points in the system were not completely drained. The applicant stated that therefore, stagnant treated water supplied from the condensate system was evaluated for these areas.

CI-13.1

Systems (Containment (64), Reactor Core Isolation Cooling (71), High Pressure Coolant Injection (73), and Core Spray (75) - The torus and torus attached piping for System 64 (i.e., the torus itself) and for Systems 71, 73, and 75 (torus attached piping) saw torus water maintained by Chemistry Program CI-3.1 (Appendix A, Table 20) for extended periods of time until the torus was drained in the summer of 2003. When filled, the torus is approximately half full of water with the other half ambient air. The torus water was not "flowing" in that the only significant water movement was relatively infrequent transfers into and out of the Unit 1 torus. The torus on an operating unit cannot be considered "flowing" either. The operating unit's torus would also be nitrogen-inerted. Torus coating touch-up/repair is part of the restart work to be completed while the torus is drained. The torus impurity administrative goals for conductivity, chloride, and sulfate given in CI-13.1 are 2.0 S/cm, 75 ppb, and 75 ppb, respectively. The applicant stated that a review of sampling data showed that the torus water was maintained within the chemistry specifications and that sampling is performed quarterly.

µS/cm

The One-Time Inspection described in the license renewal application will be performed prior to restart to verify the material condition.

In RAI 3.0-7 LP, dated August 23, 2004, the staff requested the following additional information on Notes 1 and 2 of Tables 2 and 4 concerning inspections to be performed prior to the Unit 1 restart.

Notes 1 and 2 of Tables 2 and 4 indicate that inspections will be performed prior to Unit 1 restart for certain components where additional aging effects were identified for the extended shutdown. Examples include additional aging effects for copper alloy, cast iron, cast iron alloy, and stainless steel components in system locations where condensation could build up, and carbon and low-alloy steel in an internal environment. No descriptions of the inspections were provided. The staff asked the applicant to discuss the proposed inspections, including scope, method, procedure, parameters monitored and trended, detection of aging effects, and acceptance criteria, in order to justify the adequacy of the inspections.

The applicant responded to RAI 3.0-7 LP by stating that Note 1 of Tables 2 and 4 identifies the potential for external general corrosion on carbon and low-alloy steel components that are normally operated at temperatures greater than 212 °F. This note is applicable to the reactor vessel (rv), feedwater system (03), and the heater vents and drains system (06). External surface monitoring is performed in accordance with the Systems Monitoring Program described in the LRA Section B.2.1.39. The applicant stated that this is the same AMP proposed for managing external loss of material during the period of extended operation.

RV

The applicant also stated that Note 2 of Tables 2 and 4 identifies the potential for internal loss of material and cracking (aluminum only) that are normally exposed to either dry air or nitrogen. The applicant clarified that this note is applicable to the following systems and materials:

addressed in Tables 2 and 3 was less than 140 °F in a wet layup environment; therefore, crack initiation and growth due to SCC is not a concern for stainless steels and nickel-based alloys. In Tables 2 and 3, SCC is correctly identified as an aging effect for stainless steel during plant operation at elevated temperatures and SCC is managed by various AMPs.

The staff reviewed the applicant's responses to the above RAIs and determined that additional information was required concerning the application of the One-Time Inspection Program as a verification program for layup and chemistry controls. By letter dated December 16, 2004, staff submitted RAI 3.0-10 LP requesting the applicant to provide additional information on one-time inspections. This specific RAI, the applicant's response, and the staff's review of the applicant's response are discussed below.

For systems or portions of systems that have been subject to an extended layup, the staff was concerned that the proposed one-time inspections to be performed prior to start-up may not be appropriate as a verification program for extended layup or chemistry control for certain materials where degradation is expected and additional inspections may be required. Industry documents such as EPRI NP-5106, "Sourcebook for Plant Layup and Equipment Preservation," and EPRI CS-5115, "Guidelines: Long-Term Layup of Fossil Plants," recommend periodic inspections during layup to determine the effectiveness of the layup program. EPRI NP-5106 specifically recommends that a surveillance and assessment program is needed to monitor the effects of outage or storage conditions on nuclear power plant components; otherwise, evidence of bad layup often will not even manifest itself until after a plant has returned to power. This document also states that, in order to monitor the effectiveness of the layup practice and to differentiate between the effects of power operation and layup, it would be necessary to inspect components immediately after plant shutdown and again just prior to start-up. EPRI CS-~~5112~~ 5115 also recommends that a routine monitoring program be established to check the effectiveness of the layup program. This document specifically states that a routine annual inspection of all equipment and the general condition of the plant should be conducted. GALL AMP XI.M32 describes the One-Time Inspection Program to verify the effectiveness of an AMP and confirm the absence of an aging effect. This GALL AMP also describes the use of the One-Time Inspection Program to be acceptable when an aging effect is either not expected (but cannot be ruled out), or expected to progress at a very slow rate.

On the basis of the LRA, the GALL Report, and industry documents such as EPRI NP-5106, and EPRI NP-5580, "Sourcebook for Microbiologically Influenced Corrosion in Nuclear Power Plants," aging effects are expected for nearly all materials during both the extended layup and during plant operation, unless effective layup, chemistry programs, and inspections have been implemented to confirm the absence of aging. Although consistency with the BWRVIP-79 is credited, no inspection data have been submitted by the applicant to confirm that the aging effects are not occurring or are expected to occur at a very slow rate. The applicant's response dated October 8, 2004, to RAIs 3.3-1 LP and 3.3-2 LP concerning aging of mechanical systems during the extended outage did not include any information regarding the rate of degradation or justification for one-time inspection. Further, in response to RAI 3.0-1 LP(b)2, the applicant indicated that the one-time inspection does not differentiate between the rates of aging in different environments; and in the response to RAI 3.0-5 LP the applicant stated that it was not the intent of this AMR to determine the rate of loss of material. In addition, there is no information in the LRA or in the response to RAIs to justify that the rate of degradation during the extended outage was bounded by the degradation rate during plant operation. Therefore, to support the staff review of the adequacy of the layup program and One-Time Inspection

that experience, including inspection results, is applicable to Unit 1. Alternatively, the applicant could commit to appropriate targeted periodic inspections. In a follow-up teleconference on March 29, 2005, the staff originally proposed this as an unresolved issue (URI 3.0-3 LP). The staff discussed this issue with the applicant in follow-up teleconferences. The following is a disposition of the resolution of the issues in the staff follow ups and subsequent applicant submittals.

The applicant's response to these staff concerns, (URIs 3.0-2 LP and 3.0-3 LP by letter dated May 27, 2005) clarified that the applicant will implement targeted periodic inspections for Unit 1 systems that have been shut down during the extended plant shutdown. The applicant clarified that restart inspections are being implemented and the restart program does not take credit for layup inspections and/or replacement to ensure the components are satisfactory for the remainder of the current operating period. The applicant clarified that the targeted periodic inspection techniques evaluate internal conditions that are sensitive to the presence of wear, erosion, and corrosion (including crevice corrosion). The applicant further clarified that the same AMPs applied to Units 2 and 3 will be applied to Unit 1 and, for Unit 1, the applicant committed to targeted periodic inspections to assess the effectiveness of the AMPs and to identify if latent aging effects were present as a result of the extended outage. These periodic inspections are in addition to the restart inspections and the restart inspections can be utilized as baseline for comparison. Additional periodic inspections are to be performed on ESF and auxiliary systems or portions of systems containing air/gas, treated water or raw water that were in a layup condition during the extended outage. The first periodic inspection will be performed prior to the end of the current operating period and the frequency of the periodic inspections will be determined based on the outcome of the first periodic inspections performed. The scope and extent of periodic inspections will be similar to the One-Time Inspection Program and will be developed prior to the period of extended operation.

The surveillance frequency is re-evaluated each time the surveillance is performed and can be changed based on the trend of the data results. The inspections will continue untill such time as the trend of the data results provides a basis to discontinue the inspections.

In the May 27, 2005, response, the applicant further clarified an earlier response that the condenser circulating water system raw water environment identified in the application is actually an air environment and the One-Time Inspection Program is not used as an AMP for any of the Unit 1 shutdown raw water systems.

The staff reviewed the applicant's subsequent responses (May ~~27~~ 18, 2005 and ~~31~~ 27, 2005) and, in general, determined that the response is acceptable because the applicant included a commitment to perform periodic inspections of systems that were in a layup condition during the extended shutdown rather than relying on one-time or startup inspections and there is reasonable assurance that these periodic inspections will be capable of detecting degradation caused by potential latent aging effects, including crevice corrosion, when the systems are returned to service. However, the response did not include the plant specific periodic inspection program containing information required by NUREG-1800 Appendix A or the UFSAR supplement for staff review. The applicant is requested to clarify the scope and extent of the one-time inspections versus periodic inspections and identify the submittal date for this program and the UFSAR supplement as part of the application. The applicant agreed to provide a new program that performs periodic inspections to verify that no additional latent aging effects are occurring and correct degraded conditions prior to loss of function. The applicant provided a draft program description for new plant specific AMP B.2.1.42, "Unit 1 Periodic Inspection Program." This will be provided in a docketed correspondence. This is CI 3.0-3 LP. TVA provided this in a letter dated 8/4/05 (R08 050804 801)

In its response to RAI 3.0-3 LP, dated October ~~18~~ 8, 2004, the applicant stated:

> Table 2 contains Systems [Reactor Vessel and Internals (RVI), Feedwater (03), Reactor Vessel Vents and Drains (10), Reactor Recirculation (68), Reactor Water Cleanup (69) and Control Rod Drive (85)] laid up with demineralized water maintained by the Chemistry Program CI-13.1 and moist air from possible pooling of Chemistry Program CI-13.1 controlled treated water between drain valves and double isolation valves due to closure sequence, closure timing, and possible leaking past the valves. Although portions of these systems had stagnant, low flow, and moist air environments, the Chemistry Program prevented the presence of microbes necessary to cause MIC damage. A review of BFN PERs and Work Orders (WOs) (operating experience) did not identify MIC as a concern in treated water.
>
> Table 3 contains Systems [Condenser Circulating Water (27), Gland Seal Water (37), Containment (64), Reactor Core Isolation Cooling (71), High Pressure Coolant Injection (73), and Core Spray (75)].
>
> 1. MIC is identified as a concern for raw water environments regardless of flow rate in the Condenser Circulating Water System (27).
> 2. The laid up environment for the Gland Seal Water System (37) was treated (condensate) water and moist air from possible pooling of treated water between drain or isolation valves and in the loop seals. BFN operating experience did not identify MIC as a concern in treated water environments. Although there were no chemistry controls placed on system 37 during layup, raw water or other MIC agents were not introduced into this system. Therefore, the microbes necessary for the propagation of MIC were not present in this system during layup.
> 3. Treated (torus) water was maintained by the Chemistry Program CI-13.1 during wet layup. The portions of Systems [Containment (64), Reactor Core Isolation Cooling (71), High Pressure Coolant Injection (73), and Core Spray (75)] within the BFN LR scope (torus and torus attached piping) during Unit 1 layup had a treated water environment and moist air from possible pooling of treated water (torus water) between drain valves and double isolation valves due to closure sequence and timing and possible leaking past the valves. Although portions of these systems had stagnant, low flow, and moist air environments, the Chemistry Program CI-13.1 prevented the presence of microbes necessary to cause MIC damage. A review of BFN PERs and WOs (operating experience) did not identify MIC as a concern in treated water.
>
> Table 4 Systems [Main Steam (01), Condensate (02), Heater Drains and Vents (06), Containment Inerting (76), and Containment Atmosphere Dilution (84)] contained treated water or nitrogen prior to Unit 1 layup. These systems were drained during layup. These systems were isolated without the introduction of raw water or other MIC agents. Therefore, the microbes necessary for the propagation of MIC were not present in these systems during layup.

In a follow up to the general RAI 3.0-10 LP, dated December 16, 2004, the applicant was requested to clarify why one-time inspections are appropriate for locations with stagnant, low flow or intermittent flow where MIC is expected on the basis of industry operating experience

letter containing the attachment

February 19, 2004, ~~submittal,~~ "Evaluation of BFN Unit1 Layup and Preservation Program." NRC quarterly integrated inspection report 05000259/2004006 states that on March 22, 2004, the applicant decided to remove all Unit 1 systems from layup. This decision was based on the need to transition to a system Cleanliness Verification Program. According to NRC quarterly integrated inspection report 05000259/2004007, this program is intended to replace the previous equipment layup program that has been in place since the unit was shutdown. This report also stated that, under the new program, the assigned system and component engineers, along with chemistry personnel, would perform a series of inspections of Unit 1 systems to identify any system degradation or special requirements to support Unit 1 recovery. It is the staff's understanding that transition to the newer program was still in progress at the time of the inspection period on July 10, 2004.

In RAI 3.0-11 LP, dated December 16, 2004, the applicant was requested to clarify if this series of inspections is part of the One-Time Inspection Program that is going to be implemented prior to restart. If the one-time inspections are different from or in addition to the cleanliness verification program inspections, the applicant was requested to so clarify. Also, it is not clear to the staff if this system cleanliness verification program includes inspections on components that were replaced or repaired. The applicant was requested to provide additional information as to what type of inspections have been or will be performed by the system Cleanliness Verification Program (CVP).

In its response to RAI 3.0-11 LP, the applicant stated that inspections performed under the CVP are not part of the one-time LRA inspections or credited as part of the license renewal application. The applicant clarified that to facilitate Unit 1 restart activities, Unit 1 systems have been removed from the layup program. It is not possible to maintain the layup program and perform the required field work needed for restart of Unit 1.

The applicant stated that the purpose of the CVP is to (1) verify, through cleanliness verification of all internal and external surfaces of piping systems and metallic components, that the requirements for fluid (gas or liquid) system internal and external cleanliness are in accordance with TVA and industry standards; and (2) provide the detailed remedial cleaning instructions for internal and external surfaces of piping systems and metallic components whose internal and external surface cleanliness does not meet respective cleanliness criteria as a result of extended layup, or work activity.

The CVP activities are applicable to all Unit 1 steam, water, air, gas and oil piping systems and components that receive a formal return to service in accordance with the Unit 1 Restart Test Program System Preoperational Checklist. The applicant clarified that the only Unit 1 systems excluded from this program are those that are currently in service or have been in service supporting Units 2 and 3.

The applicant also stated that CVP inspections are performed to ensure internal and external system cleanliness and that foreign material control program requirements are met. Visual inspections aided by boroscopes are performed to identify any needed remedial cleaning or flushing activities. If inspection reveals evidence of piping degradation, a problem evaluation report is initiated and entered into the Corrective Action Program. An engineering evaluation is performed to ensure that the system is capable of operation through the extended period. The applicant further stated that the inspections performed by the CVP are not a part of the one-time LRA inspections; nor are they a part of the license renewal process.

regular service condition. The applicant stated that the reactor recirculation system materials will experience crevice and pitting corrosion when the RCS water exceeds 100 ppb and 150 ppb respectively with stagnant or low flow conditions during the wet layup period. ~~The applicant claimed that it will eliminate this aging effect by minimizing the dissolved oxygen level in RCS water to a value less than 100 ppb.~~ DELETE In Table 2 of the applicant's submittal, "Evaluation of the BFN Unit 1 Lay-up and Preservation Program," Revision 1, the applicant claims that it will manage this aging effect by CI-13.1 Chemistry Control Program. The cold shutdown impurity limits for conductivity, chloride, and sulfate given in CI-13.1 (1.5 S/cm, 15 ppb, 15 ppb) are more restrictive than those given in the EPRI BWR Water Chemistry Guidelines (TR-103515-R2, page 4-6, Table 4-2) for "Reactor Water - Cold Shutdown." The staff found that the implementation of the Chemistry Control Program would enable the applicant to ~~maintain~~ Delete ~~the dissolved oxygen levels less than 100 ppb,~~ Delete subsequently mitigat~~ing~~ e the crevice and pitting corrosion in the reactor recirculation system components.

1.5 µS/cm,

Selective Leaching. The staff, after the review of the applicant's submittal, determined that the aging effect due to selective leaching of reactor recirculation system components fabricated from copper-alloy material used in. a treated-water environment require aging management for selective leaching for the period of extended operation for the Unit 1 layup systems. The applicant stated that copper-zinc alloys containing greater than 15 percent zinc in a treated-water environment is susceptible to selective leaching, while copper alloys with a copper content in excess of 85 percent resist dezincification. The applicant currently credits the One-Time Inspection Program and the Selective Leaching of Materials Program; but, requires no additional aging management of Unit 1 due to the wet layup condition as shown in Table 2 of its
February 19, 2004, letter. The staff found this acceptable because the One-Time Inspection Program and Selective Leaching Program will be just as effective to detect and manage selective leaching on the Unit 1 wet layup systems as it is on systems not in wet layup in BFN.

Loss of Material Due to General Corrosion. General corrosion of carbon and low-alloy steel in treated water is an aging mechanism that must be managed for the period of extended operation for the Unit 1 layup Systems. The applicant identified the Chemistry Control Program, the One-Time Inspection Program and ASME Section XI Subsections IWB, IWC and IWD Inspection Program. The Chemistry Control Program mitigates general corrosion by minimizing dissolved oxygen, thus, reducing the effect of general corrosion as an internal aging effect. The applicant's one-time inspection will ensure that general corrosion has been controlled and the ASME Section XI inspections will ensure that the affected components continue to perform their required function during the period of extended operation.

Loss of Material Due to Galvanic Corrosion. Galvanic corrosion of carbon and low-alloy steel in treated water is an aging mechanism that must be managed for the period of extended operation for the Unit 1 layup systems. The applicant identified the Chemistry Control Program, the One-Time Inspection Program, and ASME Section XI Subsections IWB, IWC and IWD Inspection Program. The Chemistry Control Program minimizes galvanic corrosion by controlling dissolved oxygen, chlorides, conductivity, and PH. The applicant's one-time inspection will provide verification that galvanic corrosion has been managed during the Unit 1 wet layup period and the ASME Section XI inspections will ensure that the affected components continue to perform their required function during the period of extended operation.

identified several aging effects applicable to the materials in the RV and RVIs that are exposed to the wet layup environment during the extended outage.

The components in the RV and RVIs include RV attachment welds, reactor closure studs and nuts, RV heads, flanges and shells, RV nozzles and safe ends, RV penetrations, RVIs core shroud and core plate, RVIs core spray lines and spargers, RVIs dry tubes and guide tubes and RVIs jet pump assemblies.

section 4.0 deals with Stainless Steel Only.

In Section 4.0 of the supplemental submittal dated February 19, 2004, the applicant evaluated the following aging effects that are associated with stainless steel ~~carbon steel and nickel alloy~~ materials when they are exposed to RCS treated-water environment during the wet layup period at Unit 1.

- pitting corrosion
- crevice corrosion
- MIC
- SCC
- thermal aging
- neutron embrittlement
- stress relaxation
- particulate Fouling

Technical Staff Evaluation of Aging Effects

In Table 2 of the supplemental submittal dated February 19, 2004, the applicant provided a summary of AMRs for the RV and RVIs at Unit 1 that are within the boundary of the wet layup program. These AMRs are not addressed in the GALL Report. The staff also identified several areas where additional information or clarification was needed. The staff issued RAIs to the applicant regarding the wet layup issues. The staff's evaluation of the applicant's submittal and its responses to the RAIs are addressed below.

Pitting and Crevice Corrosion. The staff, after the review of the applicant's submittal, determined that the aging effects due to pitting and crevice corrosion of the RCS pressure and non-pressure boundary components could have been significantly affected during the wet layup period, unless stringent control on the RCS water was implemented during the wet layup period. The RVs and RVIs could have been subjected to more frequent stagnant conditions during the wet layup period than during regular service conditions. Therefore, aging effects due to pitting and crevice corrosion on the RV and RVIs materials can be more pronounced when they are exposed to stagnant conditions during the wet layup period. The applicant stated that the RV materials may have experienced pitting when the RCS water dissolved oxygen concentration exceeded 100 ppb and the chloride or ~~sulphate~~ sulfate concentrations exceeded 150 ppb during the wet layup period. However, crevice corrosion could have occurred when the dissolved oxygen content in the RCS water exceeded 100 ppb. In Table 2 of the submittal, the applicant stated that it managed these aging effects by CI-13.1 Chemistry Program. The cold shutdown impurity limits for conductivity, chloride and sulfate given in CI-13.1 [1.5 ~~micro-siemens~~ µS/cm, 15 ppb, 15 ppb] are more restrictive than those given in the EPRI BWR Water Chemistry Guidelines (TR-103515-R2, page 4-6, Table 4-2). These guidelines are applicable for RCS water when the plant is in cold shutdown condition.

In RAI 3.0-1 LP(a), the staff requested that the applicant identify the differences between the chemistry program(s) implemented in the RCS system during the wet layup period at Unit 1 and the chemistry program to be implemented in the RCS system at Unit 1 during the period of extended operation.

October 8, 2004

In its response to NRC RAI 3.0-1 LP(a), by letter dated ~~January 31, 2005~~, the applicant stated that the RCS water was monitored for conductivity, ~~and oxygen~~ chloride and sulfate concentrations in accordance with the requirements of CI-13.1. The chemistry control limits implemented during the wet layup period at Unit 1 are the same as the chemistry control limits utilized by Units 2 and 3 during cold shutdown conditions for refueling and maintenance outages. The selected BFN impurity limits are consistent with the limits for cold shutdown that are contained in BWRVIP-79, "BWR Water Chemistry Guidelines," (EPRI Report TR-103515-R2, February 2000), which is consistent with the GALL AMP XI.M2, "Water Chemistry" and the Chemistry Control Program. The chemistry program implemented during the period of extended operation for Unit 1 is the same program as that for Units 2 and 3 during power operation conditions.

The staff reviewed the response and found that implementation of a Chemistry Control Program that is more restrictive than GALL AMP XI.M2, would enable the applicant to mitigate pitting corrosion effectively in the RV and RVIs during the wet layup period at Unit 1.

The staff contended that if the dissolved oxygen content exceeded 100 ppb during the wet layup period, crevice corrosion of the RVIs could have occurred. In order to ensure that crevice corrosion is not occurring in the RV and RVIs, the staff requests that the applicant confirm that the dissolved oxygen content in the RCS water did not exceed 100 ppb during the wet layup period. This staff issue was resolved by the applicant's subsequent response and submittals (see SER Section 3.7.2.2 below).

In RAI 3.0-1 LP(b), the staff requested that the applicant discuss the criteria (e.g., guidelines) used to maintain the chemistry of the fluid in the wet layup systems, the chemistry parameters monitored, and the frequency of the monitoring/trending.

October 8, 2004

In its response to RAI 3.0-1 LP(b), by letter dated ~~January 31, 2005~~ the applicant stated that during the wet layup period reactor water was monitored in accordance with the requirements specified in Table 5 of the CI-13.1. The impurity limits for conductivity, chloride, and sulfate

µS/cm

given in CI-13.1 were 1.5 S/cm, 15 ppb and 15 ppb, respectively. The applicant also stated that sampling was performed once every two weeks, and the monitoring and trending results demonstrated that the RCS water was maintained within its impurity limits during the wet layup period.

Since the verification frequency of the RCS water chemistry is once every two weeks during the wet layup period, the staff determined that pitting and crevice corrosion in the RV and RVIs can occur if they are exposed to higher concentrations of chlorides and sulfates due to a leak in the primary systems. The staff issued follow-up RAI 3.0-1 LP (b), requesting that the applicant provide information regarding its past experience related to any sudden increase in concentration of chlorides and sulfates in the RCS water during the wet layup period, and the corrective actions taken to prevent impurities migrating into crevices in the RV and RVIs. The staff further requested that the applicant identify the crevice locations in the RV and RVIs that will not be replaced and where accumulation of aggressive ions such as chlorides and sulfates

The applicant stated that the core shroud access hole covers will be examined in accordance with GE SIL 462, Revision 1. The applicant stated that the access hole covers for Unit 1 are cracked essentially 360 degrees around and will be replaced prior to Unit 1 restart.

The staff reviewed the response and found it acceptable because of the implementation of the ISI program, which is an established AMP that is based on compliance with the staff's ISI requirements in 10 CFR 50.55a. This program has appropriate requirements for inspecting the RV components prior to Unit 1 restart. The RVIs will be inspected in accordance with the requirements of applicable BWRVIP guidelines, thus enabling the applicant to identify pitting corrosion in the RVIs in a timely manner so that proper corrective actions could be taken to ensure their structural integrity prior to Unit 1 restart.

The staff's position is that if the dissolved oxygen content exceeds 100 ppb during the wet layup period, crevice corrosion of the RVIs could occur. In order to ensure that crevice corrosion is not occurring in the RV and RVIs, the staff requests that the applicant confirm that the dissolved oxygen content in the RCS water did not exceed 100 ppb during the wet layup period 27 (Unresolved Item 3.7.2.2-1 in the applicant's response dated May 31, 2005). The staff followed this issue with the applicant in follow-up conference calls. The following is a disposition of the resolution of the issues in the staff follow-ups and subsequent applicant submittals.

To confirm that the crevice locations in RVIs are not susceptible to corrosion, the staff requests that the applicant identify these locations and provide information as to how it uses the applicable BWRVIP inspection guidelines to detect any crevice corrosion of the RVIs prior to 27 Unit 1 restart. (Unresolved Item 3.7.2.2-2 in the applicant's response dated May 31, 2005).

27

In its response dated May 25, 2005, the applicant indicated that during the wet layup period the RCS water was open to the atmosphere and, therefore, the dissolved oxygen content in RCS water was expected to increase to 8 ppm. The staff requested that the applicant provide information regarding the implementation of the BWRVIP inspection guidelines to detect crevice 27 corrosion of the RVIs prior to Unit 1 restart. In its response dated May 25, 2005, the applicant listed the following systems that have crevice type configurations, and proposed to implement appropriate BWRVIP inspection guidelines to monitor the aging effect due to crevice corrosion in these systems. The systems with crevice configuration include: (1) core spray; (2) jet pump assembly; (3) top guide; (4) control rod guide, and (5) core plate. The staff found the applicant's response acceptable because the inspection frequency and the inspection techniques specified in the respective BWRVIP guidelines, and the augmented inspection for the top guide (see TLAA SER Section 4.2.8.2) will adequately identify the crevice corrosion in the RVIs components so that corrective actions can be taken prior to Unit 1 restart, and after inservice inspection in accordance with BWRVIP guidelines. The staff considers these issues resolved.

Conclusion. The staff, after reviewing the applicant's submittal, and its responses to RAIs, concluded that the aging effect due to pitting corrosion had not caused any degradation of the RV and RVIs during the wet layup period at Unit 1. If any additional degradation occurred due to pitting corrosion in the RV and RVIs, the applicant's restart activities should be effective in identifying and correcting issues prior to Unit 1 restart. The staff concluded that the aging effect due to crevice corrosion in the RVs and RVIs during the wet layup can be ascertained.

The applicant stated that the following aging effects are less likely to occur in the RV and RVIs and, as such, they do not require an AMP. This assessment was based on the fact that the

2.3.2.3. LRA Table 3.2.2.3 contains the AMR for the system for normal operation. LRA Section 3.0.1 states that the Unit 1 HPCI system was maintained in dry layup during the extended shutdown. The applicant's February 19, 2004, submittal described the applicant's process for evaluating the effects of aging during the extended shutdown. The staff verified that the applicant had identified all applicable AERMs during the extended shutdown and credited appropriate AMPs for managing the AERMs. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

Aging Effects. Table 1 of the applicant's February 19, 2004, supplement on wet layup provides the AMR of the HPCI system components within the scope of license renewal and was maintained in dry layup conditions. The component types include bolting, condenser, expansion joint, fittings, flexible connectors, gland seal blower, heat exchangers, piping, pumps, restricting orifices, strainers, tanks, traps, tubing, turbines, and valves.

The February 19, 2004, submittal describes the internal environment of the system as being maintained at less than 60 percent RH de-humidified air. The external environment was inside air.

For the Unit 1 HPCI system components, the applicant identified the following materials, environments, and AERMs: carbon and low-alloy steel components in air/gas (internal) or inside air (external) environments are subject to a loss of material due to general corrosion. Cast iron and cast iron alloy components in air/gas (internal) or inside air (external) environments are subject to a loss of material due to general corrosion. Elastomer components in inside air (external) environments are subject to hardening and loss of strength due to elastomer degradation. No aging effects are identified for stainless steel, nickel-alloy, and copper-alloy components in air/gas (internal) or inside air (external) environments. No aging effects are identified for ~~elastomer and~~ glass components in inside air (external) environments. No aging effects are identified for elastomers in air/gas (internal) environments. Per Table 1, System 73

During its review, the staff determined that additional information was needed to complete its review.

In Table 1 of the February 19, 2004, submittal, for the HPCI system (73) and core spray system (75), the Unit 1 layup components made of carbon and low-alloy steel as well as cast iron and cast iron alloy in air/gas (internal) or inside air (external) environments are subject to general corrosion during the period of extended outage. In the LRA AMR, the same aging effect is also identified for the same components in air/gas (internal) and inside air (external) environments. Because of the uncertainty of the dryness of air environments, the staff requested, in RAI 3.2-1 LP, the applicant to assure that the above layup air environments for these components are not any more aggressive than their counterparts in the plant operating environments, and that no additional aging effects would need to be considered. By letter dated October 8, 2004, the applicant stated that the HPCI system (73) was drained and laid up dry per 1-GOI-100-13.A and 0-TI-373. The core spray system (75) was drained and laid up dry per 1-GOI-100-13.17 and 0-TI-373. The air/gas environments for these systems were maintained to less than 60 percent humidity with dehumidifiers. The applicant stated that both the normal and layup environments were relatively dry (no pooling) air/gas environments. In addition, the heating and ventilation in the reactor building was maintained during layup; therefore, the inside air environment for systems 73 and 75 did not significantly change systems 73 and 75. Based on the above, the staff concluded that the layup air environments for the above components are not any more

To ensure the general acceptability of the One-Time Inspection Program in managing loss of material due to general corrosion, the staff requested in RAI 3.0-2 LP that the applicant provide detailed information of the One-Time Inspection Program, and provide justification that it is adequate for managing the aging effects for the components within the dry layup systems. The staff's discussion of this RAI and its resolution by the applicant are provided in SER Section 3.7.1.3.1.

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On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May 27 and 31, 2005, the staff found the applicant had identified appropriate AMPs for managing the aging effects of the Unit 1 HPCI system components during the extended shutdown. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

Conclusion. On the basis of its review, the staff concluded that the applicant had adequately identified the aging effects, and the AMPs credited for managing the aging effects, for the Unit 1 HPCI system components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

3.7.3.1.2 Core Spray System

Technical Staff Evaluation. The technical staff reviewed the AMR of the core spray system (75) to determine whether the proposed aging management was adequate to address any potential aging during the extended shutdown of Unit 1. The core spray system is described in LRA Section 2.3.2.5. LRA Table 3.2.2.5 contains the AMR for the system for normal operation. LRA Section 3.0.1 states that Unit 1 core spray system was maintained in dry layup during the extended shutdown. The applicant's February 19, 2004, submittal describes the applicant's process for evaluating the effects of aging during the extended shutdown. The staff verified that the applicant identified all applicable AERMs during the extended shutdown and credited appropriate AMPs for managing the AERMs. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

Aging Effects. Table 1 of the applicant's February 19, 2004, submittal provides the AMR of the core spray system components within the scope of license renewal and maintained in dry layup conditions. The component types include bolting, fittings, piping, pumps, restricting orifices, strainers, tanks, tubing, and valves.

The February 19, 2004, submittal describes the internal environment of the system as being maintained at less than 60 percent RH de-humidified air. The external environment was inside air.

For the Unit 1 core spray system components, the applicant identified the following materials, environments, and AERMs: carbon and low-alloy steel, and cast iron and cast iron alloy. Components in air/gas (internal) or inside air (external) environments are subject to a loss of

For the Unit 1 containment system components, the applicant identified the following materials, environments, and AERMs: carbon and low-alloy steel components in treated water (internal and external) environments are subject to loss of material due to general, crevice, pitting, and galvanic corrosion. Carbon low-alloy steel components in inside air (external) and outside air (external) environments are subject to loss of material due to general corrosion. Carbon and low-alloy steel components in buried (external) environments are subject to loss of material due to general, crevice, and pitting corrosion, and MIC. Stainless steel components in treated water (internal) environments are subject to loss of material due to crevice and pitting corrosion. Nickel-alloy components in treated water (internal) environments are subject to loss of material due to crevice and pitting corrosion. Elastomer components in inside air (external) and outside air (external) environments are subject to hardening and loss of strength due to elastomer degradation (ultraviolet radiation).

During its review, the staff determined that additional information was needed to complete its review.

Table 3 of the applicant's February 19, 2004, submittal indicates components in the containment system (64), HPCI system (73), and core spray system (75) that are exposed to an air/gas (internal) environment during normal operation, whereas their counterpart environment during the extended outage is noted as "N/A." This table states that, due to drainage and system isolation, portions of these systems may have been exposed to an internal environment of moist air. The table also states that the evaluation for treated water encompasses the aging effects for a moist air environment in these systems. In RAI 3.0-5 LP, the staff requested the applicant to explain why the evaluation of the aging effects for the treated-water environment would encompass that of the aging effects for a moist air environment in these systems, since the rate of loss of material caused by a moist air environment during layup may be more severe than a flowing treated-water environment during normal operation. By letter dated October 8, 2004, the applicant stated that Table 3 addresses the aging management for portions of several systems (including containment, HPCI, and core spray systems) laid up in a wet environment. Due to closure sequence, closure timing, and possible leakage past the double isolation valves or two drain valves for these systems, it is assumed that an air/gas environment with an uncertain amount of moisture was trapped between the double isolation valves. The trapped moisture between the double isolation valves was considered the same (i.e., raw or treated water) as was water flowing through the valves prior to closure. The applicant stated that the N/A denotes that this trapped air/gas environment will be evaluated under the corresponding raw or treated water evaluations.

The applicant stated that the evaluation of these moist air environments for the systems addressed in Table 3 identified no additional aging effects other than those identified for the corresponding raw or treated-water environment. The applicant stated that the LRA identified these trapped air environments for one-time inspections because the extent of corrosion could be quantified. It was not the intent of this AMR to determine the rate of loss of material. The applicant further stated that the one-time inspection will be performed prior to restart ~~instead of being performed prior to the end of the current licensing period~~, to verify the material condition.

Letter did not state this

The staff determined that the applicant had adequately explained the nature of the trapped air/gas environments, and why the evaluation of the aging effects for the treated-water environment, in the above three ESF systems, would encompass that of the aging effects for a moist air environment in these systems. The applicant also committed to perform inspections in

The applicant stated that the torus impurity administrative goals for conductivity, chloride, and sulfate given in CI-13.1 are 2 µS/cm, 75 ppb, and 75 ppb, respectively, which are within the chemistry specifications. Sampling is performed quarterly. The applicant also stated that the LRA One-Time Inspection will be performed prior to Unit 1 restart to verify the material condition.

Based on the above information, pending the staff's acceptance of the applicant's wet layup program chemistry controls provided in SER Section 3.7.1.1, the staff determined that the applicant adequately addressed the staff's concerns related to water chemistry existing during layup and pre-startup inspections, for the containment, HPCI, and core spray systems. RAI 3.0-6 LP is, therefore, closed for these three systems.

On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, the staff found the applicant had identified appropriate AMPs for managing the aging effects of the Unit 1 containment system components not incorporated in the wet layup program during the extended shutdown. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

Conclusion. On the basis of its review, the staff concluded that the applicant had adequately identified the aging effects, and the AMPs credited for managing the aging effects, for the Unit 1 containment system components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

3.7.3.2.2 High Pressure Coolant Injection System

Technical Staff Evaluation. The technical staff reviewed the AMR of the HPCI system (73) to determine whether the proposed aging management was adequate to address any potential aging during the extended shutdown of Unit 1. The HPCI system is described in LRA Section 2.3.2.3. LRA Table 3.2.2.3 contains the AMR for the system for normal operation. LRA Section 3.0.1 and the applicant's February 19, 2004, submittal state that the Unit 1 HPCI system within the scope of license renewal was not incorporated into the layup program but was included in the evaluation. Based on location, valve leakage, etc., the components within the scope of license renewal for the HPCI system (73) saw treated (torus) water maintained by CI-13.1 chemistry program for extended periods of time. The applicant's February 19, 2004, submittal describes the applicant's process for evaluating the effects of aging during the extended shutdown. The staff verified that the applicant identified all applicable AERMs during the extended shutdown and credited appropriate AMPs for managing the AERMs. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

Aging Effects. Table 3 of the applicant's February 19, 2004, submittal provides the AMR of the HPCI system components within the scope of license renewal that were not incorporated into the wet layup program. The component types include bolting, condenser, expansion joint,

On the basis of its review of the information provided in the LRA, as supplemented by letter dated February 19, 2004, the staff concurred with the applicant's evaluation of the aging effects of the materials and environments associated with the containment inerting system during the extended shutdown. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the Unit 1 containment inerting system during the extended shutdown.

Aging Management Programs. After evaluating the applicant's identification of aging effects, the staff evaluated the AMPs to determine if they are appropriate for managing the identified aging effects from the extended shutdown. The staff also verified that the UFSAR supplement contains an adequate description of the program.

Table 4 of the applicant's February 19, 2004, submittal identifies the following AMPs for managing the aging effects described above for the containment inerting system.

- One-Time Inspection Program (B.2.1.29).
- Systems Monitoring Program (B.2.1.39)

SER Sections 3.0.3.1.7 and 3.0.3.3.1, respectively, present the staff's detailed review of these AMPs.

During its review, the staff determined that additional information was needed to complete its review.

In Table 4 of the February 19, 2004, submittal, for the containment inerting system (76), the applicant stated that inspections will be performed prior to Unit 1 restart for certain components where additional aging effects were identified for the extended outage. These additional aging effects include those identified for carbon and low-alloy steel, stainless steel, nickel alloy, copper alloy, aluminum alloy, and cast iron and cast iron alloy components in system locations where condensation could build up. No descriptions of the inspections were provided. In RAI 3.0-7 LP, the staff requested the applicant to discuss the proposed inspections, including scope, method, procedure, parameters monitored and trended, detection of aging effects, and acceptance criteria, in order to justify the adequacy of the inspections. By letter dated October 8, 2004, the applicant stated that internal surface monitoring is performed in accordance with the One-Time Inspection Program described in the LRA, Appendix B, Section B.2.1.29. This is the same AMP proposed for managing internal aging effects of components exposed to moist air during the period of extended operation. The staff found the applicant's commitment of performing one-time inspections to be acceptable, and RAI 3.0-7 LP is closed for the containment inerting system. The staff's discussion of the adequacy of the One-Time Inspection Program in managing the identified aging effects for the system components, versus periodic inspections, is provided in SER Section 3.7.1.3.1.

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On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May 27 and 31, 2005, the staff found the applicant had identified appropriate AMPs for managing the aging effects of the Unit 1 containment inerting system components not incorporated in the dry layup program during the extended shutdown. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

containment ADS components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

3.7.4 Auxiliary Systems

3.7.4.1 Auxiliary Systems in Dry Layup

3.7.4.1.1 Standby Liquid Control System

Technical Staff Evaluation. The technical staff reviewed the AMR of the standby liquid control system to determine whether the proposed aging management was adequate to address any potential aging during the extended shutdown of Unit 1. The standby liquid control system is described in LRA Section 2.3.3.18. LRA Table 3.3.2.18 contains the AMR for the system for normal operation. LRA Section 3.0.1 states that the Unit 1 standby liquid control system was maintained in dry layup during the extended shutdown. The applicant's February 19, 2004, submittal of additional information describes the applicant's process for evaluating the effects of aging during the extended shutdown. The staff verified that the applicant identified all applicable AERMs during the extended shutdown and credited appropriate AMPs for managing the AERMs. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

During its review, the staff determined that additional information was needed to complete its review. General RAIs 3.0-2 LP, 3.0-8 LP, and 3.0-10 LP are related to the standby liquid control system. These RAIs, the applicant's responses, and the staff's review of the applicant's responses are discussed in SER Section 3.7.1.3. There are no system-specific RAIs on the standby liquid control system.

Aging Effects. LRA Table 3.3.2.18 provides the AMR of the standby liquid control system components within the scope of license renewal and subject to AMR. The component types include piping, fittings, bolting, pumps, tanks, and valves.

The LRA and the February 19, 2004, submittal of additional information describe the environment during the Unit 1 shutdown as follows: the internal environment was maintained at less of 60 percent relative humidity (de-humidified air) and the external environment was inside air.

For the Unit 1 system components, the applicant identified on Evaluation of the Unit 1 Layup and Preservation Program Table 1, the following materials, environments, and AERMs: carbon and low-alloy steel components exposed to air/gas and inside air are subject to a loss of material due to general corrosion. Stainless steel, aluminum alloy and polymer-delrin exposed to air/gas and inside air experience no aging effects.

On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May ~~[illegible]~~ 18 and ~~[illegible]~~ 27, 2005, the staff

concurred with the applicant's evaluation of the aging effects of the materials and environments associated with the standby liquid control system during the extended shutdown. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the Unit 1 standby liquid control system during the extended shutdown.

Aging Management Programs. After evaluating the applicant's identification of aging effects, the staff evaluated the AMPs to determine if they are appropriate for managing the identified aging effects from the extended shutdown. The staff also verified that the UFSAR supplement contains an adequate description of the program.

Evaluation of the Unit Layup and Preservation Program Table 1 identifies the following AMPs for managing the aging effects described above for the standby liquid control system in dry layup.

- One-Time Inspection Program (B.2.1.29)
- Systems Monitoring Program (B.2.1.39)

The staff's detailed review of these AMPs is found in SER Section 3.0.3.1.7 and 3.0.3.3.1, respectively.

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On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May 27 and 31, 2005, the staff found the applicant had identified appropriate AMPs for managing the aging effects of the Unit 1 standby liquid control system components during the extended shutdown. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

Conclusion. On the basis of its review, the staff concluded that the applicant adequately identified the aging effects and the AMPs credited for managing the aging effects for the Unit 1 standby liquid control system components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

3.7.4.1.2 Off-Gas System

Technical Staff Evaluation. The technical staff reviewed the AMR of the off-gas system to determine whether the proposed aging management was adequate to address any potential aging during the extended shutdown of Unit 1. The off-gas system is described in LRA Section 2.3.3.19. LRA Table 3.3.2.19 contains the AMR for the system for normal operation. LRA Section 3.0.1 states that the Unit 1 off-gas system was maintained in dry layup during the extended shutdown. The applicant's February 19, 2004, submittal of additional information describes the applicant's process for evaluating the effects of aging during the extended shutdown. The staff verified that the applicant had identified all applicable AERMs during the extended shutdown and credited appropriate AMPs for managing the AERMs. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

During its review, the staff determined that additional information was needed to complete its review. General RAIs 3.0-2 LP, 3.0-8 LP, and 3.0-10 LP are related to the off-gas system. These RAIs, the applicant's response and the staff's review of the applicant's response are discussed in SER Section. There are no system-specific RAIs on the off-gas system.

Aging Effects. LRA Table 3.3.2.19 provides the AMR of the off-gas system components within the scope of license renewal and subject to AMR. The component types include bolting, ductwork, piping and fittings.

The LRA and the February 19, 2004, submittal of additional information describe the environment during the Unit 1 shutdown as follows: the internal environment was maintained at less than 60 percent relative humidity (de-humidified air), and the outside environment was inside air.

For the Unit 1 system components, the applicant identified on Evaluation of the Unit 1 Layup and Preservation Program Table 1, the following materials, environments, and AERMs: carbon and low-alloy steel components exposed to air/gas and inside air are subject to a loss of material due to general corrosion. Stainless steel and copper alloy exposed to air/gas and inside air experience no aging effects.

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On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May 27 and 31, 2005, the staff concurred with the applicant's evaluation of the aging effects of the materials and environments associated with the off-gas system during the extended shutdown. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the Unit 1 off-gas system during the extended shutdown.

Aging Management Programs. After evaluating the applicant's identification of aging effects, the staff evaluated the AMPs to determine if they are appropriate for managing the identified aging effects from the extended shutdown. The staff also verified that the UFSAR supplement contains an adequate description of the program.

Evaluation of the BFN Unit Layup and Preservation Program Table 1 identifies the following AMPs for managing the aging effects described above for the off-gas system in dry layup.

- One-Time Inspection Program (B.2.1.29)
- Systems Monitoring Program (B.2.1.39)

The staff's detailed review of these AMPs is found in SER Section 3.0.3.1.7 and 3.0.3.3.1, respectively.

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On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May 27 and 31, 2005, the staff found the applicant had identified appropriate AMPs for managing the aging effects of the Unit 1 off-gas system. components during the extended shutdown. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

Conclusion. On the basis of its review, the staff concluded that the applicant had adequately identified the aging effects, and the AMPs credited for managing the aging effects, for the Unit 1

off-gas system. components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

3.7.4.1.3 Reactor Core Isolation Cooling System

Technical Staff Evaluation. The technical staff reviewed the AMR of the RCIC system to determine whether the proposed aging management was adequate to address any potential aging during the extended shutdown of Unit 1. The reactor core isolation cooling system is described in LRA Section 2.3.3.23. LRA Table 3.3.2.23 contains the AMR for the system for normal operation. LRA Section 3.0.1 states that Unit 1 reactor core isolation cooling system for wet layup was not formally incorporated into the wet layup program, but was evaluated. The applicant's February 19, 2004, submittal of additional information (including Table 1 and 3). shows that the RCIC system was subject to both a dry layup condition and a wetted condition. The applicant's response to RAI 3.0-6 LP shows that the RCIC torus attached piping saw torus
C1-13.1 water maintained by Chemistry Program ~~CI-3.4~~ for extended periods of time. The BFN layup program for dry layup maintained the internal environment of Unit 1 reactor core isolation cooling system at less than 60 percent RH de-humidified air. The applicant's February 19, 2004, submittal of additional information (including Table 1 and 3), describes the applicant's process for evaluating the effects of aging during the extended shutdown. The staff verified that the applicant had identified all applicable AERMs during the extended shutdown and credited appropriate AMPs for managing the AERMs. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

During its review, the staff determined that additional information was needed to complete its review. General RAIs 3.0-2 LP, 3.0-3 LP, 3.0-4 LP, 3.0-5 LP, 3.0-6 LP, 3.0-8 LP, 3.0-9 LP and 3.0-10 LP are related to the reactor core isolation cooling system. RAIs 3.0-2 LP to RAI 3.0-8 LP are discussed in SER Section 3.7.1.3, RAI 3.0-9 LP is discussed in SER Section 3.7.1.2 and RAI 3.0-10 LP is discussed in SER Section 3.7.1.3.1. There are no system-specific RAIs on the reactor core isolation cooling system.

Aging Effects. LRA Table 3.3.2.23 provides the AMR of the reactor core isolation cooling system components within the scope of license renewal and subject to AMR. The component types include bolting, condenser, expansion joint, fittings, fittings - RCPB, flexible connector, heat exchangers, piping, piping - RCPB, pumps, restricting orifice, restricting orifice - RCPB, strainers, tanks, traps, tubing, turbines, valves, and valves - RCPB.

Table 1 of the February 19, 2004, submittal of additional information describes the dry layup environment during the Unit 1 shutdown as follows: the internal environment was air/gas (less than 60 percent RH) and the external environment was inside air. Table 3 of the February 19, 2004, submittal identifies the internal environment as treated water and the external environment as inside air or treated water.

For the Unit 1 system components, the applicant identified on Evaluation of the BFN Unit 1 Layup and Preservation Program Tables 1 and 3, the following materials, environments, and AERMs: carbon and low-alloy steel components as well as cast iron and cast iron alloy components. exposed to air/gas (internal) or inside air (external) environments are subject to a loss of material due to general corrosion; carbon and low-alloy steel components as well as cast iron and cast iron alloy components exposed to treated water are subject to general corrosion, crevice corrosion, galvanic corrosion, and pitting corrosion; stainless steel components in treated water are subject to crevice corrosion, and pitting corrosion; copper-alloy components in treated water are subject to a loss of material due to selective leaching, crevice corrosion, galvanic corrosion, and pitting corrosion; aluminum alloy components. in treated water are subject to a loss of material due to crack initiation and growth due to SCC, crevice corrosion, galvanic corrosion, and pitting corrosion; stainless steel, copper alloy, aluminum alloy, and glass components exposed to air/gas (internal) or inside air (external) environments experience no aging effects. Glass components in treated-water environment also experience no aging effects.

In response to general RAI 3.0-9 LP, the applicant identified that the RCIC steam trap drain was replaced with 2-¼ percent chromium materials to prevent FAC.

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On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, and January 31, May 27, and May 31, 2005, the staff concurred with the applicant's evaluation of the aging effects of the materials and environments associated with the reactor core isolation cooling system during the extended shutdown. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the Unit 1 reactor core isolation cooling system during the extended shutdown.

Aging Management Programs. After evaluating the applicant's identification of aging effects, the staff evaluated the AMPs to determine if they are appropriate for managing the identified aging effects from the extended shutdown. The staff also verified that the UFSAR supplement contains an adequate description of the program.

Evaluation of the BFN Unit Layup and Preservation Program Tables 1 and 3 identify the following AMPs for managing the aging effects described above for the reactor core isolation cooling system in a dry layup or a treated-water environment.

- ASME Section XI Subsections IWB, IWC, and IWD Inservice Inspection Program (B.2.1.4)
- BWR Stress Corrosion Cracking Program (B.2.1.10)
- Chemistry Control Program (B.2.1.5)
- Flow-Accelerated Corrosion Program (B.2.1.15)
- One-Time Inspection Program (B.2.1.29)
- Selective Leaching of Materials Program (B.2.1.30)
- Systems Monitoring Program (B.2.1.39)

The staff's detailed review of these AMPs is found in SER Section 3.0.3.1.3, 3.0.3.2.5, 3.0.3.2.2, 3.0.3.2.9, 3.0.3.1.7, 3.0.3.1.8, and 3.0.3.3.1, respectively.

For the Unit 1 system components, the applicant identified on Evaluation of the BFN Unit 1 Layup and Preservation Program Table 2, the following materials, environments, and AERMs: carbon and low-alloy steel components exposed to treated water are subject to a loss of material due to general corrosion, crevice corrosion, galvanic corrosion, and pitting corrosion; stainless steel components in treated water are subject to a loss of material due to crevice and pitting corrosion; cast iron and cast iron alloy components in treated water are subject to a loss of material due to general corrosion, crevice corrosion, galvanic corrosion, and pitting corrosion as well as selective leaching; copper and copper-alloy components in a treated-water environment are subject to a loss of material due to crevice corrosion, pitting corrosion and selective leaching. Glass components in a treated-water environment experience no aging effects; carbon and low-alloy steel components as well as cast iron and cast iron alloy components in inside air are subject to a loss of material due to general corrosion; stainless steel, copper alloy, and glass exposed to inside air experience no aging effects.

Table 2 does not identify IGSCC for the stainless steel RWCU system components during layup and LRA Section F.13 indicates that RWCU piping outside the primary containment isolation valves will be replaced with IGSCC resistant material. In response to general RAI 3.0-9 LP the applicant submitted system-specific information in regard to specific components that will be replaced prior to startup. By letter dated January 31,2005, the applicant clarified the scope and basis for the following RWCU specific components being replaced with IGSCC resistant material prior to restart:

- RWCU hot piping both inside and outside the drywell is being replaced with 316NG
- RWCU. valves replaced with 316L.
- RWCU pumps (IGSCC related)
- RWCU regenerative heat exchangers with 316L

Therefore, based on the commitment that stainless steel piping will be replaced with IGSCC resistant material prior to restart, the staff concluded that IGSCC is not a technical concern for the RWCU system as a result of layup conditions during the extended shutdown.

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On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, and January 31, May 27, and May 31, 2005; the staff concurred with the applicant's evaluation of the aging effects of the materials and environments associated with the reactor water cleanup system during the extended shutdown. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the Unit 1 reactor water cleanup system during the extended shutdown.

Aging Management Programs. After evaluating the applicant's identification of aging effects, the staff evaluated the AMPs to determine if they are appropriate for managing the identified aging effects from the extended shutdown. The staff also verified that the UFSAR supplement contains an adequate description of the program.

Evaluation of the BFN Unit Layup and Preservation Program Table 2 identified the following AMPs for managing the aging effects described above for the reactor water cleanup system in. wet layup.

- ASME Section XI Subsections IWB, IWC and IWD Inspection Program (B.2.1.4)

Aging Effects. LRA Table 3.3.2.29 provides the AMR of the control rod drive system components within the scope of license renewal and subject to AMR. The component types include bolting, fittings, fittings - RCPB, heat exchangers, piping, piping - RCPB, pumps, restricting orifice, rupture disk, strainers, strainers - RCPB, tanks, tubing, valves, and valves - RCPB.

Table 2 of the February 19, 2004, submittal describes the environment during the Unit 1 shutdown as follows: the internal environment was flowing, air-saturated, demineralized water (treated water) and the outside environment was inside air.

For the Unit 1 system components, the applicant identified the following materials, environments, and AERMs: carbon and low-alloy steel components exposed to air-saturated demineralized water are subject to a loss of material due to general corrosion, crevice corrosion, galvanic corrosion, and pitting corrosion; stainless steel and aluminum alloy components in treated water are subject to a loss of material due to crevice and pitting corrosion; ~~copper and copper-alloy components in treated water environment are subject to a loss of material due to general corrosion, crevice corrosion, galvanic corrosion, and pitting corrosion as well as selective leaching;~~ carbon and low-alloy steel components as well as cast iron and cast iron alloy components in inside air are subject to a loss of material due to general corrosion; stainless steel, copper alloy, and aluminum alloy components exposed to inside air experience no aging effects.

Table 2 for System 85 does not include this

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In RAI 3.3-2 LP the staff requested the following additional information on Table 2 concerning the internal environment and inspections for the control rod drive system.

LRA Table 3.3.2.29 and Table 2 of the supplement state that many carbon and low-alloy steel components in the control rod drive system have an internal environment of raw water during normal operation. However, Table 2 states that this environment is not applicable during the extended outage. The applicant was requested to clarify the environment during the extended outage, and discuss the implications of the environment on the aging of these components. The applicant was requested to specify any applicable aging effects with the corresponding AMPs and also discuss whether any inspections are planned to determine the extent of aging during the extended outage.

The applicant responded to RAI 3.3-2 LP (b)1 by stating that the raw cooling water system provides cooling water to the CRD pump oil cooler and thrust bearing. The applicant further clarified that the following materials see the raw water environment during layup: carbon steel piping and fittings, copper valves, copper heat exchanger (cooler) tubing, cast iron heat exchanger (cooler) head.

Finally the applicant stated that a sample of components with a raw water environment within the control rod drive system (85) will be inspected for the following aging effects by the One-Time Inspection Program.

- Carbon and low-alloy steel – Loss of material due to general corrosion, crevice corrosion, pitting corrosion, galvanic corrosion, microbiologically influenced corrosion, and biofouling

- Copper and copper alloys – Loss of material due to crevice corrosion, pitting corrosion, microbiologically influenced corrosion, biofouling, and selective leaching
- Cast iron and cast iron alloys - Loss of material due to general corrosion, crevice corrosion, pitting corrosion, galvanic corrosion, microbiologically influenced corrosion, biofouling, and selective leaching

The staff reviewed the applicant's above response to the RAI and determined that additional information was required. In follow-up RAI 3.3-2 LP the applicant was requested to clarify whether one-time inspection is appropriate to manage aging of carbon steel, cast iron and copper-based components in a raw water environment during layup.

The applicant's response to follow-up RAI 3.3-2 LP stated that there is no need to perform a one-time inspection on the components that were subjected to a raw water environment during layup. The applicant indicated that the inspections would have been better characterized as "restart inspections" instead of "One-Time Inspection." The applicant further stated that once the control rod drive system is returned to service the components will have the same AMPs applied to them as their current Unit 2 and 3 counterpart components.

Staff reviewed the applicant's response and concurred that, in general, restart inspections are appropriate to detect and correct degradation experienced during layup. However, staff is concerned that one-time inspections performed during the extended outage may not be appropriate to detect latent aging effects in the control rod drive system resulting from layup during the extended operating period. Latent aging effects are anticipated in crevices and in stagnant areas where contaminants are concentrated. For areas subject to concentration of contaminants during layup, the applicant should justify the application of one-time inspections in lieu of periodic inspections.

On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, and January 31, May ~~27~~ 18, and May ~~31~~ 27, 2005; the staff concurred with the applicant's evaluation of the aging effects of the materials and environments associated with the control rod drive system during the extended shutdown. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the unit control rod drive system during the extended shutdown.

<u>Aging Management Programs</u>. After evaluating the applicant's identification of aging effects, the staff evaluated the AMPs to determine if they are appropriate for managing the identified aging effects from the extended shutdown. The staff also verified that the UFSAR supplement contains an adequate description of the program.

Evaluation of the BFN Unit Layup and Preservation Program Table 3 identifies the following AMPs for managing the aging effects described above for the control rod drive system in wet layup:

- BWR Stress Corrosion Cracking Program (B.2.1.10)
- Chemistry Control Program (B.2.1.5)
- One-Time Inspection Program (B.2.1.29)
- Open-Cycle Cooling Water System Program (B.2.1.17)
- Selective Leaching of Materials Program (B.2.1.30)

- Systems Monitoring Program (B.2.1.39)

The staff's detailed review of these AMPs is found in SER Section 3.0.3.2.5, 3.0.3.2.2, 3.0.3.1.7, 3.0.3.2.11, 3.0.3.1.8, and 3.0.3.3.1, respectively.

On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, and January 31, May ~~27~~ 18, and May ~~31~~ 27, 2005; the staff found the applicant had identified appropriate AMPs for managing the aging effects of the Unit 1 control rod drive system components during the extended shutdown. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

Conclusion. On the basis of its review, the staff concluded that the applicant had adequately identified the aging effects and the AMPs credited for managing the aging effects [pending resolution of the general RAIs] for the Unit 1 control rod drive system components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

3.7.4.3 Auxiliary Systems Not in Layup Program

During its review of auxiliary systems, the staff determined that additional information was needed to complete its review. By letter dated August 23, 2004, the staff issued general RAI 3.3-1 LP requesting the following additional information on systems and portions of systems that were not included in the layup program.

LRA Section 3.0.1 describes the criteria for evaluating systems for aging during the extended outage. Systems that remain in operation for Unit 1 or in support of operation for Units 2 and 3 are not evaluated. However, based on the system descriptions, it appears that at least a portion of the following systems should have been evaluated (i.e., it appears that the system was idle or that only the main headers were needed to support operation of Units 2 and 3). Discuss the operation of the following systems during the extended shutdown, and explain why these systems were not evaluated for aging during the extended shutdown.

- Residual Heat Removal Service Water System (023)
- Control Air System (032)
- Sampling and Water Quality System (043)
- Emergency Equipment Cooling Water System (067)
- Reactor Water Cleanup System (069)
- Reactor Building Closed Cooling Water System (070)
- Radioactive Waste Treatment System (077)
- Neutron Monitoring System (092)

If it is determined that these systems, or portions thereof, met the criteria for evaluation, provide an evaluation of aging during the extended outage. Include a description of the environment,

For the radioactive waste treatment system (77), the applicant stated that the Unit 1 piping and components for this system are not in the layup program. The piping and components in this system within the LRA scope remained in-service. An aging effects evaluation was performed for this system and documented in LRA Table 3.3.2.25.

Finally, related to the neutron monitoring system (92), the applicant stated that the Unit 1 portions of piping and components for this system are not in the layup program. The portion of this system that is within the scope of license renewal is part of the reactor vessel pressure boundary. An aging effects evaluation was performed for the Unit 1 layup portions of the RVI system. The aging effects evaluation for the RV and RVI encompasses the neutron monitoring system (92). The One-Time Inspection Program described in the LRA will be performed prior to Unit 1 restart to verify the material condition.

With the staff issue raised in RAI 3.0-5 LP concerning MIC in stagnant areas, the staff reviewed the applicant's response to RAI 3.3-1 and, in general, found it to be reasonable and acceptable because it clarified that the subject systems were either in-service or were not part of the layup program. Systems that were in service during the extended outage are reviewed as part of the AMR. For systems that were not part of the layup program, the applicant includes an evaluation of aging effects and credits one-time inspections to verify the material condition. In these systems, the applicant's evaluation of aging effects determined that aging effects identified for the operating conditions encompass the aging effects for the layup conditions. The staff's evaluation of one-time inspections to manage aging effects including MIC for stagnant systems not in-service can be found in SER Sections 3.7.1.3.1~~.1~~ and 3.7.1.4 pertaining to the applicant's response to RAI 3.0-9 LP and RAI 3.0-10 LP. DELETE

3.7.5 Steam and Power Conversion Systems

3.7.5.1 Steam and Power Conversion Systems in Wet Layup

3.7.5.1.1 Feedwater System

<u>Technical Staff Evaluation</u>. The technical staff reviewed the AMR of the feedwater system (03) to determine whether the proposed aging management was adequate to address any potential aging during the extended shutdown of Unit 1. The feedwater system is described in LRA Section 2.3.4.3. LRA Table 3.4.2.3 contains the AMR for the system for normal operation. LRA Section 3.0.1 states that Unit 1 feedwater system was maintained in wet layup during the extended shutdown. The applicant's February 19, 2004, submittal describes the applicant's process for evaluating the effects of aging during the extended shutdown. The staff verified that the applicant identified all applicable AERMs during the extended shutdown and credited appropriate AMPs for managing the AERMs. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

<u>Aging Effects</u>. Table 2 of the applicant's February 19, 2004, submittal provides the AMR of the feedwater system components within the scope of license renewal that were maintained in wet layup conditions. The component types include bolting, fittings, piping, restricting orifices, tubing, and valves.

During its review, the staff determined that additional information was needed to complete its review.

In Table 2 of the February 19, 2004, submittal, for the feedwater system (03), the applicant indicated that carbon and low-alloy steel components in inside air (external) environments are subject to loss of material due to general corrosion, because the components' surface temperature is less than 212 °F during the period of extended outage. The applicant indicated that the components will be inspected for external corrosion prior to Unit 1 restart, without providing details for the inspection provided. The applicant also indicated that inspections will be performed prior to Unit 1 restart for the copper-alloy components for which additional aging effects (i.e., loss of material due to crevice, galvanic, and pitting corrosion, and selective leaching) were identified for the extended outage. These additional aging effects are the results of the presence of moist air in system locations where condensation could build up. The applicant indicated that inspections will be performed for the components prior to restart, but again, provided no descriptions of the inspections.

In RAI 3.0-7 LP, the staff requested the applicant to discuss the proposed inspections, including scope, method, procedure, parameters monitored and trended, detection of aging effects, and acceptance criteria, in order to justify the adequacy of the inspections. By letter dated October 8, 2004, the applicant stated that external surface monitoring will be performed for the affected carbon and low-alloy steel components in accordance with the Systems Monitoring Program described in LRA, Appendix B, LRA Section B.2.1.39. The applicant noted that this is the same AMP proposed for managing external loss of material during the period of extended operation. The applicant stated that internal surface monitoring will be performed for the affected copper-alloy components in accordance with the One-Time Inspection Program described in the LRA Section B.2.1.29. The applicant noted that this is the same AMP proposed for managing internal aging effects of components exposed to moist air during the period of extended operation. The staff determined the Systems Monitoring Program to be adequate in managing the external aging effects. The staff also determined that the applicant's commitment of performing one-time inspections for the internal aging effects is acceptable. RAI 3.0-7 LP is, therefore, closed for the feedwater system. The staff's discussion of the general adequacy of the One-Time Inspection Program in managing the aging effects versus periodic inspections during the period of extended outage is provided in SER Section 3.7.1.3.1.

On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May ~~27~~ 18 and ~~31~~ 27, 2005, the staff found the applicant had identified appropriate AMPs for managing the aging effects of the Unit 1 feedwater system components during the extended shutdown. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

Conclusion. On the basis of its review, the staff concluded that the applicant had adequately identified the aging effects and the AMPs credited for managing the aging effects for the Unit 1 feedwater system components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

The applicant stated that the evaluation of these moist air environments for the systems addressed in Table 3 identified no additional aging effects other than those identified for the corresponding raw or treated-water environment. The applicant stated that the LRA identified these trapped air environments for one-time inspections because the extent of corrosion could be quantified. It was not the intent of this AMR to determine the rate of loss of material. The applicant further stated that the one-time inspection will be performed prior to restart, ~~instead of being performed prior to the end of the current licensing period~~ to verify the material condition.

LETTER 10/8/04 did not state this

The staff determined that the applicant adequately explained the nature of the trapped air/gas environments, and why the evaluation of the aging effects for the raw and treated-water environments, in the above two systems, would encompass that of the aging effects for a moist air environment in these systems. The applicant also committed to perform inspections in accordance with the LRA One-Time Inspection Program, prior to Unit 1 restart, to verify the material condition of the system components. This is acceptable to the staff, and RAI 3.0-5 LP is closed for the condenser circulation water system (27) and gland seal water system (37) systems. The staff's discussion of the general adequacy of the One-Time Inspection Program for systems containing treated water and raw water during layup is provided in SER Sections 3.7.1.3.1.

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On the basis of its review of the information provided in the LRA as supplemented by letters dated February 19 and October 8, 2004 and January 31, May ~~27~~, and ~~31~~, 2005; the staff concurred with the applicant's evaluation of the aging effects of the materials and environments associated with the condenser circulation water system during the extended shutdown. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the Unit 1 condenser circulation water system during the extended shutdown.

Aging Management Programs. After evaluating the applicant's identification of aging effects, the staff evaluated the AMPs to determine if they are appropriate for managing the identified aging effects from the extended shutdown. The staff also verified that the UFSAR supplement contains an adequate description of the program.

Table 3 identifies the following AMPs for managing the aging effects described above for the condenser circulating water system.

- One-Time Inspection Program (B.2.1.29)
- Buried Piping and Tanks Inspection Program (B.2.1.31)
- Systems Monitoring Program (B.2.1.39)

SER Sections 3.0.3.1.7, 3.0.3.1.9, and 3.0.3.3.1, respectively, present the staff's detailed review of these AMPs.

During its review, the staff determined that additional information was needed to complete its review.

In Table 3 of its February 19, 2004, submittal, the applicant identified no additional AMPs for the components in this layup system, other than the above AMPs specified in the LRA for the period of extended operation. In RAI 3.0-6 LP, the staff requested the applicant to justify the conclusion by discussing the water samples performed for the normal operation and the period of extended

outage. By letter dated October 8, 2004, the applicant stated that the condenser circulation water system was exposed to Tennessee River water, which is the same environment as it is exposed to during normal operation. Without the addition of foreign chemicals the aging effects during normal operation and during layup are the same. However, the applicant stated that the one-time inspection described in LRA will be performed prior to restart to verify the material condition. This commitment is acceptable to the staff, and RAI 3.0-6 LP is closed for the condenser circulation water system. The staff's discussion of the general adequacy of the One-Time Inspection Program as it relates to the systems containing raw water during layup is provided in SER Section 3.7.1.3.1.

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On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May 27 and [illegible], 2005, the staff found the applicant had identified appropriate AMPs for managing the aging effects of the Unit 1 condenser circulation water system components not incorporated in the wet layup program during the extended shutdown. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

Conclusion. On the basis of its review, the staff concluded that the applicant had adequately identified the aging effects, and the AMPs credited for managing the aging effects, for the Unit 1 condenser circulation water system components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

3.7.5.2.2. Gland Seal Water System

Technical Staff Evaluation. The technical staff reviewed the AMR of the gland seal water system (37) to determine whether the proposed aging management was adequate to address any potential aging during the extended shutdown of Unit 1. The gland seal water system is described in LRA Section 2.3.4.7. LRA Table 3.4.2.7 contains the AMR for the system for normal operation. LRA Section 3.0.1 and the applicant's February 19, 2004, submittal states that the portion of the Unit 1 gland seal water system within the scope of BFN license renewal was not incorporated into the BFN wet layup program, but was included in the evaluation. Based on location, valve leakage, etc., the components within the scope of BFN license renewal for the gland seal water system (37) saw treated water for extended periods of time. The applicant's February 19, 2004, submittal describes the applicant's process for evaluating the effects of aging during the extended shutdown. The staff verified that the applicant had identified all applicable AERMs during the extended shutdown and credited appropriate AMPs for managing the AERMs. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

Aging Effects. Table 3 of the February 19, 2004, submittal provides the AMR of the gland seal water system components within the scope of license renewal that were not incorporated into the BFN wet layup program. The component types include bolting, fittings, piping, tanks, tubing, and valves.

The February 19, 2004, submittal identified treated water as the internal environment of the system, and the external environment was inside air.

For the Unit 1 gland seal water system components, the applicant identified the following materials, environments, and AERMs: carbon and low-alloy steel components in treated water (internal) environments are subject to loss of material due to general, crevice, pitting, and galvanic corrosion; carbon and low-alloy steel components in inside air (external) environments are subject to loss of material due to general corrosion; copper-alloy components in treated water (internal) environments are subject to loss of material due to selective leaching, crevice and pitting corrosion; cast iron and cast iron alloy components in treated water (internal) environments are subject to loss of material due to general, crevice, and pitting corrosion, as well as selective leaching; cast iron and cast iron alloy components in inside air (external) environments are subject to loss of material due to general corrosion; no AERMS are identified for carbon and low-alloy steel in air/gas (internal) environments, copper alloy components in air/gas (internal) environment, and cast iron and cast iron alloy in air/gas (internal) environments no aging effects are identified for glass components in treated water (internal), air/gas (internal), and inside air (external) environments.

During its review, the staff determined that additional information was needed to complete its review.

In Table 3 of its February 19, 2004, submittal, the applicant stated that the portion of the gland seal water system (37) within the scope of license renewal was not incorporated into the Unit 1 wet layup program. The applicant identified various aging effects for carbon and low-alloy steel, copper alloy, and cast iron and cast iron alloy components in treated water (internal) environments. To ensure that these components have not been subjected to aging degradation more severe than their Units 2 and 3 counterparts during plant operation, in RAI 3.4-1 LP, the staff requested that the applicant (1) describe the general environments associated with the above system components; (2) provide a detailed description of the water chemistry of the treated water, and discuss its differences from the water chemistry existing in the plant operation; (3) discuss any water chemistry monitoring that had been performed for the treated water during the layup period; (4) discuss the possibility of incurring more severe aging degradations to these layup components than could have occurred during plant operation, considering the potential effects of different water temperature and stagnant flow condition; (5) discuss how the latent effect of the potentially more severe aging degradation occurring in the Unit 1 layup can be accounted for in the license AMR; and (6) justify the basis for not performing inspections for potential aging effects for these components prior to restart. By letter dated October 8, 2004, the applicant provided the following information:

1. Gland seal water system was drained (ambient air present) with the gland seal tank in component layup per MPI-1-000-TNK002. However, it was assumed that the secondary containment loop seal as well as other low points in the system were not completely drained (the layup environment for the system is treated (condensate) water and moist air from possible pooling of treated water between drain or isolation valves and in the loop seals). Therefore, stagnant treated water supplied from the condensate system (02) was evaluated for these areas.

2. The impurity administrative goals for conductivity, chloride, and sulfate given in CI-13.1 are ~~2.0 S/cm~~ 75 ppb, and 75 ppb, respectively. Sampling is performed weekly. The

2.0 μS/cm,

contact with more cathodic materials, galvanic corrosion is not a concern. Similarly, copper-alloy components are not in contact with a more cathodic material such as stainless steel within the gland seal water system. Therefore, galvanic corrosion is not a concern. The staff found the applicant's explanation to be acceptable, and RAI 3.4-4 LP is closed.

On the basis of its review of the information provided in the LRA, ~~as~~ supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May ~~27~~ 18 and ~~31~~ 27, 2005, the staff concurred with the applicant's evaluation of the aging effects of the materials and environments associated with the gland seal water system during the extended shutdown. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the Unit 1 gland seal water system during the extended shutdown.

Aging Management Programs. After evaluating the applicant's identification of aging effects, the staff evaluated the AMPs to determine if they are appropriate for managing the identified aging effects from the extended shutdown. The staff also verified that the UFSAR supplement contains an adequate description of the program.

Table 3 of the applicant's February 19, 2004, submittal identifies the following AMPs for managing the aging effects described above for the gland seal water system.

- Chemistry Control Program (B.2.1.5)
- One-Time Inspection Program (B.2.1.29)
- Selective Leaching of Materials Program (B.2.1.30)
- Systems Monitoring Program (B.2.1.39)

SER Sections 3.0.3.2.2, 3.0.3.1.7, 3.0.3.1.8, and 3.0.3.3.1, respectively, present the staff's detailed review of these AMPs.

During its review, the staff determined that additional information was needed to complete its review.

Table 3 of the applicant's February 19, 2004, submittal indicates that components in the gland seal water system (37) were exposed to treated (non-controlled) water environments during the extended outage. Table 3 identified no additional AMPs for this layup system, other than those AMPs specified in the LRA for the period of extended operation. In RAI 3.0-6 LP, the staff requested the applicant to justify the determination by discussing the water sampling performed for the normal operation and the period of extended outage. By letter dated October 8, 2004, the applicant stated that the system had been drained (ambient air present) with gland seal tank in component layup per MPI-1-000-TNK002. However, it was assumed that the secondary containment loop seal as well as other low points in the system had not been completely drained. Therefore, stagnant treated water supplied from the condensate system (02) was evaluated for these areas. The applicant stated that the One-Time Inspection Program described in the LRA will be performed prior to restart to verify the material condition. The staff found the applicant's commitment to perform a one-time inspection for the potential low points in the system to be acceptable, and RAI 3.0-6 LP is closed for the gland seal water system. The staff's discussion of the general adequacy of the One-Time Inspection Program in managing the identified aging effects for the system components, as opposed to periodic inspections, is provided in SER Section 3.7.1.3.1.

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On the basis of its review of the information provided in the LRA, ~~as~~ supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May ~~27~~ and ~~31~~, 2005, the staff found the applicant had identified appropriate AMPs for managing the aging effects of the Unit 1 gland seal water system components not incorporated in the wet layup program during the extended shutdown. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

Conclusion. On the basis of its review, the staff concluded that the applicant had adequately identified the aging effects and the AMPs credited for managing the aging effects for the Unit 1 gland seal water system components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

3.7.5.3 Steam and Power Conversion Systems in Various Dry Environments

3.7.5.3.1 Main Steam System

Technical Staff Evaluation. The technical staff reviewed the AMR of the main steam system (01) to determine whether the proposed aging management was adequate to address any potential aging during the extended shutdown of Unit 1. The main steam system is described in LRA Section 2.3.4.1. LRA Table 3.4.2.1 contains the AMR for the system for normal operation. LRA Section 3.0.1 and the applicant's February 19, 2004, submittal states that portions of Unit 1 main steam system are within the boundary of the BFN layup program. However, the portions of this system within the scope of license renewal are those that lack moisture controls and are considered moist air control components. The applicant's February 19, 2004, submittal describes the applicant's process for evaluating the effects of aging during the extended shutdown. The staff verified that the applicant identified all applicable AERMs during the extended shutdown and credited appropriate AMPs for managing the AERMs. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

Aging Effects. Table 4 of the February 19, 2004, submittal provides the AMR of the main steam system components within the scope of license renewal that were exposed to an air environment that lacked moisture controls. The component types include bolting, fittings, piping, restricting orifices, strainers, tubing, and valves.

The applicant's February 19, 2004, submittal identified air/gas (moist air) as the internal environment of the system, whereas the external environment was inside air.

For the Unit 1 main steam system components, the applicant identified the following materials, environments, and AERMs, where, because of the uncontrolled moist air, aging effects different from those requiring management during the period of extended operation were identified: aluminum alloy components in air/gas (internal) moist air environments are subject to loss of material due to crevice, galvanic, and pitting corrosion, as well as crack initiation/growth due to SCC ~~c~~ carbon and low-alloy steel components in air/gas (internal) moist air environments are

inspections. By letter dated October 8, 2004, the applicant stated that internal surface monitoring is performed in accordance with the One-Time Inspection Program described in the LRA Section B.2.1.29. The applicant noted that this is the same AMP proposed for managing internal aging effects of components exposed to moist air during the period of extended operation. The staff found the applicant's commitment to perform one-time inspections prior to restart to be acceptable, and RAI 3.0-7 LP is closed for the main steam system. The staff's discussion of the general adequacy of the One-Time Inspection Program in managing the identified aging effects, as opposed to periodic inspections of the system components is provided in SER Section 3.7.1.3.1.

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On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, January 31, 2005, May 27 and 31, 2005, the staff found the applicant identified appropriate AMPs for managing the aging effects of the Unit 1 main steam system components exposed to an environment that lacked moisture controls. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

Conclusion. On the basis of its review, the staff concluded that the applicant had adequately identified the aging effects, and the AMPs credited for managing the aging effects, for the Unit 1 main steam system components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

3.7.5.3.2 Condensate and Demineralized Water System

Technical Staff Evaluation. The technical staff reviewed the AMR of the condensate and demineralized water system (02) to determine whether the proposed aging management was adequate to address any potential aging during the extended shutdown of Unit 1. The condensate and demineralized water system is described in LRA Section 2.3.4.2. LRA Table 3.4.2.2 contains the AMR for the system for normal operation. LRA Section 3.0.1 and the applicant's February 19, 2004, submittal states that portions of Unit 1 condensate and demineralized water system are within the boundary of the BFN layup program. However, the portions of this system within the scope of license renewal lacked moisture controls and is, therefore, considered moist air. The applicant's February 19, 2004, submittal describes the applicant's process for evaluating the effects of aging during the extended shutdown. The staff verified that the applicant identified all applicable AERMs during the extended shutdown and credited appropriate AMPs for managing the AERMs. The staff also reviewed the applicable UFSAR supplements for the AMPs to ensure that the program descriptions adequately describe the AMPs.

Aging Effects. Table 4 of the February 19, 2004 submittal; provides the AMR of the condensate and demineralized water system components within the scope of license renewal that were exposed to an air environment that lacked moisture controls. The component types include bolting, condenser, expansion joint, fittings, piping, pumps, restricting orifices, tanks, tubing, and valves. In its submittal, the applicant. identified air/gas (moist air) as the internal environment of the system, whereas the external environment was inside air and outside air.

and Cast Iron and Cast Iron Alloy

Table 4, System 02 includes this

For the Unit 1 condensate and demineralized water system components, the applicant identified the following materials, environments and AERMs: copper-alloy components in air/gas (internal) moist air environments are subject to loss of material due to selective leaching, crevice corrosion, and pitting corrosion; aluminum alloy components in air/gas (internal) moist air environments are subject to loss of material due to crevice, galvanic, and pitting corrosion, as well as crack initiation/growth due to SCC; carbon and low-alloy steel components in air/gas (internal) moist air environments are subject to loss of material due to general, crevice, and pitting corrosion; carbon low-alloy steel components in inside air (external) or outside air (external) environments are subject to loss of material due to general corrosion; stainless steel components in air/gas (internal) moist air environments are subject to loss of material due to crevice corrosion and pitting corrosion; cast iron and cast iron alloys in air/gas (internal) moist air environments are subject to loss of material due to galvanic, general, crevice, and pitting corrosion, as well as selective leaching; no aging effects are identified for Copper-alloy components in inside air (external) environments; no aging effects are identified for aluminum alloy, ~~carbon and low-alloy steel~~ and stainless steel components in an inside air. (external) or outside air (external) environment; no aging effects are identified for polymer materials in an air/gas (internal) moist air or inside air (external) environment.

During its review, the staff determined that additional information was needed to complete its review.

In Table 4 of its February 19, 2004, submittal, the applicant identified galvanic corrosion for the cast iron and cast iron alloys in air/gas (internal) environments during the Unit 1 layup period, but not for the plant operating condition. In RAI 3.4-5 LP, the staff requested the applicant to explain the discrepancy. By letter dated October 8, 2004, the applicant stated that the cast iron valves and fittings within the scope of license renewal for both normal operation and Unit 1 layup are coupled with either carbon steel or aluminum. Due to cast iron being either equal to or greater than carbon steel or aluminum in galvanic series , galvanic corrosion is not a concern for the cast iron components within the scope of license renewal for the condensate and demineralized water system. The staff found the applicant's explanation to be acceptable, and RAI 3.4-5 LP is closed.

In RAI 3.4-6 LP, the staff requested the applicant to explain why galvanic corrosion was not identified as a potential aging mechanism for the copper-alloy components in the condensate and demineralized water system that are exposed to air/gas (internal) moist air environments. By letter dated October 8, 2004, the applicant stated that the copper-alloy fittings and valves within the scope of license renewal for the condensate and demineralized water system are not in contact with a more cathodic material such as stainless steel or nickel-based alloys. Therefore, galvanic corrosion is not a concern for the components of the condensate and demineralized water system during the period of extended operation. The staff found the applicant's explanation to be acceptable, and RAI 3.4-6 LP is closed.

On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19 and October 8, 2004, the staff concurred with the applicant's evaluation of the aging effects of the materials and environments associated with the condensate and demineralized water system during the extended shutdown. The staff did not identify any omitted aging effects. Therefore, the staff found that the applicant had identified the appropriate aging effects for the Unit 1 condensate and demineralized water system during the extended shutdown.

Aging Management Programs. After evaluating the applicant's identification of aging effects, the staff evaluated the AMPs to determine if they are appropriate for managing the identified aging effects from the extended shutdown. The staff also verified that the UFSAR supplement contains an adequate description of the program.

Table 4 of the applicant's February 19, 2004, submittal identifies the following AMPs for managing the aging effects described above for the condensate system and demineralized water system.

- Chemistry Control Program (B.2.1.5)
- Aboveground Carbon Steel Tanks Program (B.2.1.26)
- One-Time Inspection Program (B.2.1.29)
- Selective Leaching of Materials Program (B.2.1.30)
- Systems Monitoring Program (B.2.1.39)

SER Sections 3.0.3.2.2, 3.0.3.1.6, 3.0.3.1.7, 3.0.3.1.8, and 3.0.3.3.1, respectively, present the staff's detailed review of these AMPs.

During its review, the staff determined that additional information was needed to complete its review.

In Table 4 of the February 19, 2004, submittal, for the condensate and demineralized water system (02), no AMPs other than those identified above for the period of extended operation are noted for the extended outage. In RAI 3.4-5 LP, the staff requested the applicant to justify the basis for not performing inspections of the affected system components prior to restart. By letter dated October 8, 2004, the applicant stated that the one-time nspection described in the LRA will be performed prior to restart to verify the material condition. The staff found the applicant's commitment of performing one-time inspections prior to restart to be acceptable, and considers RAI 3.4-5 LP closed for this system. The staff's discussion of the general adequacy of the One-Time Inspection Program as opposed it periodic inspections for the system components is provided in SER Section 3.7.1.3.1.

On the basis of its review of the information provided in the LRA as supplemented by letters dated February 19 and October 8, 2004, and January 31, May ~~27~~ 18, and May ~~31~~ 27, 2005, the staff found the applicant identified appropriate AMPs for managing the aging effects of the Unit 1 condensate and demineralized water system components exposed to an environment that lacked moisture controls. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

Conclusion. On the basis of its review, the staff concluded that the applicant had adequately identified the aging effects, and the AMPs credited for managing the aging effects, for the Unit 1 condensate and demineralized water system components during the extended shutdown, so that there is reasonable assurance that the intended functions will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

The technical staff reviewed the applicant's AMR results for BFN containments, structures and component supports and reported its evaluation findings in SER Section 3.5. The staff also reviewed the containment and structural aspects of applicants's evaluation of the BFN Unit 1 Layup and Preservation Program, and determined that additional information was needed to complete its review.

The staff determined that BFN document titled, "Evaluation of the BFN Unit 1 LayUp and Preservation Program," including Tables 1 through 4, did not provide information related to BFN's evaluation of the Unit 1 spent fuel storage system layup effects. RAI 3.5-1 (related to Unit 1 layup issue) requested, by letter dated June 23, 2004, that the applicant describe the method adopted in assessing the Unit 1 spent fuel storage system related layup effects. The applicant was also asked to provide a discussion of the applicable spent fuel pool environments (any delta change in pool water chemistry, ambient humidity, and temperature, etc.), results of past periodic inspections of the spent fuel pool structural components and pool liners, any observed pool leakages or degraded conditions, and corrective actions taken to support BFN's conclusion that no layup effect is applicable to the Unit 1 spent fuel storage system.

By letter dated July 19, 2004, the applicant responded that:

> The Unit 1 spent fuel storage system was never placed in layup. The Unit 1 spent fuel storage system contains spent fuel and remained in service since Unit 1 was shut down and defueled in 1985. The Unit 1 spent fuel storage pool is located on elevation 664.0' of the Unit 1 reactor building. This area where the spent fuel pools are located is referred to as the refuel floor and is common for all three units (i.e., there are no physical barriers separating the spent fuel pools from the other units). Therefore the spent fuel pools are exposed to the same operating environments. The spent fuel storage pool chemistry is maintained in accordance with Technical Requirement Manual section TR 3.9.3 Spent Fuel Pool Water Chemistry.

The spent fuel pool storage system is in service and complies with all applicable license and regulatory requirements. The structural components of the Unit 1 spent fuel storage system are being monitored under the Maintenance Rule (Structures Monitoring Program) requirements, which are the same requirements as those for inspection of the Unit 2 and 3 spent fuel storage system. Plant procedure 0-TI-346 implements the requirements of the Maintenance Rule and contains the same performance criteria for all 3 units. The Maintenance Rule inspection results for Unit 1 spent fuel storage pool are consistent with the Maintenance Rule inspection results for Unit 2 and 3 spent fuel storage pools. The structural components of the Unit 1 spent fuel pool and the supporting equipment of the spent fuel pool storage system are all exposed to an environment that is consistent with the operating environments of the Units 2 and 3 spent fuel storage system. Any degraded condition discovered during system operation or as part of the Maintenance Rule Inspection of the Unit 1 spent fuel storage system is handled the same as for the Units 2 and 3 spent fuel storage systems. The BFN Corrective Action Program to address degraded conditions is SPP-3.1. The structural components of BFN spent fuel storage system are addressed in LRA Section 2.4.2.1.

The operating environment for the Unit 1 spent fuel storage system is consistent with the operating environments of the Units 2 and 3 spent fuel storage systems and the system has been maintained consistent with license and regulatory requirements and the plant corrective program. Therefore, there is no difference between the Unit 1 spent fuel storage system and

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those of Units 2 and 3. Since the system was not in layup, as described above, no layup effects are applicable to the Unit 1 system. This is the basis for not including the spent fuel storage system to the BFN document "Evaluation of the BFN Unit 1 Layup and Preservation Program."

The staff found the applicant's response, which is based on plant-specific structural configuration and operational experience, adequate and reasonable to support its assertion that no layup effects are applicable to the Unit 1 spent fuel storage system. Therefore, the RAI is considered closed.

In RAI 3.5-2 the staff requested the applicant to describe the approach used in evaluating the Unit 1 structures and component supports related layup effects. The staff also requested the applicant to provide a discussion of the environments applicable to Unit 1 structures and component supports (e.g., any exposure to aggressive chemicals or ponding of water, significant change in ambient humidity and temperature, etc.), results of past periodic inspections of the structures and component supports, any observed degraded conditions, and corrective actions taken to support BFN's conclusion that no layup effect is applicable to Unit 1 structures and component supports that require an AMR.

In its letter dated July 19, 2004, the applicant responded that:

> For Unit 1 structures and component supports, the external service environments defined in Table 3.0.2 of the LRA were used in the aging management review. An example of an environment is the "Inside Air" environment that is defined in Table 3.0.2 as "Atmospheric air, maximum average temperature 150°F, humidity up to 100 percent, potentially exposed to ionizing radiation, not exposed to weather." The range of interior temperatures, pressures, relative humidity, and radiation dose for the reactor building and primary containment are defined in calculations ND-Q1999-900031 (RIMS W78 030430 005), "Summary of Operational Environmental Conditions for Browns Ferry Nuclear Plant," ND-Q2999-880143 (RIMS R14 020723 105), "Summary of Harsh Environmental Conditions for Browns Ferry Unit 2" and NDQ3999- 910035 (RIMS R14 020723 104), "Summary of Harsh Environmental Conditions for Browns Ferry Unit 3." The interior temperatures, pressures, relative humidity, and radiation dose are shown on the Harsh Environmental Data Drawings 47E225 series for each unit. The environmental conditions defined in the referenced calculations are enveloped by the definition for "Inside Air" contained in Table 3.0.2, except for the area of the main steam tunnel located on elevation 565.0' of the Units 2 and 3 reactor buildings. The main steam tunnels during plant operation have an average area temperature of 160°F. This temperature occurs as a result of plant operation and has not been seen in the same area of the Unit 1 reactor building during plant lay-up. The Unit 1 lay-up environment is the same or bounded by the evaluated operating environments.
>
> The Unit 1 reactor building structure is subject to the Maintenance Rule SMP requirements. A baseline inspection for the BFN SMP was performed in 1997. All the same attribute inspections that were performed for Units 2 and 3 were performed for Unit 1. This inspection is documented in calculation CD-Q0303-970086 (RIMS R14 971105 102). LCEI-CI-C9, "Procedure for Walkdown of Structures for Maintenance Rule," was the procedure utilized to perform SMP inspections and requires the documentation of defects in accordance with the requirements of the procedure. There were two defects noted from the inspection of the Unit 1 reactor building, and these two defects were

noted as: (1) a personnel lock door that appeared to not be airtight and (2) rust was noted on some of the torus reinforcement steel between bays 12-13, 13-14, and 14-15. These defects were dispositioned as not affecting structural function. The SMP requires a reinspection on a five-year frequency. The 2002 SMP inspection is documented in calculation CDQO-303-2003-0260 (RIMS R14 030211 102). During the 2002 SMP inspections, there were four defects noted from the inspection of the Unit 1 reactor building and which were dispositioned as not affecting structural function. These four defects were noted as: (1) a concrete pad at the floor around conduit was chipped, (2) DELETE bolt missing from angle securing ~~E-2~~ structural plate partition wall to the concrete floor, (3) in the southwest comer of a stairwell, mortar was missing at one end of the masonry block, and (4) some concrete deterioration was noted in bay 7 of the torus area (work in progress to repair the area was noted from walkdown). These defects noted from the two inspection periods can be categorized as isolated conditions and do not represent an adverse trend that will affect the functionally of structural components.

The component supports located in Unit 1, except for those that are required for Unit 2 or Unit 3 system operation, are not subject to periodic inspections during the shutdown period. All component supports for safety-related systems required for Unit 1 operation are to be inspected and existing configurations confirmed as part of the Unit 1 recovery effort. The following plant procedures (walkdown instructions [WI]), are utilized: WI-BFN-0-CEB-01 was used for piping and supports, WI-BFN-0-CEB-02 was used for structural items, and WI-BFN-0-GEN-01 was used for both piping/supports and structural steel as a general walkdown procedure. Additionally, the following procedures were used to document baseline configurations for other component supports:

WI-BFN-0-CEB-03 - Small Bore Piping
WI-BFN-0-CEB-04 - Seismic Verification of A46 and IPEEE
WI-BFN-0-CEB-05 - Pipe Rupture/HELB
WI-BFN-0-CEB-06 - Seismically Induced Water Spray

The inspections would document as-built configurations or existing plant configurations that did not conform to the acceptance criteria defined in the WI. These configurations would be evaluated to design criteria requirements. If the evaluations determined that the configuration did not meet the design criteria requirement, a plant modification would be designed and issued under the plant work control process.

An electronic search of the site Corrective Action Program for PERs was performed to identify any adverse conditions with component supports. The search did not result in the identification of any adverse conditions.

The environment for the Unit 1 structures and component supports is consistent with the operating environments of the Units 2 and 3 structures and component supports; therefore, there is no difference in the Unit 1 structures and component supports from Units 2 and 3 and no lay-up affects are applicable to Unit 1.

The staff found the above response very plant-specific and reasonably detailed to justify the applicant's assertion that the environment of the Unit 1 structures and component supports is consistent with the operating environments of the Units 2 and 3 structures and component

supports; therefore, no layup effects are applicable to Unit 1 structures and component supports. RAI 3.5-2 (related to Unit 1 layup issue) is considered resolved.

In RAI 3.5-3, the staff pointed out that, when the plant is operating, the containment drywell, torus, and connecting vent assemblies are subjected to a relatively inert environment, and all the requirements related to their inspections, and leak-rate testing are applicable. These requirements ensure the leak tight and structural integrity of these components. Also, industry operating experience problems, as reflected in NRC's generic letters, information notices, and other industry published event reports are considered applicable. These activities may or may not have been considered for Unit 1 during its long layup. In this context, the applicant was requested to provide information that would describe the benchmark condition of the containment pressure boundary related components prior to restart of the unit, and actions that will be taken prior to the extended period of operation. The relevant regulatory requirements are 10 CFR 50,55a, and Appendix J of 10 CFR 50. The relevant generic letters are GL 87-05, GL 89-16, and GL 98-05. The relevant information notices are IN 86-99, IN 88-82, IN 89-06, IN 89-79, and IN 92-20.

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In its letter dated July 19, 2004, the applicant responded that, for the Unit 1 containment drywell and torus, the environment during the extended outage was the same as or bounded by the evaluated operating unit environments. LRA Table 3.0.2 describes the containment environment for the drywell and torus that was used in the AMR as "Atmospheric air, maximum average temperature 150 °F, humidity up to 100 percent, potentially exposed to ionizing radiation, not exposed to weather." The applicant pointed out that "Inerting was not credited for elimination of aging effects requiring aging management, and that the Unit 1 containment environment associated with temperature and ionizing radiation are not as severe as the evaluated (operating) environment conditions." The torus was subject to the torus water environment during the shutdown period. The torus was subsequently drained and is being refurbished as part of the Unit 1 recovery effort.

On the subject of containment inspections, and leak-rate testing, the applicant stated that 100 percent of the examinations required in Examination Categories of Table IWE-2500-1 for the First Inspection Interval will be completed as pre-service exams before Unit 1 restarts except those that may be excluded by 10 CFR 50.55a and except where specific written relief has been granted by the staff. The requirements of ASME Section XI In-Service Inspection Subsection IWE, 1992 Edition with the 1992 Addendix will be implemented on Unit 1. Type A, B and C leak rate testing required by 10 CFR 50 Appendix J will also be performed prior to Unit 1 restart.

In addition, the applicant addressed the relevant information notices and generic letters as follows:

NRC GL 87-05: Request Additional Information Assessment - Degradation of Mark I Drywells

The applicant provided the staff with the results of the ultrasonic testing for corrosion degradation of the drywell liner plate, RIMs No. L44 880830 801, dated August 30, 1988. The results of the ultrasonic testing state that each unit's drywell was ultrasonically tested near the sand cushion area during 1987. The results from these tests showed that the nominal thickness was maintained on each drywell. On Unit 1, no reading below the nominal thickness of one inch was measured, indicating that the integrity of the drywell liner plate was maintained.

ADD NRC GL 98-05

NRC GL 89-16: Installation of a Hardened Wet Well Vent

BFN will be installing the hardened well vent as part of the Unit 1 recovery effort. This generic letter does not address aging effects or aging management considerations.

NRC IN 86-99: Degradation of Steel Containments
See response to Generic letter 87-05

NRC IN 88-82: Torus Shells with Corrosion and Degraded Coatings on BWR Containments. In 1983, Engineering Change Notice (ECN) P0555 was issued to completely inspect and recoat the torus as necessary. The Unit 1 work was completed on this ECN.

NRC IN 89-06: Bent Anchor Bolts in Boiling Water Reactor Torus Supports. Based on the configuration of the BFN torus supports, it has been determined that BFN tie down bolts would not be subject to the effects that occurred at plant Hatch. This information notice does not address aging effects or aging management considerations.

NRC IN 92-20: Inadequate Local Leak Rate Testing. The vent line bellows at BFN are of a different design (single-ply bellows) than the Quad Cities bellows identified in IN 92-20. The design of the BFN penetration bellows allows full pressure to be transmitted to all portions of the bellows during Appendix J testing.

In addition to the above information, the applicant addressed the staff's RAIs related to the Unit 1 primary containment during the AMR of other two units. They are discussed in SER Section 3.5.

On the basis of its review of the information provided in the LRA, as supplemented by letters dated February 19, 2004, and a telephone conference held between the staff and the applicant on April 14, 2004, the staff found that the applicant identified appropriate AMPs for managing the aging effects of the Unit 1 containment, structures and component supports during the extended shutdown. In addition, the staff found the program descriptions in the UFSAR supplement acceptable.

3.7.6.3 Conclusion

On the basis of its review, the staff concluded that the applicant had adequately identified the aging effects and the AMPs credited for managing the aging effects for the Unit 1 containment, structures and component supports during the extended shutdown, so that there is reasonable assurance that the intended functions of these Unit 1 structural components will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.29(a).

The staff also reviewed the applicable UFSAR supplement program descriptions and concluded that the UFSAR supplement provides an adequate description of the AMPs credited for managing aging in these components, as required by 10 CFR 54.21(d).

analysis (EMA) methodology described in General Electric (GE) NEDO-32205-A, "10 CFR 50 Appendix G Equivalent Margin Analysis for Low Upper-Shelf Energy in BWR-2 through BWR-6 Vessels," which has been approved by the staff. According to the applicant, this analysis confirmed that an adequate margin of safety against fracture, equivalent to 10 CFR 50, Appendix G requirements, does exist. The EOL USE calculations satisfy the criteria of 10 CFR 54.3(a). As such, these calculations are a TLAA.

The RVs were originally licensed for 40 years with an assumed neutron exposure of less than 10^{19} n/cm^2 (E > 1.0 MeV). The CLB calculations use calculated fluences that are lower than this limiting value. The applicant stated that the design basis value of 10^{19} n/cm^2 bounds calculated fluences for the original 40-year license term for each unit. The tests performed on RV materials provided limited Charpy impact data. It was not possible to develop original Charpy impact test USE values using the methods of 10 CFR Part 50, Appendix H and ASTM E23, "Methods for Notched Bar Impact Testing of Metallic Materials," invoked by 10 CFR Part 50 Appendix G. Therefore, alternative methods approved by the staff in NEDO-32205-A were used to demonstrate compliance with the 10 CFR Part 50, Appendix G USE requirement.

Fluences were calculated for the RVs for the extended 60-year [54 EFPY (Effective Full-Power Year) for Unit 1; 52 EFPY for Units 2 and 3] licensed operating periods, using the methodology of NEDC-32983P, "General Electric Methodology for Reactor Pressure Vessel Fast Neutron Flux Evaluation," which was approved by the staff in an SER dated September 14, 2001. The applicant used bounding fluence calculation, for each unit which included an extended power uprate[1] (EPU). The applicant provided the results for one bounding calculation for each RV and determined the peak surface fluence of 1.95×10^{18} n/cm^2 and peak 1/4*t* fluence of 1.35×10^{18} n/cm^2 for Unit 1 vessel, and peak surface fluence of 2.3×10^{18} n/cm^2 and peak 1/4*t* fluence of 1.59×10^{18} n/cm^2 for Units 2 and 3 vessels. Peak fluences were calculated at the vessel inner surface (inner diameter), for purposes of evaluating USE. The value of neutron fluence was also calculated for the 1/4*t* location into the vessel wall measured radially from the inside diameter using Equation 3 from Paragraph 1.1 of RG 1.99, Revision 2. This 1/4*t* depth is recommended in the ASME Section XI, Appendix G, subarticle G-2120 as the maximum postulated defect depth. The applicant evaluated the EOL USE by an EMA using the 54 EFPY calculated fluence for Unit 1 and the 52 EFPY calculated fluence for Units 2 and 3. As documented in the staff's SER, BWRVIP-74-A provided a generic EMA which demonstrated that BWR/3-6 plates and BWR/2-6 welds showing that percentage of reductions in USE of equal to or less than 23.5 percent and 39 percent, respectively, would meet the requirements of 10 CFR Part 50, Appendix G. The applicant provided results of the EMA for limiting welds and plates on the three RVs, which are summarized in LRA Tables 4.2.1.1 through ~~4.2.1.~~ 4.2.1.6. The applicant stated that the results are acceptable because the limiting USE percentage drop is less than the BWRVIP-74-A percentage drop acceptance criterion in all cases.

4.2.1.2 Staff Evaluation

Appendix G to 10 CFR Part 50, Section IV.A.1 requires, in part, that the RPV beltline materials have Charpy USE values in the transverse direction for base metal and along the weld for weld material of no less than 50 ft-lb, unless it is demonstrated in a manner approved by the Director,

[1]TVA by letter dated January 7, 2005, agreed to decouple the power uprate licensing request from License Renewal Application.

10 CFR 54.21(c)(1)(ii) and that the safety margins established and maintained during the current operating term will be maintained during the periods of extended operation as required by 10 CFR 54.21(c)(1). The staff also concluded that the UFSAR supplement contains an appropriate summary description of the TLAA on ART calculations for the period of extended operation, as required by 10 CFR 54.21(d).

4.2.3 Reflood Thermal Shock Analysis of the Reactor Vessel

4.2.3.1 Summary of Technical Information in the Application

The applicant stated that UFSAR Section 3.3.5 includes an EOL thermal shock analysis performed on the RVs for a design basis loss of coolant accident (LOCA) followed by a LPCI system initiation. The effects of embrittlement assumed in this thermal shock analysis will change with an increase in the licensed operating period. The applicant stated that this analysis satisfies the criteria of 10 CFR 54.3(a). As such, this analysis is a TLAA.

For the current operating period, a thermal shock analysis was originally performed on the RV components. The analysis assumed a design basis LOCA followed by LPCI system initiation and accounted for the full effects of neutron embrittlement at the end of the current license term of 40 years. The current analysis assumes EOL material toughness, which in turn depends on EOL ART values. The critical location for fracture mechanics analysis is at one quarter of the vessel thickness (from the inside, 1/4*t*). For this event, the peak stress intensity occurs approximately 300 seconds after the LOCA. The applicant stated that the analysis shows that 300 seconds into the thermal shock event, the temperature of the vessel wall at 1.5 inches deep (which is 1/4*t*) is approximately 400 °F. The ART values, described in LRA Section 4.2.2 and tabulated in Table 4.2.2.1, list the ART values for the limiting weld metal of the RVs. The highest calculated RV beltline material ART value is 167.7 °F (Unit 1). Using the equation for K_{Ic} presented in ASME Section XI Appendix A and the maximum ART value, the material reaches upper shelf (a K_{Ic} value of 200 ksi in) at 272 °F, which is well below the 400 °F, 1/4*t* temperature predicted for the thermal shock event at the time of peak stress intensity. Therefore, the applicant claimed that the projected analysis is valid for the period of extended operation.

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4.2.3.2 Staff Evaluation

The analysis assumes EOL material toughness, which in turn depends on EOL ART. The critical location for fracture mechanics analysis is at the 1/4*t* location. For the reflood thermal shock analysis of the RV, the peak stress intensity occurs at approximately 300 seconds after the LOCA. At that time, the temperature at 1/4*t* is approximately 400 °F, which is much higher than the 54 EFPY ART value167.7 °F for the limiting material of all the three BFN vessels. Therefore, the staff concurred with the applicant that the revised thermal shock analysis of the BFN vessels is valid for the period of extended operation because the ART for the limiting beltline plate material is 167.7 °F for Unit 1, which is below the 400 °F at 1/4*t* temperature predicted for the thermal shock event at the time of peak stress intensity. The reflood thermal shock analysis is, therefore, bounding and valid for the period of extended operation.

Fluence (n/cm^2, E>1MeV)	Test Temperature (°F)	Reduction in Area (%)
1 x 10^{21}	550	40
6.9 x 10^{21}	750	52.5

Elongation

Material	Fluence n/cm^2, (E>1MeV)	Test Temperature (°F)	Elongation (%)
Base	8 X 10^{21}	554	20
Weld	8 X 10^{21}	567	4

The applicant stated that the bounding shroud fluence (Unit 1) is 5.34 x 10^{21} n/cm^2 (E >1 MeV) for BFN, and the listed ductility values bound all three BFN shrouds. As described in LRA Section 4.2.4, the maximum thermal shock stress results in a calculated thermal shock strain amplitude of 0.57 percent. Both reduction in area and elongation values, which are values at failure, are significantly in excess of the calculated thermal shock strain at the most irradiated location. While the analysis indicates that either measure of ductility is acceptable for the period of extended operation, reduction in area is a more appropriate measure of ductility for the reflood thermal shock event. The strain associated with the reflood thermal shock event is very localized and is constrained by the surrounding bulk material. As such, it is similar to the triaxial stress condition present in the neck region (where the area reduction is taking place) during a tensile test. The percentage reduction in area is a measure of this triaxial stress state and, as such, is the most appropriate property for evaluating the effect of thermal shock on the RV core shroud. This staff position was previously approved for Dresden and Quad Cities LRA SER (NUREG-1796). The staff concluded that the thermal shock strain associated with the LOCA is less than the reduction in area or elongation, which would be expected to fail the shroud at the highest fluence point. Therefore, the staff concluded that the core shroud will have sufficient ductility during the reflood thermal shock transient during the period of extended operation. The staff accepts the applicant's analysis for the BFN units.

4.2.4.3 UFSAR Supplement

As required by 10 CFR 54.21(d), applicants for license renewal must include a UFSAR supplement summary description of the "programs and activities for managing the effects of aging and the evaluation of TLAA for the period of extended operation." The applicant provided UFSAR supplement summary description of reflood thermal shock analysis of the RV core shroud in LRA Section A. On the basis of its review, the staff concluded that the UFSAR supplement summary adequately describes the TLAA on reflood thermal shock analysis of the RV core shroud and is, therefore, acceptable.

4.2.4.4 Conclusion

The staff reviewed the applicant's TLAA on reflood thermal shock analysis of the RV core shroud and the applicant's responses to the RAIs and concluded that the applicant has demonstrated that the calculated thermal shock strain at the most irradiated portion of the core shroud is acceptable. The staff also accepted the applicant's conservative methodology in

B31.1 requires the application of a stress reduction factor to the allowable thermal stress range if the number of full range cycles exceeds 7000.

The applicant indicated that the assumed thermal cycle count for the analyses can be approximated by the thermal cycles used in the reactor vessel fatigue analysis. These thermal cycles are listed in UFSAR Section 4.2.5. The total count of all these listed thermal cycles is fewer than 1100 over the 40-year plant life. For the 60-year extended operating period, the number of assumed operating cycles would be increased to ~~2200,~~ considerably fewer than the 7000 cycle threshold in USAS B31.1. In accordance with 10 CFR 54.21(c)(1)(i), the applicant concluded that the existing piping analyses within the scope of licence renewal will remain valid for the period of extended operation.

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4.3.3.2 Staff Evaluation

The staff reviewed the technical information in LRA Section 4.3.3, pertaining to the fatigue analysis of piping and components. The applicant indicated that the RCPB and non-RCPB piping and components at BFN, within the scope of license renewal, were designed to USAS B31.1-1967. Although this Code does not require explicit fatigue analysis, it considers fatigue implicitly in the design calculations by applying a stress range reduction factor to the allowable thermal stress range, which depends on the number of design thermal expansion cycles. The staff, therefore, concurred with the applicant that qualifications of piping to this code are considered as TLAAs, in accordance with the provisions of 10 CFR 54.21(c)(1).

In the application of USAS B31.1-1967, the applicant approximated the number of thermal expansion cycles over a 40-year plant life by the thermal cycles used in the reactor vessel fatigue analysis. These thermal cycles are listed in UFSAR Section 4.2.5. For a 60-year plant life, the total count of all significant full thermal cycles was determined as fewer than 1650, which is substantially less than the 7000-cycle full thermal stress range limit in USAS B31.1. The staff concurred with the applicant that an adequate margin of safety for the RCPB and non-RCPB systems will be maintained for the period of extended operation, because the projected number of thermal operating cycles to the end of the period of extended operation is fewer than the design cycle limit of 7000 cycles, and the stress range limits in the current piping calculations therefore remain valid. The staff, therefore, concurred with the applicant that the existing piping analyses, within the scope of license renewal, will remain valid for the period of extended operation in accordance with 10 CFR 54.21(c)(1)(i).

In accordance with 10 CFR 54.21(d), the applicant's supplement for the UFSAR regarding the piping and component fatigue analyses is provided in LRA Section A.3.2.3. The staff reviewed this supplement and found it acceptable because it provides a reasonable summary of the information presented in LRA Section 4.3.3.

4.3.3.3 UFSAR Supplement

As required by 10 CFR 54.21(d), applicants for license renewal must include a UFSAR supplement summary description of the "programs and activities for managing the effects of aging and the evaluation of TLAA for the period of extended operation." The applicant provided UFSAR supplement summary description of piping and component fatigue analysis in LRA Section A.3.2.3. On the basis of its review, the staff concluded that the UFSAR supplement

summary adequately describes the piping and component fatigue TLAA and is, therefore, acceptable.

4.3.3.4 Conclusion

The staff reviewed the applicant's piping and component fatigue TLAA, as summarized in LRA Section 4.3.3, and determined that the metal fatigue assessments at BFN Units 1, 2, and 3 will continue to comply with the staff's requirements throughout the period of extended operation. The staff therefore concluded that the applicant's piping and component fatigue TLAA meets the requirements of 10 CFR 54.21(c)(1)(ii), and that the safety margins established and maintained during the current operating term will be maintained during the period of extended operation, as required by 10 CFR 54.21(c)(1). The staff also concluded that the UFSAR supplement contains an appropriate summary description of the piping and component fatigue TLAA for the period of extended operation, as required by 10 CFR 54.21(d).

4.3.4 Effects of Reactor Coolant Environment On Fatigue Life of Components and Piping (Generic Safety Issue 190)

4.3.4.1 Summary of Technical Information in the Application

In LRA Section 4.3.4, "Effects of Reactor Coolant Environment on Fatigue Life of Components and Piping (Generic Safety Issue 190)," the applicant described the actions taken to address the issue of environmentally assisted fatigue. Generic Safety Issue (GSI) 190 addresses the effects of reactor coolant environment on the fatigue life of components and piping. Although GSI 190 is resolved, SRP-LR Section 4.3.1.2 states that for licence renewal, the applicant's consideration of the effects of coolant environment on component fatigue life is an area of review.

The applicant stated that plant-specific calculations were performed for the following fatigue sensitive component locations, identified in NUREG/CR 6260 for older-vintage BWRs:

- reactor vessel shell and lower head
- reactor vessel feedwater nozzle
- reactor recirculation piping (outlet and inlet nozzles)
- core spray system (nozzle and safe end)
- RHR line Class 1 piping
- feedwater line Class 1 piping

The applicant stated that for each location listed above, detailed environmental fatigue calculations for 60 years were performed using the appropriate F_{en} relationships from NUREG/CR 6583 "Effects of LWR Coolant Environments on Fatigue Design Curves of Carbon and Low-Alloy Steels," for carbon and alloy steels, and the appropriate F_{en} relationships from NUREG/CR 5704 "Effects of LWR Coolant Environments on Fatigue Design Curves of Austenitic Stainless Steels," for stainless steel, as appropriate for the material. These evaluations are consistent with the recommendations in SRP-LR Section 4.3.2.2 for addressing the effects of the reactor coolant environment by assessing the effects on a sample of critical components. The 60-year CUF for the reactor recirculation piping was determined as ~~4.161~~ and the 60-year CUF for the feedwater line Class 1 piping was calculated as 1.489. In accordance with 10 CFR 54.21(c)(1)(iii), the applicant stated that all necessary plant transients will be

4.181

established by CMAA 70. Therefore, fatigue life is not significant to the operation of this equipment, and the analysis is valid for the period of extended operation. The applicant provided a satisfactory validation of 10 CFR 54.21(c)(1)(i). The staff also reviewed the UFSAR Supplement A.3.5.1 and determined that the UFSAR Supplement includes an appropriate summary description of the reactor building crane load cycles TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d).

4.7.1.3 UFSAR Supplement

As required by 10 CFR 54.21(d), applicants for license renewal must include a UFSAR supplement summary description of the "programs and activities for managing the effects of aging and the evaluation of TLAA for the period of extended operation." The applicant provided UFSAR supplement summary description of reactor building crane load cycles in LRA Section A.3.5.1. On the basis of its review, the staff concluded that the UFSAR supplement summary adequately describes the TLAA on reactor building crane load cycles and is, therefore, acceptable.

4.7.1.4 Conclusion

On the basis of its review, the staff concluded that the applicant has provided an acceptable demonstration, pursuant to 10 CFR 54.21(c)(1)(i) that the analyses remain valid for the reactor building crane load cycles TLAA. The staff also concludes that the UFSAR supplement contains an appropriate summary description of the reactor building crane load cycles TLAA evaluation for the period of extended operation, as required by 10 CFR 54.21(d). Therefore, the staff has reasonable assurance that the safety margins established and maintained during the current operating term will be maintained during the period of extended operation, as required by 10 CFR 54.21 (c)(1).

In a letter dated June 15, 2005 the applicant provided additional information

4.7.2 Corrosion – Flow Reduction

remove CR

LRA Section 4.7.2 originally considered a design calculation ~~that addresses concerns whether~~ the flow reduction due to corrosion in carbon steel piping used in raw water systems is a TLAA. The functional basis for determining the acceptability is based on periodic flow testing as described in the Technical Instruction 0-TI-~~175~~ 171 RHRSW Sump Pump Flow Test, Surveillance Instruction 0-SI-4.5.C.1(4) ~~SI-4.5.C (series)~~ EECW System Annual Flow Rate Test, Surveillance Instruction ~~SI-4.5.C (series)~~ 1/2/3 - SI-4.5.C.1(3) RHRSW Pump and Header Operability and Flow Test, and Surveillance Instructions ~~SI-4.11 (series)~~ 0-SI-4.11.B.1.g for Fire Protection Piping. Based on its further review, the applicant determined that the calculation should not be considered to be a TLAA; therefore, this section is deleted from the application.

4.7.3 Dose to Seal Rings for the High Pressure Coolant Injection and Reactor Core Isolation Cooling Containment Isolation Check Valves

Although this TLAA was included in the initial LRA, the applicant by its letter dated June 9, 2005, made a review of the safety determination per 10 CFR 54.3, and stated as follows:

> LRA Section 4.7.3 originally considered a design calculation that determines the dose to seal rings on the high-pressure coolant injection system and reactor core isolation

GE's analysis, and the fact that a single failure at this location has no safety consequence, was that no inspection was necessary to manage IASCC in top guide grid beams.

The staff was concerned that multiple failures of the top guide grid beams are possible when the threshold fluence for IASCC is exceeded. According to BWRVIP-26, multiple cracks have been observed in top guide beams at Oyster Creek Nuclear Power station. In order to exclude the top guide grid beams from inspection when their fluence exceeds the threshold value, it must be demonstrated that failure of all beams that exceed the threshold fluence will not impact the safe shutdown of the reactor during normal, upset, emergency, and faulted conditions. If this cannot be demonstrated, then an inspection program to manage this aging effect to preclude loss of component intended function is required.

In its response, by letter dated January 31, 2005, the applicant indicated that LRA Section 4.7.6 considered the fluence at the top guide as a TLAA. The applicant manages this TLAA with the Chemistry Control Program and the BWRVIP. The BWRVIP implements the requirements of NRC-accepted BWRVIP-26. The NRC letter to Carl Terry, BWRVIP Chairman, dated June 10, 2003, states the following: "The staff believes that a comprehensive evaluation of the impact of IASCC and multiple failures of the top guide beams is necessary, and that an inspection program for top guide beams for all BWRs should be developed by the BWRVIP to ensure that all BWRs can meet the requirements of 10 CFR Part 54 throughout the period of extended operation." The applicant made a commitment, as part of the BWRVIP, to work to resolve these issues generically. When resolved, the applicant will follow the BWRVIP recommendations resulting from that resolution. Prior to the period of extended operation, the applicant will develop a site-specific inspection program, if necessary, to manage the effects of IASCC in the top guide.

The staff determined that the applicant was required to submit, for NRC review and approval, a site-specific AMP that addresses potential multiple failures of the top guide grid beams. The applicant, in its response dated May 25, 2005, indicated that it will perform inspections of the guide beams similar (in inspection methods, scope and frequency of inspection) to the inspections specified in the BWRVIP-47, "BWR Lower Plenum Inspection and Flaw Evaluation Guidelines," for the control rod guide tube components. The applicant stated that the extent of examination and its frequency will be based on a ten percent sample of the total population, which includes all grid beam and beam-to-beam crevice slots, within 12 years and five percent of the population is to be completed within six years. The applicant stated that ~~it will~~ the program to inspect the top guide grid beams will be implemented prior to the end of the current license period. The sample locations selected for examination will be in areas that are exposed to highest neutron fluence. The staff finds this response acceptable because it defines a representative population of IASCC susceptible locations, and selects locations in the top guide that are exposed to the highest neutron fluences. In addition, the proposed inspection requirements were previously accepted by the staff in the SE related to the license renewal of Peach Bottom Atomic Power Station, Units 2 and 3. The staff considered this RAI resolved.

<u>Core Shroud</u> - In addition to the implementation of the ASME Section XI, Subsections IWB, IWC, and IWD Inservice Inspection Program, Chemistry Control Program, and BWR Vessel Internals Program, the applicant committed to implement the inspection guidelines of BWRVIP-76 "Boiling Water Reactor Core Shroud Inspection and Flaw Evaluation Guidelines." The staff's review of this report is not complete. The applicant proposed to evaluate the staff SER and complete SER action items. The staff requested that the applicant make a

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
1. Accessible Non-Environmental Qualification Cables and Connections Inspection Program	A new program will be developed that is consistent with the program described in NUREG-1801 Section XI.E1 evaluation.	A.1.1	• Prior to the period of extended operation	• LRA Section B.2.1.1
2. Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program	The portion of the program that manages LPRM cable system aging will credit existing Technical Specification requirements and, with the exceptions specified in the LRA, will meet the intent of the program described in NUREG-1801 Section XI.E2.	A.1.2	• Ongoing	• LRA Section B.2.1.2 • Response to follow-up to RAI 2.5-2 dated March 2, 2005
	The portion of the program that manages IRM cable system aging will be a new program at BFN and will be consistent with the program described in NUREG-1801 Section XI.E2.		• Prior to the period of extended operation	• LRA Section B.2.1.2 • Response to follow-up to RAI 2.5-2 dated March 2, 2005
3. Inaccessible Medium Voltage Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Program	A new program will be developed that is consistent with the program described in NUREG-1801 Section XI.E3 to manage the medium-voltage cables to the Residual Heat Removal Service Water pumps.	A.1.3	• Prior to the period of extended operation	• LRA Section B.2.1.3 • Response to RAI 3.6-3(a) dated December 9, ~~2005~~ 2004
	Annually inspect for water collection for in-scope cable manholes and conduit.		• Prior to the period of extended operation	• Response to follow-up RAI 3.6-3 dated January 18, 2005
4. ASME Section XI Inservice Inspection Subsections IWB, IWC, and IWD Program	The existing program is credited.	A.1.4	• Ongoing	• LRA Section B.2.1.4

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
12. Boiling Water Reactor Vessel Internals Program	The existing program is credited for Units 2 and 3.	A.1.12	• Ongoing	• LRA Section B.2.1.12
	Inspection will be performed of the top guide beams with examination extent and frequency similar to the CRD guide tube (BWRVIP-47) examination requirements. The sample will emphasize the components exposed to the highest fluence. The method of examination will be EVT-1. TVA reserves the right to modify the above agreed upon inspection program should BWRVIP-26 be revised in the future. Any changes, however, will not be final until a Safety Evaluation is issued by the NRC for the revised BWRVIP-26.		• Prior to the period of extended operation	• Response to NRC Question (3) dated May 25, 2005
12. Boiling Water Reactor Vessel Internals Program (continued)	The steam dryers have been added to the scope of license renewal. The aging management review will be completed and an aging management program will be established for the steam dryers. The aging management program will be the NRC approved BWRVIP Steam Dryer Inspection and Evaluation Guidelines. If the BWRVIP Steam Dryer Inspection and Evaluation Guidelines are not approved by the NRC, then a plant specific aging management program will be submitted to the NRC for review and approval two years before the first BFN unit enters the period of extended operation.		• Two years before the first BFN unit enters the period of extended operation	• Response to RAI 3.1-1 dated January 31, 2005

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TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
12. BWR Vessel Internals Program (continued)	Enhance the Reactor Pressure Vessel Internals Inspection (RPVII) Units 1, 2, and 3 procedure to require visual inspection of the AHCs and inspection of the AHCs welds by UT unless tooling constraints prohibit performance of a UT. In the event tooling constraints prohibit inspection by UT during the period of extended operation, NRC approval will be requested to substitute an EVT-1 inspection.	add line	• Two years before the first BFN unit enters the period of extended operation	• Response to RAI B.2.1.12-1(C) dated January 31, 2005 • Response to NRC Question (7) dated May 25, 2005
12. Boiling Water Reactor Vessel Internals Program (continued)	The BFN jet pump nozzle and forged integral portion of the thermal sleeve are type 316NG stainless steel. The BWR Reactor Vessel Internals Program implements the inspection requirements for weld TS-2. As noted in Table 3.3-1 of BWRVIP-41, the TS-2 weld is currently inaccessible and is not inspected. BFN will implement the inspection technique for this weld that the BWRVIP Inspection Committee is developing when available.		• BFN will implement the inspection technique for weld TS-2 that the BWRVIP Inspection Committee is developing, when available.	• Response to Question (12) dated May 25, 2005
13. Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program	**DELETED**	A.1.13	• **DELETED**	• LRA Section B.2.1.14 • Response to RAI 3.1.2.2-9 dated January 31, 2005

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
14. Flow-Accelerated Corrosion Program	The existing program is credited for Units 2 and 3.	A.1.14	• Ongoing	• LRA Section B.2.1.15
15. Bolting Integrity Program	The existing program is credited.	A.1.15	• Ongoing	• LRA Section B.2.1.16
16. Open-Cycle Cooling Water System Program	The existing program is credited for Units 2 and 3.	A.1.16	• Ongoing	• LRA Section B.2.1.17
17. Closed-Cycle Cooling Water System Program	The existing program is credited for Units 2 and 3.	A.1.17	• Ongoing	• LRA Section B.2.1.18
18. Inspection of Overhead Heavy Load and Light Load Handling Systems Program	The existing program is credited.	A.1.18	• Ongoing	• LRA Section B.2.1.20
19. Compressed Air Monitoring Program	The existing program is credited for Units 2 and 3.	A.1.19	• Ongoing	• LRA Section B.2.1.21
	This program will be enhanced to incorporate guidelines in ASME OM-S/G-2000, Part 17; ANSI/ISA-S7.0.01-1996; and EPRI TR 108147		• Prior to the period of extended operation	• LRA Section B.2.1.21
20. BWR Reactor Water Cleanup System Program	The existing program is credited for Units 2 and 3.	A.1.20	• Ongoing	• LRA Section B.2.1.22
21 Fire Protection Program	The existing program is credited for Units 2 and 3.	A.1.21	• Ongoing	• LRA Section B.2.1.23

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
22. Fire Water System Program	The existing program is credited.	A.1.22	• Ongoing	• LRA Section B.2.1.24
	This program will be enhanced by making the following changes: BFN will perform flow tests or non-intrusive examinations to identify evidence of loss of material due to corrosion.		• Before entering the period of extended operation	• LRA Section B.2.1.24
22. Fire Water System Program (continued)	BFN will perform sprinkler head inspections before the end of the 50-year sprinkler head service life and at 10-year intervals thereafter during the period of extended operation to ensure that signs of degradation, such as corrosion, are detected in a timely manner.		• Prior to exceeding the 50-year service life for any sprinkler	• LRA Section B.2.1.24
23. Aboveground Carbon Steel Tanks Program	The existing program is credited.	A.1.23	• Ongoing	• LRA Section B.2.1.26
24. Fuel Oil Chemistry Program	The existing program is credited.	A.1.24	• Ongoing	• LRA Section B.2.1.27
25. Reactor Vessel Surveillance Program	The existing program is credited.	A.1.25	• Ongoing	• LRA Section B.2.1.28
	Enhance the Integrated Surveillance Program (ISP) for the license renewal period (in accordance with proposed BWRVIP-116); it will be implemented when approved by the NRC.		• Prior to the period of extended operation	• LRA Section B.2.1.28

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TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

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Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
Reactor Vessel Surveillance Program (continued)	BFN will implement either BWRVIP-116, as approved by the staff, or if the ISP is not approved two years prior to the commencement of the license renewal period, a plant-specific surveillance program for each BFN unit will be submitted to the NRC that ensures the BFN Unit 1, Unit 2, and Unit 3 reactor vessels meet the requirements of 10 CFR 50 Appendix H.		• Two years prior to the commencement of the license renewal period	• Response to RAI B.2.1.28-1(A) dated January 31, 2005 • Response to Question (9) dated May 25, 2005
25. Reactor Vessel Surveillance Program (continued)	The BFN, Units 1 and 3 surveillance capsules (standby capsules) will remain in place and will continue to be irradiated during plant operation, including the period of extended operation. Therefore, the BFN, Units 1 and 3 irradiated material samples continue to remain available to the ISP, if needed. If any surveillance capsules are removed without the intent to test them, these capsules will be stored in manner which maintains them in a condition which would support re-insertion into the RV, if necessary.		• Ongoing	• Response to Question (10) dated May 25, 2005

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
28. Buried Piping and Tanks Inspection Program (continued)	Before the tenth year of extended operation, BFN will perform an engineering evaluation to determine if sufficient inspections have been conducted to draw a conclusion regarding the ability of the underground coatings to protect the underground piping from degradation. If not, BFN will conduct a focused inspection to allow that conclusion to be reached		• Within ten years after entering the period of extended operation	• Response to RAI 7.1.22-1 dated May 25, 2005
	Buried piping within the scope of the Buried Piping and Tanks Inspection Program will be inspected when they are excavated for maintenance or when those components are exposed for any reason		• Ongoing	• Response to RAI 7.1.22-1 dated May 25, 2005
29. ASME Section XI Subsection IWE Program	The existing program is credited.	A.1.29	• Ongoing	• LRA Section B.2.1.32
30. ASME Section XI Subsection IWF Program	The existing program is credited.	A.1.30	• Ongoing	• LRA Section B.2.1.33
	Enhance the ASME Section XI Subsection IWF Program to manage the aging effects of ASME equivalent Class MC supports.		• Prior to the period of extended operation	• Response to Follow-up RAI B.2.1.33-1dated May 31, 2005
31. 10 CFR 50 Appendix J Program	The existing program is credited.	A.1.31	• Ongoing	• LRA Section B.2.1.34

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TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
33. Structures Monitoring Program (continued)	Enhance procedures implementing the 10 CFR 50.65 Maintenance Rule program to include the guidance provided in ACI 349.3R-96 Chapter 7 to clarify the "suitably knowledgeable or trained" inspector qualifications to "training and proficiency demonstration of inspectors for structural aging effects and long term performance issues". The procedures will also be clarified to identify.		• Prior to the period of extended operation	• LRA Section B.2.1.36
	Enhance LCEI-CI-C9, Attachment 1, "Buried Piping Inspection Checklist," to include "Mechanical Penetration" as an inspection attribute.		• Prior to entering the period of extended operation	• Response to GALL audit Question 285 dated October 8, 2004
34. Inspection of Water-Control Structures Program	The existing program is credited.	A.1.34	• Ongoing	• LRA Section B.2.1.37
	Enhance program documents to ensure that required structures and structural components within the scope of license renewal are identified.		• Prior to the period of extended operation	• LRA Section B.2.1.37
	Program documents will be enhanced to include special inspections following the occurrence of large floods, earthquakes, tornadoes, and intense rainfall		• Prior to the period of extended operation	• LRA Section B.2.1.37

the "responsible engineer" as the "structures monitoring program engineer" to avoid confusion with industry guidance

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
36. Fatigue Monitoring Program add period	The enhanced Fatigue Monitoring Program will use the EPRI-licensed FatiguePro® cycle counting and fatigue usage tracking computer program. This program calculates stress cycles and resulting Cumulative Usage Factor (CUF) values from operating cycles. These calculations will be automated and performed periodically based on information downloads from the plant's instrumentation computers. The enhancements will include expansion of the program coverage as follows: • This program will include select Reactor Vessel locations as specified in Table 4.3.1.1 of the LRA. • This program will include the locations identified by NUREG / CR-6260 for environmental fatigue evaluation as discussed in 4.3.4 of the LRA and in accordance with NUREG-1801 Section X.M1. • This program will include monitoring the fatigue of the suppression chamber and suppression chamber vents, as specified in 4.6.1 of the LRA.	A.1.36	• Prior to the period of extended operation	• LRA Section B.3.2
37. Systems Monitoring Program	The existing program is credited	A.2.1	• Ongoing	• LRA Section B.2.1.39

TABLE 1: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (NON-UNIT SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
41. Time-Limited Aging Analysis: Reactor Vessel Thermal Limit Analyses: Operating Pressure-Temperature Limits (P-T)	Revised P-T limits will be prepared and submitted to the NRC for approval using an approved fluence methodology	A.3.1.5	• Prior to the period of extended operation	• LRA Section A.3.1.5 • LRA Section 4.2.5
42. Time-Limited Aging Analysis: Reactor Vessel Circumferential Weld Examination Relief	An extension of the Reactor Vessel Circumferential Weld Examination Relief request will be submitted to the NRC.	A.3.1.6	• Prior to the period of extended operation	• LRA Section 4.2.6 • Response to NRC RAI 4.2.6-1 dated January 31, 2005 • Response to NRC RPV Internals, Question (2) dated May 25, 2005 1
43 Time-Limited Aging Analysis: Reactor Vessel Axial Weld Failure Probability	The Units 1, 2, and 3 limiting weld chemistry, chemistry factor and 60 year life mean RT_{NDT} values are within the limits of the values assumed in the analysis performed by the NRC staff in its BWRVIP-05 SER supplement. Therefore, the probability of failure for the axial welds is bounded by the NRC evaluation.	A.3.1.7	• Complete	• LRA Section 4.2.7 • Response to NRC RAI 4.2.7-1 dated January 31, 2005 • Response to NRC RPV Internals, Question (2) dated May 25, 20005

TABLE 2: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (UNIT 1 SPECIFIC)

This note applies to Tables 2 & 3

NOTE: This Table does not contain all of the same Item Numbers as contained in Table 1. While there is a one-to-one correlation of items with the same number, the same Item Numbers are not in both tables as explained below:

- For Item Numbers 2. through 49., only those Item Numbers that have a Unit 1 Specific commitment are included in this table.
- Item Numbers 50. through 63. apply only to Unit 1.

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
2. Electrical Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements Used in Instrumentation Circuits Program	Unit 1 High-Range Radiation Monitoring cables will be included in the Environmental Qualification (EQ) Program, regardless of their location in mild or harsh areas of the plant.	A.1.2	• Prior to Unit 1 restart	• Response to GALL audit Question 169 dated October 8, 2004
5. Chemistry Control Program	The program will be enhanced to include Unit 1.	A.1.5	• Prior to Unit 1 restart	• LRA Section B.2.1.5
7. Boiling Water Reactor Vessel Inside Diameter Attachment Welds Program	The program will be enhanced to incorporate Unit 1.	A.1.7	• Prior to Unit 1 restart	• LRA Section B.2.1.7 • LRA Appendix F.6
8. Boiling Water Reactor Feedwater Nozzle Program	The Unit 1 operating procedures will be upgraded to decrease the magnitude and frequency of feedwater temperature fluctuations.	A.1.8	• Prior to Unit 1 restart	• LRA Section B.2.1.8

TABLE 2: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (UNIT 1 SPECIFIC)

delete

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
25. Reactor Vessel Surveillance Program (continued)	BWRVIP-86-A and BWRVIP-116 will be updated to incorporate Browns Ferry Unit 1 accordingly and a license amendment will be submitted to the NRC to implement the ISP for site-specific use for Unit 1 prior to the beginning of the period of extended operation.		• Prior to the period of extended operation	• Response to RAI B.2.1.28-1(b) dated January 31, 2005
26. One-Time Inspection Program	Perform a one-time inspection of the ASME equivalent Class MC supports in a submerged environment of the Unit 1 Torus.	A.1.26	• Prior to Unit 1 restart	• Response to RAI B.2.1.33-2(b) dated January 18, 2005
35. Environmental Qualification Program	The program will be implemented on Unit 1.	A.1.35	• Prior to Unit 1 restart	• LRA Section B.3.1
42. Time-Limited Aging Analysis: Reactor Vessel Circumferential Weld Examination Relief	The RPV circumferential weld examination relief request for BFN Unit 1 will be included, and TVA will be using procedures and training to limit cold over-pressure events during the period of extended operation for BFN Unit 1. The procedures and training used to limit cold over-pressure events will be the same as those approved by the NRC when BFN requested that the BWRVIP-05 technical alternative be used for the current term for Units 2 and 3.	A.3.1.6	• Prior to Unit 1 restart	• LRA Section 4.2.6 as modified by the response to NRC Question (1) concerning RPV Internals dated May 25, 2005 • Request granted by NRC letter dated May 31, 2005
47. RAI 2.1-2, B	Perform Unit 1 DCN to qualify twelve temperature switches in the Turbine Building.	N/A	• Prior to the period of extended operation	• Response to RAI 2.1-2,B dated September 3, 2004

TABLE 2: BFN COMMITMENT LIST ASSOCIATED WITH LRA APPENDIX A AGING MANAGEMENT PROGRAMS AND TLAAs (UNIT 1 SPECIFIC)

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
63. Response to NRC Questions Concerning RPV Internals	TVA commits to replace all BFN Unit 1 dry tubes prior to restart	N/A	• Prior to Unit 1 restart	• Response to Question (8) dated May 25, 2005
	For Unit 1 Control Rod Drive Return Line Cap, MSIP will be performed."		• Prior to Unit 1 restart	• Response to Question (6) dated May 25, 2005
	The Unit 1 AHCs will be changed to bolted design prior to Unit 1 restart and do not require enhanced inspections.		• Prior to Unit 1 restart	• Response to NRC Question (7) dated May 25, 2005

Delete quote

TABLE 3: UNIT 1 RESTART COMMITMENTS THAT ARE DISCUSSED IN LRA APPENDIX F (SEE SER SECTION 1.7 AND 2.6)*

Note: see Note at beginning of Table 2

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
50. Appendix F.1 add period	Main steam leakage path piping will be evaluated and modified as required to ensure structural integrity.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
51. Appendix F.2	Containment Atmosphere Dilution System modification will be implemented.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
52. Appendix F.3	Fire Protection Program will be revised to ensure compliance with 10 CFR 50 Appendix R. Fire protection Report will be revised per Unit 1 License Condition 2.C.13.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
53. Appendix F.4	Environmental Qualification Program will be implemented.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
54. Appendix F.5	GL 88-01 will be addressed, and necessary plant modifications made.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
55. Appendix F.6	BWRVIP Programs used for Units 2 and 3 will be used for Unit 1.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
56. Appendix F.7	ATWS features will be installed.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
57. Appendix F.8	Reactor Vessel Head Spray piping in drywell will be removed, and the primary containment penetrations will be sealed.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005

TABLE 3: UNIT 1 RESTART COMMITMENTS THAT ARE DISCUSSED IN LRA APPENDIX F (SEE SER SECTION 1.7 AND 2.6)*

Item Number/Title	Commitment	LRA Appendix A (UFSAR)	Implementation Schedule	Source
58. Appendix F.9	The Hardened Wetwell Vent modification will be implemented.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
59. Appendix F.10	Service Air and Demineralized Water Primary Containment Penetrations will be capped.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
60. Appendix F.11 add period	Auxiliary Decay Heat Removal System will be modified to serve Unit 1.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
61. Appendix F.12	Maintenance Rule will be fully implemented when the temporary Unit 1 exemption ceases to be effective.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005
62. Appendix F.13	Replace RWCU piping outside of primary containment with IGSCC resistant piping. • Implement actions requested in GL 89-01 for RWCU.	N/A	• Prior to Unit 1 restart	• LRA Appendix F • TVA response dated January 31, 2005

* Note: Other Appendix F commitments are shown in Table 2.

add bullets

APPENDIX B

CHRONOLOGY

This appendix contains a chronological listing of the routine licensing correspondence between the U.S. Nuclear Regulatory Commission (NRC) staff and the Tennessee Valley Authority (TVA), and other correspondence regarding the NRC staff's reviews of the Browns Ferry Nuclear (BFN), Units 1, 2 and 3 (under Docket Numbers 50-259, 50-260 and 50-296) license renewal application (LRA).

July 12, 1984	TVA letter to NRC, in regards to NUREG 0737, Item II.K.3.28, "Qualification of ADS Accumulators"
July 24, 1985	NRC letter to TVA, "NUREG.0737, Item II.K.3.28, Qualification of ADS Accumulators"
March 1, 1988	TVA letter, R. Gridley to NRC, "Browns Ferry Nuclear Plant (BFN) - Anticipated Transients Without Scram (ATWS) Rule (10 CFR 50.62) - Plant Specific Design"
August 1, 1988	TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) - Response to Bulletin (sic) 88-01, NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping, dated January 25, 1988"
October 24, 1988	TVA letter, S. A. White to NRC, "Browns Ferry Nuclear Plan (BFN) Nuclear Performance Plan, Revision 2"
December 8, 1988	NRC letter to TVA, "Browns Ferry Nuclear Plant, Units 1, 2 and 3 - Appendix R Safe Shutdown System Analysis"
January 22, 1989	NRC letter to TVA, "Compliance with Rule 10 CFR 50.62 Relating to Alternate Rod Injection and Reactor Pump Trip Systems"
January 26, 1989	NRC letter to TVA, "Technical Specifications on Anticipated Transients Without Scram (ATWS) - Recirculation Pump Trip (RPT), Browns Ferry Nuclear Plants, Units 1, 2, and 3" (Accession No. ML020020476)
October 30, 1989	NRC letter to All Operating Licensees with Mark I Containments, "Installation of a Hardened Wetwell Vent (Generic Letter 89-16)," dated September 1, 1989. 2. TVA letter, M. J. Ray to NRC, "Response to Generic Letter 89-16, Installation of Hardened Wetwell Vent"
November 3, 1989	NRC letter to TVA, "Supplemental Safety Evaluation on Post-Fire Safe Shutdown Systems and Final Review of the National Fire Protection Association Code Deviations - Browns Ferry Nuclear Plant, Unit 2"

page number need to be corrected Generic comment for all Appendix B pages

December 3, 2003	NRC letter to TVA, "Browns Ferry Nuclear Plant Unit 3 - Safety Evaluation of Supplemental Response to Generic Letter 88-01"
December 31, 2003	Letter from Mr. Mark. J. Burzynski, Tennessee Valley Authority (TVA) to the NRC, submitting the application for the renewal of the operating Licenses for Browns Ferry Nuclear Units 1,2, and 3 (Accession No. ML040060361)
January 7, 2004	Letter from P.T.Kuo, NRC, to J.A.Scalice,TVA forwarding the Notice of Receipt and Availability of the application for the renewal of the operating license for the BFN Units 1,2 and 3 (Accession No. ML0400090370) Delete one zero
February 19, 2004	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC- Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - January 28, 2004 Meeting Follow-Up - Additional Information - Supplemental Information - Unit 1 Wet Lay-Up (Accession No. ML040510241)
March 4, 2004	Letter from P.T.Kuo, NRC to J. A. Scalice, TVA indicating acceptability and sufficiency for docketing and opportunity for a hearing regarding the application from Tennessee Valley Authority for renewal of the operating licenses for the BFN, units 1, 2, and 3 (Accession No. ML040650206)
March 25, 2004	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC stating use of the BFN license renewal boundary drawings to obtain scoping results (Accession No. ML040860596)
March 31, 2004	Letter from P.T.Kuo, NRC, to J.A.Scalice,TVA forwarding the review schedule for application for renewal of the operating licenses for the BFN Units 1,2 and 3 (Accession No. ML040910016)
May 4, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the April 7, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML041310015)
May 6, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the March 24, 2004 and March 30, 2004 conference calls between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML041310029)
May 10, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the April 14, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML041310206)

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May 27, 2004 Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 - March 30-31, 2004 Meeting Follow-Up - Additional Information for License Renewal Environmental Review

May 28, 2004	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC updating the LRA application sections 4.2 and 4.3 to reflect extended power uprate conditions (Accession No. ML041550393)
June 15, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the May 19, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML041700550)
June 16, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the April 21, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML041700505)
June 16, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the May ~~24~~ 27, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) concerning activities on BFN units 1, 2 and 3 LRA. (Accession No. ML041700523)
June 18, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the May 5, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML041700572)
June 23, 2004	Letter from Yoira Diaz-Sanabria, NRC, to K. W. Singer, Tennessee Valley Authority (TVA) forwarding request for additional information for the review of the BFN units 1, 2 and 3 license renewal application on section 3.5 of the LRA. (Accession No. ML041760076)
June 28, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the May 27, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML041810168)
July 7, 2004	Response to Request for Additional Information (RAI) Regarding Severe Accident Mitigation Alternatives for Browns Ferry Nuclear Plant, Units 1, 2, and 3
July 9, 2004	TVA letter to NRC, "Browns Ferry Nuclear Plant (BFN) Unit 1 - Technical Specification (TS) 436 - Increased Main Steam Isolation Valve (MSIV) Leakage Rate Limits and Exemption from 10 CFR 50, Appendix J" (Accession No. ML041980222)
July 10, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the June 16, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML041950508)

October 7, 2004 Browns Ferry Nuclear - Units 1, 2, and 3 License Renewal Application - Notification of change of TVA License Renewal Project Manager

August 23, 2004 In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the July 28, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML042390497)

August 26, 2004 In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the July 24, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML042400550)

August 31, 2004 In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the July 12, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML042450211)

August 31, 2004 Letter from Yoira Diaz-Sanabria, NRC, to K. W. Singer, Tennessee Valley Authority (TVA) forwarding request for additional information for the review of the BFN units 1, 2 and 3 license renewal application on sections 2.1, 2.2, and 2.3 of the LRA. (Accession No. ML042450260)

September 3, 2004 Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC NRC scoping and screening audit – request for additional information (RAI) (Accession No. ML042520374)

September 16, 2004 In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the August 19, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML042600522)

September 27, 2004 NRC letter to TVA, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 — Issuance of Amendments Regarding Full- Scope Implementation of Alternative Source Term" (Accession No. ML042730028)

September 30, 2004 Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC NRC scoping and screening audit –request for additional information (Accession No. ML042750259)

October 6, 2004 Letter from Yoira Diaz-Sanabria, NRC, to K. W. Singer, Tennessee Valley Authority (TVA) forwarding request for additional information for the review of the BFN units 1, 2 and 3 license renewal application on ~~Appendix F~~ 2.3.1, 2.3.2, and 2.3.3 of the LRA. (Accession No. ML042860015)

October 8, 2004 Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC NRC scoping and screening audit –request for additional information (Accession No. ML042870422)

October 8, 2004	Letter from Yoira Diaz-Sanabria, NRC, to K. W. Singer, Tennessee Valley Authority (TVA) forwarding request for additional information for the review of the BFN units 1, 2 and 3 license renewal application on section 2.3 of the LRA. (Accession No. ML042860~~151~~) 015
October 8, 2004	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC NRC scoping and screening staff audit at BFN – request for additional information (Accession No. ML042870428)
October 8, 2004	Letter from Yoira Diaz-Sanabria, NRC, to K. W. Singer, Tennessee Valley Authority (TVA) forwarding request for additional information for the review of the BFN units 1, 2 and 3 license renewal application on sections 2.3.2 and 2.3.3 of the LRA (Accessiion No. ML042860066)
October 12, 2004	Letter from Yoira Diaz-Sanabria, NRC, to K. W. Singer, Tennessee Valley Authority (TVA) forwarding request for additional information for the review of the BFN units 1, 2 and 3 license renewal application on section 3.3 of the LRA (Accession No. ML042860133)
October 15, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the September 15, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML042920201)
October 18, 2004	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC NRC scoping and screening audit – request for additional information (Accession No. ML042930471)
October 19, 2004	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC – request for additional information - Sections 2.1, 2.2, and 2.3, related to the Scoping and Screening: Mechanical Systems (Accession No. ML042930931)
October 21, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the September 22, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML042990519)
October 22, 2004	In a memorandum (signed by Yoira Diaz-Sanabria), NRC summarized the August 18, 2004 conference call between the NRC staff and Tennessee Valley Authority (TVA) regarding draft Request for Additional Information (D-RAI) concerning the staff's review of the LRA. (Accession No. ML043000040)

February 28, 2005 Browns Ferry Nuclear Plant - Units 1, 2, and 3 License Renewal Application - LRA Section 3.5 - Response to NRC Request For Follow Up Question for RAI 3.5-7

January 31, 2005 — Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application –Sections 3.5, 4.7.4, and B.2.1.32 - Response to NRC Request for Additional Information (Accession No. ML050320149)

January 31, 2005 — Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application –Section 3 Unit 1 layup questions - Response to NRC Request for Additional Information (Accession No. ML050320208)

January 31, 2005 — Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application – Section 2.1, status of response to RAI 2.1-2, A.3 - Response to NRC Request for Additional Information (Accession No. ML050310442)

February 28, 2005 — Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application –Section 2.1, final status of response to RAI 2.1-2, A.3 - Response to NRC Request for Additional Information (Accession No. ML050600274)

March 2, 2005 — Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application –Sections 2.5 and 4.7.8 - Response to NRC Request for Additional Information (Accession No. ML0506205~~92~~) 258

March 3, 2005 — Letter from Ram Subbaratnam, NRC, to K.W. Singer, Tennessee Valley Authority (TVA) forwarding request for additional information for the review of the BFN units 1, 2 and 3 license renewal application on Section 4.7.7 of the LRA (Accession No. ML050620592)

March 11, 2005 — Letter from Yoira Diaz-Sanabria, NRC, to K.W. Singer, Tennessee Valley Authority (TVA) forwarding request for additional information for the review of the BFN units 1, 2 and 3 license renewal application on Sections 3.1.2.4 and 3.5 of the LRA (Accession No. ML050700309)

March 11, 2005 — Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application –Section 3.3 - Response to NRC Request for Additional Information (Accession No. ML050700463)

March 16, 2005 — Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application –Sections 4.6.2 T-Quenchers within Reactor Vessel Vents and Drains System - Response to NRC Request for Additional Information (Accession No. ML050760230)

May 31, 2005	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application –Section 2.1.2 and 2.3.4.4 Secondary Containment and Main Steam System - Response to NRC Request for Additional Information (Accession No. ML051520081)
Delete	
May 31, 2005	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application – Section 2.4, 3.5 and B.2.1.33 - Response to NRC Request for Additional Information (Accession No. ML051520084)
May 31, 2005	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application –Section 4.7.7 TLAA Core Plate Relaxation of Bolts - Response to NRC Request for Additional Information (Accession No. ML051520139)
same letter	
May 31, 2005	Letter from Mr. M D. Skaggs, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application (LRA) - Response to NRC Request for Additional Information (RAI) concerning follow up to RAIs 2.4-3, 3.5-1, 3.5-4, B.2.1.33-1, and ~~2.1.36~~ B.2.1.36 (Accession No. ML051520084)
May 31, 2005	Letter from M.L. Ma~~rshall, Jr., NRC, to~~ K W. Singer, Tennessee Valleu Authority (TVA) - Browns Ferry Nuclear Plant Unit 1 - Safety Evaluation for Relief Request 1-ISI-19 Associated With Reactor Pressure Vessel Circumferential Shell Welds (Accession No. ML051110626)
June 3, 2005	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application –Response to NRC Request for Additional Information on Potential Open Item 3.3.2.35-1 (Accession No. ML051540336)
June 9, 2005	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application – Response to NRC Request for Additional Information (RAI) 4.7.3-1-Radiation Dose for Valve Seals (Accession No. ML051610400)
June 9, 2005	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application – Response to NRC Request for Additional Information (RAI) Concerning follow up to RAI 2.3.3.18-1 and follow up to RAI 2.3.3.22-1(Accession No. ML051610592)
June 15, 2005	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application – Response to NRC Request for Additional Information (RAI) for the Time-limited Aging Analysis identified in 4.7.2 and 4.7.5 of LRA (Accession No. ML051660547)

June 15, 2005	Letter from Mr. T.E.Abney, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application – Response to NRC Request for Additional Information (RAI) on Clarification for Item 2 of RAI 2.3-2 and RAI 2.3-3 (Accession No. ML051670564)
June 22, 2005	Letter from Ram Subbaratnam, NRC, to K.W. Singer, Tennessee Valley Authority (TVA) - Request for Additional Information on Section 4.7.7 (Accession No. ML051730507)
June 29, 2005	Letter from Mr. W.D. Crouch, Tennessee Valley Authority (TVA) to the NRC - Browns Ferry Nuclear Plant (BFN) - Units 1, 2, and 3 License Renewal Application – Response to NRC Request for Additional Information (RAI) concerning Follow up to Section 4.7. 7 Time Limited Aging Analysis RA Is (Accession No. ML0519402910
August 4, 2005	Browns Ferry Nuclear Plant - Units 1, 2, and 3 License Renewal Application - Description of Unit 1 Periodic Inspection Program
August 9, 2005	Browns Ferry Nuclear Plant - Units 1, 2, and 3 - Consolidated List of commitments for License Renewal.

APPENDIX D

REFERENCES

This appendix contains a listing of references used in the preparation of the Safety Evaluation Report prepared during the review of the license renewal application for Browns Ferry Nuclear Plant, Units 1, 2, and 3, Docket Numbers 50-259, 50-260, and 50-296, respectively.

1. NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," April 2001

(2) NEI 95-10, "Industry Guideline for Implementing the Requirements of 10 CFR Part 54 - The License Renewal Rule, Revision 3," August 2001

(3) NUREG-1801, "Generic Aging Lessons Learned Report (GALL)," April 2001

(4) Browns Ferry Nuclear Plant, Units 1, 2, and 3, updated final safety analysis report (UFSAR), ~~Supplement~~ 20.

Amendment

ABSTRACT

This safety evaluation report (SER) documents the technical review of the Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3, license renewal application (LRA) by the staff of the U.S. Nuclear Regulatory Commission (NRC) (the staff). By letter dated December 31, 2003, Tennessee Valley Authority (TVA or the applicant) submitted the LRA for BFN in accordance with Title 10, Part 54, of the *Code of Federal Regulations* (10 CFR Part 54). TVA is requesting renewal of the operating licenses for BFN Units 1, 2, and 3, (Facility Operating License Numbers DPR-33, DPR-52, and DPR-68, respectively) for a period of 20 years beyond the current expiration dates of midnight December 20, 2013, for Unit 1; midnight June 28, 2014, for Unit 2; and midnight July 2, 2016, for Unit 3.

Units

The BFN units are located on the north shore of Wheeler Reservoir in Limestone County, Alabama, at Tennessee River Mile (TRM) 294. The site is approximately 30 miles west of Huntsville, Alabama; it is also 10 miles northwest of Decatur, Alabama and 10 miles southwest of Athens, Alabama. The NRC issued the construction permits for ~~Unit~~ 1 and 2 on May 10, June 28 1967; for Unit 3 on July 31, 1968. The NRC issued the operating licenses for Unit 1 on July 2 December 20, 1973; for Unit 2 on ~~August 2~~, 1974; and for Unit 3 on ~~August 18~~, 1976. All of the units consist of a Mark 1 boiling water reactor (BWR) with a nuclear steam supply system supplied by General Electric Corporation. The balance of each of the plants was originally designed and constructed by the Tennessee Valley Authority. Unit 1 licensed power output is 3293 megawatt thermal (MWt), with a gross electrical output of approximately 1100 megawatt electric (MWe). Units 2 and 3 licensed power output is 3458 MWt, with a gross electrical output of approximately 1155 MWe. The units operated from the original licensing until 1985 when they were voluntarily shut down by the applicant to address management and technical issues. The applicant then implemented a comprehensive nuclear performance plan to correct the deficiencies that led to the shutdown. This plan included changes in management, programs, processes and procedures, as well as extensive equipment refurbishment, replacement, and modifications. Unit 2 was subsequently restarted in 1991, and Unit 3 followed in 1995. In the early 1990s, the applicant decided to defer restart of Unit 1. Unit 1 is currently in a shutdown status.

This SER presents the status of the staff's review of information submitted to the NRC through June 15, 2005, the cutoff date for consideration in the SER. The staff identified open items and confirmatory items that must be resolved before the staff can make a final determination on the application. SER Sections 1.5 and 1.6 summarize these items. The staff will present its final conclusion on the review of the BFN application in its update to this SER.

Also needs to be corrected on p. 2-201

3.7.1 General Technical Concerns

Generic Comment: All Page numbers need to be checked.

3.7.5.1 Steam and Power Conversion Systems In Wet Layup

Suggest deleting the "s" from Renewals on page A-1

Appendix A has title as "Commitments for License Renewals"

Appendices

Tables

ABBREVIATIONS

AC	alternating current
ACI	American Concrete Institute
ACSR	aluminum conductor steel reinforced
ACRS	Advisory Committee on Reactor Safeguards
ADHR	auxiliary decay heat removal
ADS	atmospheric dilution system
AERM	aging effect requiring management
AFW	auxiliary feedwater
AHC	access hole cover
AISC	American Institute of Steel Construction
AMP	aging management program
AMR	aging management review
ANSI	American National Standards Institute
APCSB	Auxiliary and Power Conversion Systems Branch
APRM	average power range monitor
ART	adjusted reference temperature
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
AST	alternate source term
ASTM	American Society for Testing and Materials
ATWS	anticipated transient without scram
B&PV	boiler and pressure vessel
B&W	Babcock and Wilcox
BFN	Browns Ferry Nuclear Plant
BWR	boiling water reactor
BWROG	Boiling Water Reactor Owners Group
BWRVIP	Boiling Water Reactor Vessel and Internals Project
CAD	containment atmosphere dilution
CASS	cast austentitic stainless steel
CBF	cycle-based fatigue add dash
CCCW	closed cycle cooling water
CCWP	condensate circulating water pump
CDF	core damage frequency
CF	chemistry factor
CFR	*Code of Federal Regulations*
CI	confirmatory item
CLB	current licensing basis
CMAA	Crane Manufacturers Association of America
CO_2	carbon dioxide
CRD	control rod drive
CS	core spray
CUF	cumulative usage factor
CVP	Cleanliness Verification Program
CWST	condensate water storage tank

Indent

not used in SER

DBA	design basis accident
DBE	design basis event
DC	direct current ← Design of Civil Structures on p. 3-292 uses "DC" for it's abbreviation
DCN	design change ~~notice~~ notice
DG	diesel generator or Draft Regulatory Guide
DGB	diesel generator building
ECCS	emergency core cooling system
ECP	electrochemical potential
EDG	emergency diesel generator
EECW	emergency equipment cooling water
EFPY	effective full-power year
EMA	equivalent margin analysis
EMPAC	enterprise maintenance planning and control ~~system~~ — defined on p. 2-3 w/o system
EOL	end of life
EPRI	Electric Power Research Institute
EPU	extended power uprate
EQ	environmental qualification
ESF	engineered safety feature
EVT	enhanced visual test
FAC	flow-accelerated corrosion
F_{en}	environmental fatigue life correction factor
FERC	Federal Energy Regulatory Commission
FP	fire protection
FPC	fuel pool cooling and cleanup
FPR	Fire Protection Report
~~FR~~	~~federal register or flow restriction~~ not used
FSAR	final safety analysis report
FW	feedwater
GALL	Generic Aging Lessons Learned Report
GDC	general design criteria or general design criterion
GE	General Electric Corporation
GEIS	Generic Environmental Impact Statement
GES	general engineering specification
GL	generic letter
GSI	generic safety issue
H_2	hydrogen
HELB	high-energy line break
HEPA	high efficiency particulate air ← page 2-48 uses "high-efficiency" need to remove dash on page 2-48
HH	handhole
HPCI	high pressure coolant injection
HPFP	high pressure fire protection ← page 2-67 & 3-90 use "high-pressure" need to remove dashes on pages 2-67 & 3-90.
HSLA	high strength low-alloy
~~HT~~	~~heat transfer~~ not used
HVAC	heating, ventilation, and air conditioning
HWC	hydrogen water chemistry

indent

page 3-139 uses "high-strength low-alloy" needs to be consistent.

HX heat exchanger

I&C instrumentation and control

page 3-340 uses "instrumentation and controls". suggest removing "s" from "controls" on page 3-340.

IASCC irradiation assisted stress corrosion cracking
ID inside diameter
IGSCC intergranular stress corrosion cracking
IN information notice
INPO Institute of Nuclear Power Operations
IPA integrated plant assessment
IPS intake pumping station
IR insulation resistance
IRM intermediate range monitor
ISG interim staff guidance
ISI inservice inspection
ISP Integrated Surveillance Program

kV kiloVolt

LER Licensee Event Report
LLRT local leak rate test
LLRW low level radioactive waste

page 2-62 uses "low-level". dash needs to be removed on page 2-62

LOCA loss of coolant accident
LP layup program
LPCI low pressure coolant injection

page 2-55 uses "low-pressure" dash needs to be removed on page 2-55

LPRM local power range monitor
LR license renewal
LRA license renewal application
LTOP low temperature over-pressure
LWR light water reactor

~~MC mechanical closure~~ not used
MEAP material, environment, aging program
MEL master equipment list
~~MELB medium energy line break~~ not used
MeV million electron Volts
MIC microbiologically influenced corrosion
MS main steam
MSIV main steam isolation valve

page 2-51 uses "main steam safety injection valve". Definition on page 2-51 need to be revised to "main steam isolation valve"

MWe megawatt electric
MWt megawatt thermal

n/cm^2 neutrons per square centimeter
NDE nondestructive examination
not used ~~NDT nil-ductility temperature~~
NEDP Nuclear Engineering Design Procedure
NEI Nuclear Energy Institute
NEIL Nuclear Electric Insurance Limited
NEPA National Environmental Policy Act of 1969
NFPA National Fire Protection Association

~~NMC~~	~~Nuclear Management Company~~	not used
NMCA	noble metal chemical application	
NPS	nominal pipe size	
NPSH	net positive suction head	
NRC	U.S. Nuclear Regulatory Commission	
NSR	non-safety-related	
NSSS	nuclear steam supply system	
NUMARC	Nuclear Management and Resources Council	
NUREG	U.S. Nuclear Regulatory Commission Regulatory Guide	
O_2	oxygen	
OCCW	open-cycle cooling water	
ODSCC	outside-diameter stress-corrosion cracking	
OFS	orificed fuel supports	
OI	open item	
PB	pressure boundary	
PER	Problem Evaluation Report	
PFM	probabilistic fracture mechanics	
PT	penetrant testing	
PTS	pressurized thermal shock	
PUAR	Plant Unique Analysis Report	← page 4-33 uses "Plant-Unique" Dash need to be removed on page 4-33
PVC	polyvinyl chloride	
PW	pipe whip restraint	
PWR	pressurized water reactor	
PWSCC	primary water stress-corrosion cracking	page 3-124 uses "stress corrosion" w/o a dash. Need to be consistent.
QA	quality assurance	
~~QG~~	~~qualification guide~~	not used
RAI	request for additional information	
RBCCW	reactor building closed cooling water	
RBM	rod block monitor	
RCIC	reactor core isolation cooling	
RCPB	reactor coolant pressure boundary	
RCS	reactor coolant system	
RCW	raw cooling water	
RG	regulatory guide	
RH	relative humidity	
RHR	residual heat removal	
RHRSW	residual heat removal service water	
RPV	reactor pressure vessel	
RPVII	reactor pressure vessel internals inspection	
RSW	raw service water	
RT	reference temperature	
RT_{NDT}	reference temperature nil ductility transition	
RV	reactor vessel	
RVI	reactor vessel internal	
~~RVID~~	~~Rod Vessel Integrity Database~~	not used

~~RVLIS~~	~~reactor vessel level instrumentation system~~	not used
RWCU	reactor water cleanup	
SBF	stress-based fatigue	
SBO	station blackout	
SC	structure and component	
SCC	stress-corrosion cracking	page 3-17 uses "stress corrosion" w/o dash, Need to be consistent
SER	Safety Evaluation Report	
SGT	standby gas treatment	
SI	surveillance instruction	
SIL	Services Information Letter	SIL is defined as "Service Information Letter" on page 3-123
SLC	standby liquid control	
SMP	Structures Monitoring Program	
SO_2	sulfur dioxide	
SOC	statement of consideration	
SOER	Significant Operating Experience Report	
SP	shelter/protection	
SPP	standard program and process	
SR	safety-related	
SRM	source range monitor	
SRP	Standard Review Plan	
SRP-LR	Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants	
SRV	safety relief valve	
SS	stainless steel or structural support	or Systems & Structures see page 2-28
SSA	safe shutdown analysis	
SSC	system, structure, and component	
SSE	safe shutdown earthquake	
~~t~~	~~thickness~~	not used
TI	~~temporary~~ technical instruction	
TIP	traversing in-core probe	
TLAA	time-limited aging analysis	
TRM	Technical Requirements Manual or Tennessee River Mile	
TS	technical specification	
TVA	Tennessee Valley Authority	
TVAN	Tennessee Valley Authority Nuclear	
UFSAR	updated final safety analysis report	
UNID	unique component identifier	
USAS	USA standard	
USE	upper-shelf energy	
UT	ultrasonic testing	
UV	ultra violet	
V	volt	
VFLD	vessel flange leak detection	
VIP	vessel ~~internal~~ and internals project	
VT	visual test	

~~WO~~ ~~work order~~ not used

XLPE cross-linked polyethylene