Entergy

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April 6, 2007
JAFP-07-0048

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

REFERENCES:

1. Letter, Entergy to USNRC, "James A. FitzPatrick Nuclear Power Plant, Docket No. 50-333, License No. DPR-59, License Renewal Application," JAFP-06-0109, dated July 31, 2006
2. Letter, Entergy to USNRC, "License Renewal Application for James A. FitzPatrick Nuclear Power Plant (TAC No. MD2667)," JAFP-07-0019, dated February 01, 2007
3. Letter, Entergy to USNRC, "License Renewal Application for James A. FitzPatrick Nuclear Power Plant (TAC No. MD2666)," JAFP-07-0021, dated February 12, 2007

SUBJECT: **Entergy Nuclear Operations, Inc.**
James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333, License No. DPR-59
License Renewal Application, Amendment 9

Dear Sir or Madam:

On July 31, 2006, Entergy Nuclear Operations, Inc. submitted the License Renewal Application (LRA) for the James A. FitzPatrick Nuclear Power Plant (JAFNPP) as indicated by Reference 1.

This LRA amendment consists of three attachments. Attachment 1 contains the revised list of regulatory commitments. Attachment 2 contains a revised response to RAIs previously provided in References 2 and 3. Attachment 3 contains the database of questions and answers from NRC audits of the LRA Aging Management Programs and Aging Management Reviews.

Should you have any questions concerning this submittal, please contact Mr. Jim Costedio at (315) 349-6358.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 6th day of April, 2007.

A124

Sincerely,

PETE DIETRICH
SITE VICE PRESIDENT

PD/cf

Attachments 1, 2, and 3

cc:

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Attachment 1

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 9

JAFNPP License Renewal Commitment List, Revision 2

JAFNPP Revised List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION NO. / COMMENTS
1	Implement the Buried Piping and Tanks Inspection Program as described in LRA Section B.1.1.	October 17, 2014	JAFP-06-0109	A.2.1.1 B.1.1
2	Enhance the BWR CRD Return Line Nozzle Program to examine the CRDRL nozzle-to-vessel weld and the CRDRL nozzle inside radius section per Section XI Table IWB-2500-1 Category B-D Items B3.90 and B3.100.	October 17, 2014	JAFP-06-0109	A.2.1.2 B.1.2
3	Enhance the Diesel Fuel Monitoring Program to include periodic draining, cleaning, visual inspections, and ultrasonic measurement of the bottom surfaces of the fire pump diesel fuel oil tanks, EDG day tanks, and EDG fuel oil storage tanks to ensure that significant degradation is not occurring. Enhance the Diesel Fuel Monitoring Program to specify acceptance criteria for UT measurements of diesel generator fuel storage tanks within the scope of this program.	October 17, 2014	JAFP-06-0109	A.2.1.9 B.1.9
4	Enhance the External Surfaces Monitoring Program guidance documents to include periodic inspections of systems in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(1) and (a)(3). Inspections shall include areas surrounding the subject systems to identify hazards to those systems. Inspections of nearby systems that could impact the subject systems will include SSCs that are in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4(a)(2).	October 17, 2014	JAFP-06-0109	A.2.1.11 B.1.11
5	Enhance the Fire Protection Program to inspect fire barrier walls, ceilings, and floors at least once every refueling outage. Inspection results will be acceptable if there are no visual indications of degradation such as cracks, holes, spalling, or gouges. Enhance the Fire Protection Program to verify that each seal type is included in the 10% sample inspected every 24 months.	October 17, 2014	JAFP-06-0109	A.2.1.13 B.1.13.1

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION NO. / COMMENTS
6	Enhance the Fire Water Program to include inspection of hose reels for corrosion. Acceptance criteria will be enhanced to verify no significant corrosion. Enhance Fire Water Program to include visual inspection of spray and sprinkler system internals for evidence of corrosion. Acceptance criteria will be enhanced to verify no significant corrosion. Enhance Fire Water Program to include that a sample of sprinkler heads will be inspected using guidance of NFPA 25 (2002 Edition) Section 5.3.1.1.1. NFPA 25 also contains guidance to repeat sampling every 10 years after initial field service testing. Enhance Fire Water Program to include that wall thickness evaluations of fire water piping will be performed on system components using non-intrusive techniques to identify evidence of loss of material due to corrosion. These inspections will be performed before the end of the current operating term and at intervals thereafter during the period of extended operation. Results of the initial evaluations will be used to determine the appropriate inspection interval to ensure aging effects are identified prior to loss of intended function.	October 17, 2014	JAFP-06-0109	A.2.1.14 B.1.13.2
7	Implement the Heat Exchanger Monitoring Program as described in LRA Section B.1.15.	October 17, 2014	JAFP-06-0109	A.2.1.16 B.1.15
8	Implement the Metal-Enclosed Bus Inspection Program as described in LRA Section B.1.17.	October 17, 2014	JAFP-06-0109	A.2.1.19 B.1.17
9	Implement the Non-EQ Instrumentation Circuits Review Program as described in LRA Section B.1.18.	October 17, 2014	JAFP-06-0109	A.2.1.20 B.1.18
10	Implement the Non-EQ Insulated Cables and Connections Program as described in LRA Section B.1.19.	October 17, 2014	JAFP-06-0109	A.2.1.21 B.1.19
11	Enhance the Oil Analysis Program to periodically sample lubricating oil in the security generator, and the fire pump diesel. Enhance the Oil Analysis Program to include viscosity and neutralization number determination of oil samples from components that do not have regular oil changes. Enhance the Oil Analysis Program to include particulate and water content for oil replaced periodically.	October 17, 2014	JAFP-06-0109	A.2.1.22 B.1.20
12	Implement the One-Time Inspection Program as described in LRA Section B.1.21.	Will be implemented within the 10 years prior to October 17, 2014	JAFP-06-0109	A.2.1.23 B.1.21
13	Enhance the Periodic Surveillance and Preventive Maintenance Program activity guidance documents as necessary to assure that the effects of aging will be managed as described in LRA Section B.1.22.	October 17, 2014	JAFP-06-0109	A.2.1.24 B.1.22

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION NO. / COMMENTS
14	Enhance the Reactor Vessel Surveillance Program to include the data analysis, acceptance criteria, and corrective actions described in LRA Section B.1.24.	October 17, 2014	JAFP-06-0109	A.2.1.26 B.1.24
15	Implement the Selective Leaching Program in accordance with the program as described in LRA Section B.1.25.	October 17, 2014	JAFP-06-0109	A.2.1.27 B.1.25 / Audit Item 443 & 445
16	Enhance the Structures Monitoring Program procedure to: • specify that manholes, duct banks, underground fuel oil tank foundations, manway seals and gaskets, hatch seals and gaskets, underwater concrete in the intake structure, and crane rails and girders are included in the program. • include guidance for performing structural examinations of elastomers and rubber components to identify cracking and change in material properties. • include guidance for performing periodic inspections to confirm the absence of aging effects for lubrite surfaces in the torus radial beam seats and for lubrite surfaces in the torus support saddles. • perform an engineering evaluation on a periodic basis (at least once every five years) of groundwater samples to assess aggressiveness (pH < 5.5, chloride > 500 ppm and Sulfate > 1500) of groundwater to concrete. • inspect any inaccessible concrete areas that may be exposed by excavation for any reason, or any inaccessible area where observed conditions in accessible areas, which are exposed to the same environment, show that significant concrete degradation is occurring.	October 17, 2014	JAFP-06-0109	A.2.1.30 B.1.27.2 / Audit Item 203 &287 Audit Item 201 Audit Item 201
17	Implement the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program as described in LRA Section B.1.28.	October 17, 2014	JAFP-06-0109	A.2.1.31 B.1.28
18	Enhance the Water Chemistry Control – Auxiliary Systems Program to include guidance for sampling the control room and relay room chilled water, decay heat removal cooling water, and the security generator jacket cooling water.	October 17, 2014	JAFP-06-0109	A.2.1.32 B.1.29.1
19	Enhance the Bolting Integrity Program to include guidance from EPRI NP-5769 and EPRI TR-104213. Enhance the Bolting Integrity Program to clarify that actual yield strength is used in selecting materials for low susceptibility to SCC and to clarify the prohibition on use of lubricants containing MoS2 for bolting.	October 17, 2014	JAFP-06-0109	A.2.1.35 B.1.30

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION NO. / COMMENTS
20	At least 2 years prior to entering the period of extended operation, for the locations identified in NUREG/CR-6260 for BWRs of the JAFNPP vintage, JAFNPP will implement one or more of the following: (1) Refine the fatigue analyses or develop new analyses (Class 1 RHR piping and Class1 feedwater piping locations), if necessary, to determine valid CUFs less than 1 when accounting for the effects of reactor water environment. This includes applying the appropriate Fen factors to valid CUFs determined in accordance with one of the following options. 1. For locations, including NUREG/CR-6260 locations, with existing fatigue analysis valid for the period of extended operation, use the existing CUF to determine the environmentally adjusted CUF. 2. More limiting JAFNPP-specific locations with a valid CUF may be added in addition to the NUREG/CR-6260 locations. 3. Representative CUF values from other plants, adjusted to or enveloping the JAFNPP plant specific external loads may be used if demonstrated applicable to JAFNPP. 4. For locations, including NUREG/CR-6260 locations, an analysis using the NRC-approved ASME code 2001 edition up to and including 2003 addendum, may be performed to determine a valid CUF. The determination of Fen will account for operating time with normal water chemistry and operating time with hydrogen water chemistry. (2) Manage the effects of aging due to fatigue at the affected locations by an inspection program that has been reviewed and approved by the NRC (e.g., periodic non-destructive examination of the affected locations at inspection intervals to be determined by a method acceptable to the NRC). (3) Repair or replace the affected locations before exceeding a CUF of 1.0. Should JAFNPP select the option to manage environmentally assisted fatigue during the period of extended operation, details of the aging management program such as scope, qualification, method, and frequency will be submitted to the NRC at least 2 years prior to the period of extended operation.	October 17, 2012	JAFP-06-0167	A.2.2.2.3 4.3.3/Audit Item 317 Audit Item 485 &487

#	COMMITMENT	IMPLEMENTATION SCHEDULE	SOURCE	RELATED LRA SECTION NO. / COMMENTS
21	Enhance the BWR Vessel Internals Program to inspect fifteen (15) percent of the top guide locations using enhanced visual inspection techniques. EVT-1, within the first 18 years of the period of extended operation, with at least one-third of the inspections to be completed within the first six (6) years and at least two-thirds within the first 12 years of the period of extended operations. Locations selected for examination will be areas that have exceeded the neutron fluence threshold.	As stated in the commitment.	JAFP-07-0048	A.2.1.7 and B.1.7
22	Enhance the BWR Vessel Internals Program to ensure the effects of aging on the steam dryer are managed in accordance with the guidelines of BWRVIP-139 as approved by the NRC and accepted by the BWRVIP Executive Committee.	October 17, 2014	JAFP-06-0167	A.2.1.7 and B.1.7 Audit Item 245
23	Enhance the BWR Vessel Internals Program to perform inspections of the core plate rim hold down bolts. Appendix A.2.2.7 Core Plate is revised to add that JAFNPP will perform one of the following: 1. Install core plate wedges prior to the period of extended operation, or, 2. Complete a plant-specific analysis to determine acceptance criteria for continued inspection of core plate rim hold down bolting in accordance with BWRVIP-25 and submit the inspection plan, along with the acceptance criteria and justification for the inspection plan, to the NRC two years prior to the period of extended operation for NRC review and approval. If Option 2 is selected, the analysis to determine acceptance criteria will address the information requested in RAIs 3.1.2-2A and 4.7.3.2-1.	October 17, 2012	JAFP-07-0019	A.2.1.7, B.1.7, 4.7.3.2 Audit Item 252 A.2.2.7 Audit Item 483 RAI 4.7.3.2-1
24	Implement the Bolted Connections Program as described in LRA Section B.1.31.	October 17, 2014	JAFP-07-0019	A.2.1.36 B.1.31 Audit item 296
25	Implement the Oil-Filled Cable System aging management that will be controlled by the following programs: External Surfaces Monitoring Program Oil Analysis Program Periodic Surveillance and Preventive Maintenance Program	October 17, 2014	JAFP-07-0048	B.1.11 B.1.20 B.1.22

Attachment 2

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 9

Updated RAI Responses:

RAI 3.1.2-2A
RAI 3.6.2-1
RAI 4.7.3.2-1

Requests For Additional Information
License Renewal Application

RAI 3.1.2-2A

The applicant implemented AMP B.1.7, "BWR Vessel Internals," for managing the aging effects due to loss of preload and cracking in these bolts. AMP B.1.7 in turn invokes the inspection guidelines that are specified in the BWRVIP-25 report, "BWR Core Plate Inspection and Flaw Evaluation Guidelines." Table 3.1.2-2 of the Boiling Water Reactor Vessel and Internals Project (BWRVIP)-25 report recommends that if wedges are not installed, the core support rim bolts should be inspected for cracks using enhanced visual testing (EVT-1) from below the core plate or ultrasonic testing (UT) from above the core plate if an effective UT technique is developed. Since wedges are not currently installed at JAFNPP, the staff requests that the applicant provide information regarding the type of inspection methods, inspection frequency and the results of the inspections that have been performed thus far on core support rim bolts. If the applicant does not plan to install wedges, it should provide information regarding the accessibility for performing the inspections, type of inspections including UT technique, and inspection frequency that will be used to monitor the aging degradation in the core support rim bolts during the license renewal period.

RAI 3.1.2-2A Revised Response

During RO11 in December 1994, twenty core plate hold-down bolts were examined by visual inspection (VT-1). The bolts were examined from the top side of the core plate. All examined bolts showed that the weld keeper used as a nut lock remained fillet welded to the top of the bolt. The pertinent plant drawing shows that this is typical for all 72 bolt locations.

During RO13 in October- November 1998, all 72 core plate hold-down bolts were examined by visual inspection (VT-1) from the top side of the core plate. This inspection again showed the nut lock welded to the top of each bolt.

As described in the response to RAI 4.7.3.2-1, JAFNPP will perform one of the following.

1. Install core plate wedges prior to the period of extended operation, or

2. Complete a plant specific analysis to determine acceptance criteria for continued inspection of core plate rim hold down bolting in accordance with BWRVIP-25 and submit the inspection plan, along with the acceptance criteria and justification for the inspection plan, to the NRC two years prior to the period of extended operation for NRC review and approval.

If option 2 is selected, the analysis to determine acceptance criteria will address the information requested in RAIs 3.1.2-2A and 4.7.3.2-1.

License renewal commitment 23 specifies this commitment.

RAI 3.6.2-1

In JAFNPP LRA Table 3.6.2-1, the applicant states that 115 KV oil-filled cable (passive electrical for station blackout) has no aging effect requiring management for meeting the component's electrical intended function. The staff requests the applicant to provide a technical justification of why an AMP is not required or provide a plant-specific AMP that contains the required ten elements to manage the aging effects due to aging mechanisms such as insulation degradation, moisture intrusion, elevated operating temperature, and galvanic corrosion. In addition, explain what periodic tests are planned prior to and during the extended period of operation.

RAI 3.6.2-1 Revised Response

LRA Section 3.6.2.1, Oil-Filled Cable System, will be added as follows:

Oil-Filled Cable System

The reserve station service transformer (T2) high side connects to the 115kV switchyard breaker (10022) via an underground low-pressure oil-filled cable.

The mechanical portion, oil-filled cable system components provide a reservoir of oil for the cables with a high/low alarm. The mechanical portion has an intended function of pressure boundary, which is subject to aging management review.

The electrical portion of the oil-filled cable system consists of a single 350MCM cable per phase plus a spare cable. The 115kV underground low-pressure oil-filled transmission cables are in the offsite-power recovery path and are subject to aging management review.

115kV Oil-Filled Cables (ELEC)

The reserve station service transformer (T2) high side connects to the 115kV switchyard breaker (10022) via an underground low-pressure oil-filled cable.

The underground oil-filled transmission cable consists of a single 350MCM cable per phase plus a spare cable. The spare cable is to ensure reliability is maintained should there be a single cable failure. Cable construction has a spiral steel core as a central helix preventing cable collapse and serves as the channel for the cable-oil. Copper conductors are shaped over the spiral steel core. The copper conductors are wrapped with paper insulation then completely immersed and impregnated with insulating oil under pressure. A seamless lead sheath is applied to the impregnated paper, which prevents moisture intrusion into the cable insulation and retains the oil. As an anti-corrosion protection, the cable uses an okolene (black polyethylene) outer jacket over the lead sheath. Lead sheath cables are designed for installation in wet environments for extended periods.

The JAF oil-filled cable system will be included in the periodic surveillance and preventive maintenance program to verify the absence of aging effects that require management.

Underground Low-Pressure Oil-Filled Cable System (MECH)

The oil-filled cable system consists of carbon steel tanks, stainless steel cell banks, sight glasses, copper alloy and stainless steel valve bodies, and stainless steel tubing with an intended function of pressure boundary.

The cell banks, tanks, sight glasses, valve bodies, and tubing environments are oil internal and outdoor air external.

Aging Effects for Mechanical Components

Aging effects for materials exposed to oil:

MATERIAL	AGING EFFECT	AGING MECHANISM
Carbon Steel (internal surfaces)	Loss of Material	General corrosion Galvanic corrosion Crevice corrosion Microbiologically influenced corrosion (MIC) Pitting Corrosion
Stainless Steel (internal surfaces)	Loss of Material	Crevice corrosion Microbiologically influenced corrosion (MIC) Pitting Corrosion
Copper Alloy (internal surfaces)	Loss of Material	Crevice corrosion Microbiologically influenced corrosion (MIC) Pitting Corrosion Selective leaching
Glass (internal surfaces)	Loss of Material	General corrosion

Aging effects for materials exposed to air-outdoor:

MATERIAL	AGING EFFECT	AGING MECHANISM
Carbon Steel (external)	Loss of Material	General corrosion Crevice corrosion Pitting Corrosion
Stainless Steel (external)	Loss of Material	Crevice corrosion Pitting Corrosion
Copper Alloy (external)	Loss of Material	Crevice corrosion Pitting Corrosion

Aging Effects for Electrical Components

Loosening of bolted connections

Aging Effects Requiring Management

Loss of material from internal and external surfaces of carbon steel, stainless steel and copper alloy components is an aging effect requiring management. The Oil analysis program and External surfaces monitoring program in conjunction will be implemented by JAFNPP to manage aging effects for the mechanical portion oil-filled cable system.

Operating Experience Review

The operating experience review at JAFNPP did not identify any failures of the oil-filled cable system, but because of the uniqueness of this system, an additional search was performed for the oil filled cable. Additional operating experience was reviewed by searching the JAF CR database, and the INPO database for additional keywords "oil-filled," "cable failure," "underground cable," and "115kV." No failures were identified for the oil-filled cable. Interviews with knowledgeable plant staff did not identify any additional OE.

JAFNPP Aging Management Programs

The Oil Analysis Program, External Surfaces Monitoring Program, and Periodic Surveillance and Preventive Maintenance Program in combination will manage the effects of aging, thereby precluding loss of the intended functions of the oil-filled cable system.

Oil Analysis Program

The Oil Analysis Program will manage the mechanical portion of the low-pressure oil-filled cable system maintaining the oil systems free of contaminants (primarily water and particulates) thereby preserving an environment that is not conducive to aging mechanisms. This program manages loss of material for carbon steel, stainless steel, and copper alloy components wetted by oil. Also, this program will test the insulating oil contained in the electrical cable portion of the system. Insulating oil testing will be performed based on testing criteria and acceptance criteria in accordance with Doble: *Reference Book on Insulating Liquids and Gasses,* Doble Engineering company.

External Surfaces Monitoring

Under the External Surfaces Monitoring Program, visual inspections manage aging effects for the external surfaces of the mechanical portion of the low-pressure oil filled cable system. The program manages loss of material for external carbon steel, stainless steel, and copper alloy components by visual inspection of external surfaces.

Periodic Surveillance and Preventive Maintenance Program

The following activities, under the Periodic Surveillance and Preventive Maintenance Program for the 115kV underground oil-filled cables will verify the absence of aging effects requiring management. A preventive maintenance procedure will provide the maintenance activities for the oil-filled cable system as described in the vendor maintenance requirements. This program will ensure that the oil-filled cable system will be able to perform its intended function into the period of extended operation.

Weekly operational inspections are performed on the115kV yard readings to check oil level in the reservoirs. Each reservoir is equipped with an external sight-glass and a level switch to provide high and low-level alarms. This assures positive pressure and purity of the oil to assure there are no voids.

Visual inspection will be performed to:

- Check all exposed parts of the cable, potheads and reservoirs for physical damage.
- Check seams, valves, soldered joints and lead wipes for evidence of oil leaks.
- Check oil level in the reservoir against previous level.

These visual inspections meet the vendor recommendations and will be performed at least once per year.

A PM will be performed to check the oil level alarm switch settings in accordance with the vendor manual. This PM will be performed at least once every year.

During maintenance inspections on circuit breakers and transformers, the following will be performed:

- Check the torque of the pothead bolts as specified in the vendor manual.

The frequency of this maintenance will be at least once every five years.

LRA Table 3.6.2-1 is revised as shown below (strike-outs deleted, underlined text added).

Component Type	Intended Function	Material	Environment	AERM	AMP	NUREG -1801, Vol.2 Item	Table 1 Item	Notes
Oil-filled cable system - MECH (passive mechanical for SBO recovery)	Pressure boundary	Carbon steel, stainless steel, copper alloy, glass	Mineral oil (internal) Outdoor weather (external)	Loss of material	Oil analysis External surfaces monitoring			J
Oil-filled cable – ELEC (passive electrical for SBO recovery)	Conducts electricity	~~Insulation material – various~~ Organic polymers	~~Moisture and voltage stress~~ Outdoor weather, Soil	None	Periodic Surveillance and Preventive Maintenance			J, 602

Notes for Table 3.6.2-1

602 – Based on vendor information this transmission cable is not subject to water treeing, since it is designed for continuously wet conditions. Industry and plant operating experience has not provided any information on failures of this type of cable. The only portion of the cables exposed to the environments (outdoor weather and soil) is the okolene (black polyethylene) outer jacket, which is over the lead sheath and serves as an anti-corrosion and moisture protection. These environments do not affect the oil impregnated paper insulation.

RAI 4.7.3.2-1

Section 4.7.3.2 of the JAFNPP LRA addresses the recommendations of the BWRVIP-25 report, "BWR Core Plate Inspection and Flaw Evaluation Guidelines," pertaining to the TLAA for the RV core plate hold-down bolts. The relevant degradation mechanisms for this TLAA include loss of preload and cracking of the core plate rim hold-down bolts. Section 4.7.3.2 of the JAFNPP LRA indicated that the BWRVIP-25 report calculated the loss of preload for these bolts for the original 40-year licensed operating period. Appendix B to BWRVIP-25 projected this calculation to 60 years, demonstrating that the JAFNPP core plate rim hold-down bolts would experience, at most, a 19 percent loss of preload for the extended period of operation.

The staff determined that additional information is required concerning the data and analyses that were used to determine that the loss of preload at the end of the period of extended operation would be less than 20 percent. Therefore, the staff requests that the applicant provide additional information demonstrating that the requirements specified in the BWRVIP-25 report, including Appendix B, are applicable to JAFNPP, based on the following:

a. configuration and geometry of the JAFNPP core plate rim hold-down bolts;

b. the temperature of the core plate rim hold-down bolts during normal operation, taking into consideration power uprate conditions; and

c. projected bolt neutron fluence at the end of the period of extended operation, taking into consideration power uprate conditions.

Please include the actual values for bolt temperature and projected bolt neutron fluence in the above discussion, and explain how it was determined that the effects of temperature and neutron fluence at the end of the period of extended operation would result in less than a 20 percent loss of bolt preload. Provide a detailed description of the methodology and data used at JAFNPP to perform the above analyses, and include the basis for the stress relaxation curves.

Finally the staff requests that the applicant demonstrate that, under the conditions stated in Scenario 3 of BWRVIP-25, Appendix A (determination of hold-down bolt loading with no credit for aligner pins or rim weld), the axial and bending stresses for the hold-down bolts with the mean and highest loading will not exceed the ASME Code, Section III allowable stresses for primary membrane and primary membrane plus bending, as a result of a 20 percent reduction in the specified bolt pre-load. Clearly state the assumptions on which this analysis is based, taking into consideration the fact that the approach recommended in Appendix A of BWRVIP-25 is based on an elastic finite element analysis of the core plate and hold-down bolts.

RAI 4.7.3.2-1 Revised Response

a. The core plate hold-down bolts at JAFNPP are the typical design for a BWR-4 identified in BWR-25. JAFNPP core plate bolts have no plant-specific characteristics.
b. and c.

These sections of RAI 4.7.3.2-1 are requesting specific details related to a plant-specific analysis discussed in LRA Section 4.2.2.7. (This is also addressed in audit question 483.) The details of the analysis are not available since it has not been performed at this time. In lieu of providing the details requested, JAFNPP will perform one of the following.

1) Install core plate wedges prior to the period of extended operation, or

2) Complete a plant-specific to determine acceptance criteria for continued inspection of core plate rim hold down bolting in accordance with BWRVIP-25 and submit the inspection plan, along with the acceptance criteria and justification for the inspection plan, to the NRC two years prior to the period of extended operation for NRC review and approval.

If Option 2 is selected, the analysis to determine acceptance criteria will address the information requested in RAIs 3.1.2-2A and 4.7.3.2-1.

License renewal commitment 23 tracks this commitment.

Attachment 3

James A. FitzPatrick Nuclear Power Plant

License Renewal Application – Amendment 9

NRC Audit Database

JAFNPP AMP and AMR Database

Audit Question

50

LR Request

AMP B.1.1-1 Buried Piping and Tanks Inspection
LRA Section B.1.1, "Program Description," states that the program includes preventive measures to mitigate corrosion. Please discuss the specific preventive measures used at JAFNPP to mitigate corrosion of buried components, including the types of materials used for any coatings, wrappings, or linings.

LR Response

This program is a new program that will be consistent with GALL AMP XI.M34 including the use of preventive measures such as coatings. The preventive measures used at JAFNPP include bituminous coatings such as coal tar epoxy or enamel that are applied in accordance with industry standards and site specifications.

JAFNPP AMP and AMR Database

Audit Question

51

LR Request

AMP B.1.1-2 Buried Piping and Tanks Inspection
With regard to AMP B.1.1 described in LRA Section B.1.1, please discuss a) the aggressiveness of the soil at the JAFNPP site as it relates to degradation of each of the material-environment combinations of the buried components identified, b) how soil aggressiveness is determined at JAFNPP, and c) the variation in soil aggressiveness at the different locations containing buried components on the JAFNPP site.

LR Response

Buried components at JAFNPP are coated with materials that were selected during original design and construction to provide protection from the potential adverse conditions of the soil (i.e., groundwater). The buried piping and tanks inspection program will perform inspections that will confirm that the buried components and their coatings are adequate to ensure that the components are able to perform their intended functions for the period of extended operation.

For information concerning the aggressiveness of ground water, see the response to audit question 201.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.1-3 Buried Piping and Tanks Inspection
LRA Section B.1.1, "Program Description," states that a focused inspection will be performed within the first ten years of the period of extended operation, unless an opportunistic inspection occurs within this ten-year period. Please confirm that an inspection, either focused or opportunistic, will also be performed during the ten-year period immediately prior to entering the period of extended operation, as recommended in NUREG-1801. Also, please revise the FSAR supplement for AMP B.1.1 to reflect this inspection.

LR Response

An inspection will be performed during the 10 year period immediately prior to the period of extended operation. This point will be clarified by inserting the following after the third sentence of Section 3.1.B.4.b of JAF-RPT-05-LRD02.

"If an inspection did not occur, a focused inspection will be performed prior to the period of extended operation."

The FSAR supplement for AMP B.1.1 will be clarified to reflect this inspection.

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.1-5 Buried Piping and Tanks Inspection
With regard to AMP B.1.1 described in LRA Section B.1.1, please confirm that any coating and wrapping degradations are reported and evaluated according to site corrective actions procedures in accordance with 10 CFR 50, Appendix B.

LR Response

As stated in section B.1.1 of the LRA this program is consistent with GALL. In addition, section 3.1.B.7.b of JAF-RPT-05-LRD02 states that the site corrective action program is in accordance with 10 CFR 50 Appendix B such that any coating or wrapping degradations would be reported.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.1-6 Buried Piping and Tanks Inspection
LRA Section B.1.1, Exceptions to NUREG-1801, states that methods that allow assessment of pipe condition without excavation may be substituted for inspections requiring excavation solely for the purpose of inspection. Phased array UT technology is provided as an example of such a method. If phased array UT is used, please discuss the following with regard to this exception: a) how will the method be qualified, b) what training will inspectors be given, c) what criteria will be used to determine if corrective actions are needed, and d) what information will be provided related to the condition of coatings, linings, or wraps used on the buried components.

LR Response

The criteria will be that the inspection method allows effective assessment of piping condition without the threat of damage to the coating that accompanies excavation. It is anticipated that such methods will allow for assessment of more extensive portions of buried piping than the method of excavating for visual inspections at a sampling of locations. This exception was to allow the use of more effective state-of-the-art inspection techniques, such as phased array UT, in lieu of excavating piping which has the potential for damaging the piping and its coating. Any technique used will be appropriately qualified for use and will require the use of trained inspectors applying appropriate acceptance criteria. The specific acceptance criteria and the extent of information providing an indication of the condition of the coating will depend on the specific inspection method developed. The effectiveness of the method in determining the overall condition of the piping and its protective coating will be the determining factor in the selection of alternate methods, if any.

The following applies to the use of the phased array UT method of inspection for inspection of buried piping and tanks.
A. How will the method be qualified?
The method of qualification for a specific UT technique will be through demonstration. This will be completed utilizing the guide lines established in ASME Sec. V and any additional industry guidance that has been established at the time of qualification.
B. What training will inspectors be given?
The minimum training requirements for inspectors performing / interpreting examination results will be that of a Level II. This will be in accordance with Entergy Nuclear Northeast's non-destructive testing written practice.
C. What criteria will be used to determine if corrective actions are needed?
The piping examined will be evaluated utilizing existing Engineering procedures and specifications. Corrective actions will be through the normal JAFNPP correction action process.
D. What information will be provided related to the condition of coatings, linings, or wraps used on the buried components?
The ability to determine the condition of an exterior coating, lining, or wrap will not be known until the technique has been demonstrated. If ascertaining the condition of this material is considered an essential variable of the examination, the use of multiple test methods may be necessary to obtain the required results.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.1-8 Buried Piping and Tanks Inspection
The FSAR supplement for AMP B.1.1 In Section A.2.1 of the LRA does not include a discussion of the commitment to implement this new program prior to the period of extended operation. Please revise the FSAR supplement to include this commitment.

LR Response

Section A.2.1 of the LRA states, "All aging management programs will be implemented prior to entering the period of extended operation." For additional clarification, LRA Appendix A will be revised as follows.

Section A.2.1.1, Buried Piping and Tanks Inspection Program, add
"This program will be implemented prior to the period of extended operation."

This requires a LRA Amendment.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.9 -1 Diesel Fuel Monitoring
The "Program Description" for AMP B.1.9 states that the program entails sampling to ensure that adequate diesel fuel quality is maintained to prevent corrosion of fuel systems. Please provide the sampling frequency for each of the diesel fuel tanks in the scope of license renewal.

LR Response
The EDG fuel oil storage tanks are sampled every 31 days. The diesel fire pump fuel oil tanks are sampled every 92 days.

Reference procedure SP-01.07, "Diesel Fuel oil Sampling and Analysis", step 2.3.1:

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.9 -4 Diesel Fuel Monitoring

With regard to AMP B.1.9, please confirm that accumulated water is periodically drained from each of the diesel fuel tanks in the scope of license renewal and provide the frequency at which this activity is performed. If it is not, please provide the technical justification for not draining accumulated water periodically from each tank.

LR Response

As stated in LRA Section B.1.9 under "Enhancements", the Diesel Fuel Monitoring Program will be enhanced to include periodic draining. The diesel fuel oil tanks are sampled monthly for water. If water is detected then it is drained. Site reference is ST-9J.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.9 -5 Diesel Fuel Monitoring
With regard to AMP B.1.9, please clarify whether coatings are used on any of the diesel fuel tanks in the scope of license renewal. Please include the type of coating, if any, and the results of any recent inspections of the coating.

LR Response

Coatings are not used on the diesel fuel tanks in the scope of license renewal.

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.9 -6 Diesel Fuel Monitoring
With regard to AMP B.1.9, please confirm that multi-level oil sampling and analysis are performed for the diesel fuel oil storage tank in accordance with ASTM Standard D 4057. If it is not, please provide the technical justification for not performing multi-level sampling.

LR Response

JAFNPP performs periodic multilevel sampling to provide assurance that fuel oil contaminants are within acceptable limits. ASTM D4057, Standard Practice for Manual Sampling of Petroleum and Petroleum Products, is used for guidance on oil sampling.
The JAF procedure is SP-01.07.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.9 -7 Diesel Fuel Monitoring
With regard to AMP B.1.9, please provide the frequency at which water and biological activity or particulate contamination concentrations are monitored and trended for each of the diesel fuel tanks in the scope of license renewal.

LR Response
The monitoring and trending attribute of NUREG-1801, Section XI.M30, Fuel Oil Chemistry Program states water and biological activity or particulate contamination concentrations are monitored and trended in accordance with the plant's technical specifications or at least quarterly. As indicated in the LRA, no exceptions are taken with respect to the monitoring and trending attribute of the program described in NUREG-1801, Section XI.M30. The EDG fuel oil storage tanks are sampled every 31 days. The diesel fire pump fuel oil tanks are sampled every 92 days. These samples include a Tech Spec required composite for particulates on the diesel fuel oil storage tanks. The samples also include a test for water and sediment required by the Technical Requirements Manual.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.9 -8 Diesel Fuel Monitoring
The Operating Experience section for AMP B.1.9 states that in 2000, sample results for EDG fuel oil storage tanks exceeded the industry acceptable limit for particulate contamination. Please discuss the extent and cause of this excursion and the corrective actions.

LR Response

The probable cause was listed as possible fuel oil degradation. The extent affected tanks TK-6B and TK-6D. Corrective actions included resampling tank TK-6B and draining and refilling tank TK-6D with fresh fuel oil. Resample results of TK-6B were acceptable.

Reference document, CR-JAF-2000-02022 and CR-JAF-2000-05845

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.9 -9 Diesel Fuel Monitoring
The Operating Experience section for AMP B.1.9 states that in 2002, trending of bottom sample results for EDG fuel oil storage tank 93TK-6C showed a particulate contamination increase. Please discuss the extent and cause of this excursion.

LR Response

The probable cause was listed as fuel oil degradation. Corrective action was to drain 2000 gallons of fuel oil from the bottom of the tank and refill the tank with fresh fuel oil

Reference document, CR-JAF-2002-01207.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.9 -10 Diesel Fuel Monitoring
The Exception noted for AMP B.1.9 states that the guidelines of ASTM D2276 are not used for determination of particulates; instead ASTM D6217 is used. However, NUREG-1801, Rev. 1, includes ASTM D6217 as an acceptable standard for the determination of particulates. Please clarify why the use of ASTM D6217 was identified as an exception.

LR Response
The NUREG-1801 Section XI.M30 Parameters Monitored/Inspected states, "For determination of particulates, modified ASTM D 2276, Method A, is used.". The guidelines of ASTM D2276 are not used for determination of particulates, so it was necessary to identify this as an exception.

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.9 -11 Diesel Fuel Monitoring

The Enhancement noted for AMP B.1.9 states that the Diesel Fuel Monitoring Program will be enhanced to include periodic draining, cleaning, visual inspections, and ultrasonic measurement of the bottom surfaces of the fire pump diesel fuel oil tanks, EDG day tanks, and EDG fuel oil storage tanks. Please provide a) the frequency for these activities for each diesel fuel tank in the scope of license renewal, b) the basis for each frequency, and c) how the locations for UT measurements will be determined.

LR Response

The emergency diesel underground fuel oil storage tanks are cleaned and inspected on an eight year frequency. They were UT inspected in 1988. These inspections have not revealed any degradation in the surface of the tank. As described in XI.M34 the most susceptible area for corrosion is the bottom of the tanks where water and sediment can accumulate. JAFNPP plans to continue to inspect these tanks on this eight year frequency based on past inspection results and if any significant corrosion is detected a UT of the corrosion site and adjacent areas of the tank bottom will be performed using the appropriate grid size based on the size of the tank.

The fire pump diesel fuel oil tanks and the EDG day tanks are not currently subjected to internal inspections. An inspection frequency cannot be firmly established until the internal condition of these tanks is baselined. JAFNPP therefore plans to inspect these tanks on an eight year frequency similar to the EDG underground storage tanks. This frequency is based on the past inspection results of the EDG underground fuel oil storage tanks which have not indicated significant degradation while exposed to the same internal fuel oil environment. If initial inspections find unexpected conditions the frequency will be adjusted via the corrective action process.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.9 -12 Diesel Fuel Monitoring
Section B.1.9 of the LRA states two enhancements for AMP B.1.9; however, the FSAR supplement in Section A.2.1.9 of the LRA does not include a discussion of the commitment to enhance this program. Please revise the FSAR supplement to include a discussion of the two enhancements for AMP B.1.9 to be implemented prior to the period of extended operation.

LR Response
Section A.2.1 of the LRA states, "All aging management programs will be implemented prior to entering the period of extended operation." This includes enhancements to individual programs. For additional clarification, LRA Appendix A will be revised as follows.

Section A.2.1.9, Diesel Fuel Monitoring Program, add
"This program will be enhanced to include periodic draining, cleaning, and ultrasonic measurement of the bottom surfaces of the fire pump diesel fuel oil tanks, EDG day tanks, and EDG fuel oil storage tanks. Also, this program will be enhanced to specify acceptance criteria for UT measurements of diesel fuel storage tanks included in this program. These enhancements will be implemented prior to the period of extended operation."

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.9 -13 Diesel Fuel Monitoring
With regard to AMP B.1.9, please clarify whether flashpoint is measured as part of the fuel oil analysis. If it is not, please provide the technical justification for not measuring this parameter.

LR Response

Flashpoint is not a required parameter for this AMP. NUREG-1801 Section XI.M30 does not specify flash point as a test for diesel fuel oil. However, flash point is measured.

Reference procedure SP-01.07, "Diesel Fuel oil Sampling and Analysis", step 3.1.2.A:
Flash Point – °F 125 °F - min

Flash points are measured on both new and stored diesel fuel oil.

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.9 -14 Diesel Fuel Monitoring
Clarify whether or not the inspections and/or surveillance tests requirements described in this AMP are consistent with Technical Specifications (TS) Sections 3.0.2, 3.0.3, 3.8.3.3 and 5.5.10. If not, provide a technical basis for its acceptability and your commitments for revising the TS.

LR Response

The inspections and/or surveillance test requirements described in this AMP are consistent with Technical Specifications (TS).

Reference procedure SP-01.07, "Diesel Fuel oil Sampling and Analysis", step 3.1.1.

JAFNPP AMP and AMR Database

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LR Request
AMP B.1.21-2 One-Time Inspection
In LRA Section B.1.21, the Program Description states that the one-time inspection activity for small bore piping in the reactor coolant system and associated systems that form the reactor coolant pressure boundary will also be comparable to the program described in NUREG-1801, Section XI.M35, One-Time Inspection of ASME Code Class I Small-Bore Piping. Please clarify if JAFNPP meets the requirements of ASME Section XI with respect to the inspection of Class 1 small bore piping and socket welds.

LR Response
JAFNPP meets the requirements of ASME Section XI with respect to the inspection of Class 1 small bore piping and socket welds through implementation of a risk-informed ISI program. During the period of extended operation, as required by 10 CFR 50.55a, JAFNPP will meet the requirements of ASME Section XI or implement an approved alternative such as the existing risk-informed ISI Program.

The ISI program for small-bore piping at JAF uses nondestructive examination (NDE) techniques to detect and characterize flaws. Three different types of examinations are volumetric, surface, and visual. Examinations performed on pipe segments within the 3rd interval inspection program have included the examination of associated socket welds. The pipe segments have been examined for FAC and thermal fatigue by ultrasonic's, radiography and surface examination (dependent upon flaw mechanism) that captures the associated socket welds verifying integrity. Surface examinations, such as magnetic particle or dye penetrant testing, are used to locate surface flaws.

Three levels of visual examinations are specified. VT-1 visual examination is conducted to assess the condition of the surface of the part being examined, looking for cracks and symptoms of wear, corrosion, erosion or physical damage. It can be done with either direct visual observation or with remote examination using various optical and video devices. VT-2 visual examination is conducted □specifically to locate evidence of leakage from pressure retaining components (periodic pressure tests). While the system is under pressure for a leakage test, visual examinations are conducted to detect direct or indirect indication of leakage. VT-3 visual examination is conducted to determine general mechanical and structural condition of components and supports and to detected discontinuities and imperfections.

A preliminary review of Class 1 piping was performed to derive an estimated number of Class 1 socket welds and/or piping segments in accordance with the Risk-Informed Inservice Inspection Program (RI-ISI). The estimated total of Class 1 socket welds and/or piping segments is eight piping segments that are inspected in each ISI interval out of the total segments identified in the ISI program and includes approximately 15 welds out of the total class I socket weld population. The total number of inspections conducted during the 3rd ISI Interval estimated at approximately 5% of the total segments and 1% of the total welds.

Examination Category B-F welds are scheduled and examined as part of the IGSCC Augmented Inspection Program. Extent and frequency of examinations are in accordance with the Risk-Informed ISI Program.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.21-7 One-Time Inspection
The FSAR supplement for AMP B.1.21 in Section A.2.1.23 of the LRA does not discuss the commitment to implement this new program prior to the period of extended operation. Please revise the FSAR supplement to discuss this commitment.

LR Response

Section A.2.1 of the LRA states, "All aging management programs will be implemented prior to entering the period of extended operation." This includes the One-Time Inspection Program. For additional clarification, LRA Appendix A will be revised as follows.

Section A.2.1.23, One-Time Inspection Program, add
"This program will be implemented within the 10 years prior to the period of extended operation."

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.22-3 Periodic Surveillance and Preventive Maintenance

In LRA Section B.1.22, the table in the Program Description states that this AMP will be used to manage loss of material for carbon steel components on cranes, rails, and girders. NUREG-1801 includes AMP XI.M23, Inspection of Overhead Heavy Load and Light Load Handling Systems, which covers aging management of these components. Please confirm that the activities in JAFNPP AMP B.1.22 are consistent with the recommendations in NUREG-1801 AMP XI.M23 for managing aging of these components. Please provide the technical justification for those activities that are not consistent.

LR Response

Reactor building steel crane structural girders used in load handling are inspected under the Periodic Surveillance and Preventive Maintenance Program (PSPM) identified in Section B.1.22 of the application. Process facility crane rails and girders are inspected under the Structures Monitoring Program as identified in Section B.1.27. The Structures Monitoring Program will be enhanced, as identified in Section B.1.27, to address crane rails and girders. These programs when enhanced will include visual inspections of the crane rails and girders consistent with XI.M23 to manage loss of material. Therefore the aging management activities for crane rails and girders under the above two programs will be consistent with the attributes described for the program in NUREG-1801 XI.M23 during the period of extended operation.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.22-4 Periodic Surveillance and Preventive Maintenance
In LRA Section B.1.22, the table in the Program Description states that this AMP will be used to manage loss of material for the internal surfaces of various piping, valve, and flow elements. NUREG-1801 includes AMP XI.M38, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components, which covers aging management of these components. Please confirm that the activities in JAFNPP AMP B.1.22 are consistent with the recommendations in NUREG-1801 AMP XI.M38 for managing aging of these components. Please provide the technical justification for those activities that are not consistent.

LR Response

The XI.M38 program consists of visual inspections of the internal surfaces of steel piping, piping components, ducting, and other components exposed to environments such as condensation and uncontrolled indoor air that are not covered by other aging management programs.

Aging management activities for internal steel piping, piping components, and ducting included in the Periodic Surveillance and Preventive Maintenance program as shown in Attachment 3 of JAF-RPT-05-LRD-02- include periodic visual inspections and are consistent with the attributes described for the program in NUREG-1801 XI.M38

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.22-5 Periodic Surveillance and Preventive Maintenance
In LRA Section B.1.22, the table in the Program Description states that this AMP will be used to monitor core spray piping per the existing augmented flow accelerated corrosion program. Similar statements are made for the HPCI system and RCIC system piping. Please clarify the intent of these statements. Specifically, are these components in the scope of this AMP or the flow-accelerated corrosion AMP?

LR Response

The intent of these statements was to explain that the core spray, HPCI and RCIC piping included in this program are administratively controlled in the Flow Accelerated Corrosion program, but are inspected using the Periodic Surveillance and Preventive Maintenance program. Because the aging effect for these components is loss of material due to erosion and not loss of material due to flow accelerated corrosion it would not be appropriate to manage using the Flow Accelerated Corrosion program. Therefore these components are managed by the Periodic Surveillance and Preventive Maintenance program..

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.22-7 Periodic Surveillance and Preventive Maintenance
The FSAR supplement for AMP B.1.22 in Section A.2.1.24 of the LRA does not discuss the commitment to implement the enhancement to this program prior to the period of extended operation. *Please revise the FSAR supplement to discuss this commitment.*

LR Response

Section A.2.1 of the LRA states, "All aging management programs will be implemented prior to entering the period of extended operation." This includes enhancements to individual programs. For additional clarification, LRA Appendix A will be revised as follows.

Section A.2.1.24, Periodic Surveillance and Preventative Maintenance Program, add "This program will be enhanced as necessary to assure that the effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis. These enhancements will be implemented prior to the period of extended operation."

This requires a LRA amendment.

JAFNPP License Renewal Commitment 13 states, "Enhance the Periodic Surveillance and Preventive Maintenance Program as necessary to assure that the effects of aging will be managed as described in LRA Section B.1.22". The referenced LRA section identifies the specific PSPM activities credited for license renewal. This assures that all of the credited activities are identified when implementing the commitment. JAF-RPT-05-LRD02 identifies which of these specific activities are accomplished with existing procedures. JAF-RPT-05-LRD02 will be a reference employed when implementing the commitment.

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.2 -1 BWR CRD Return Line Nozzle
The program description of the LRA states that JAFNPP has cut and capped the CRD return line (CRDRL) nozzle to mitigate cracking, and continues ISI examinations to monitor the effects of crack initiation and growth of the nozzle and cap. Please provide the following information:
a) Provide details about the cracking found and the repairs made (i.e., cut and capped) to mitigate future cracking;
b) Provide the ASME Section XI inspection results since the corrective actions to address cracking were implemented; and
c) Discuss the results of your 2004 self-assessment and the corrective actions taken.

LR Response

a) UT data for CRDRL cut and cap (1983) was provided.

B) The CRDRL nozzle-to-cap and cap weld was inspected after the cap was installed and has been inspected in accordance with the IGSCC Inspection Program as a Category E weld. In 2000 the inspection results revealed an unacceptable flaw in this weld and a repair was initiated to install a weld overlay. (Reference: JAF Mod JD-00-010). Upon completion of the weld overlay Mod a UT examination for the inspection of overlays was performed with acceptable results.

C) Copy of assessment was provided to the NRC auditor. LO-WPOLO-2004-00056

JAFNPP AMP and AMR Database

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LR Request
AMP B.1.2 -2a BWR CRD Return Line Nozzle
The discussion of Exceptions to NUREG-1801 for AMP B.1.2 in the LRA states that JAFNPP repaired the CRDRL nozzle by weld overlay rather than removing the crack by grinding. ASME Code Case N-504-1 was the technical basis for using this alternate repair. It is also stated that the staff has approved the use of this Code Case in a letter dated October 26, 2000. Please provide the following information:

Since code cases can not be used as the basis for justification to license renewal, please provide the technical justification for this weld repair for the period of extended operation.

LR Response
Technical justification to license renewal for Applicability to Nickel-Based Austenitic Steel
This repair was prepared specifically for austenitic stainless steel material. An alternate application to nickel-base austenitic materials (i.e., Alloy 52) was used due to the specific configuration of the nickel-based austenitic weldment.
A nickel-based filler was required and Alloy 52 was selected in place of low carbon austenitic stainless steel.
Delta ferrite measurements were not performed for this overlay.
A system hydrostatic test of completed repairs has been performed.
A system leakage test of completed repairs with a four-hour hold time was used

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.2 -2b BWR CRD Return Line Nozzle
The discussion of Exceptions to NUREG-1801 for AMP B.1.2 in the LRA states that JAFNPP repaired the CRDRL nozzle by weld overlay rather than removing the crack by grinding. ASME Code Case N-504-1 was the technical basis for using this alternate repair. It is also stated that the staff has approved the use of this Code Case in a letter dated October 26, 2000. Please provide the following information:
b). Discuss how the CRDRL will be monitored for cracking during the period of extended operation

LR Response

The CRDRL is incorporated into the JAF IGSCC Inspection Program, implemented in accordance with the requirements of BWRVIP-75A, classified under Category E. The extent and frequency of the inspection are in accordance with the parameters specified under Category E weldments

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.2 -3 BWR CRD Return Line Nozzle

The discussion of Exceptions to NUREG-1801 for AMP B.1.2 in the LRA states that liquid penetrant testing (PT) of CRDRL nozzle blend radius, adjacent wall area and bore regions is not performed. Note 3 states that JAFNPP performs EVT-1 visual examinations (1/2 mil resolution) of the CRDRL nozzle blend radius and adjacent wall area every 10 years in lieu of PT examinations. Note 3 further states that the weld overlay installed over a crack in the CRDRL nozzle-to-cap weld covers the nozzle, the nozzle-to-cap weld, and part of the cap. Since the weld overlay is examined using UT in accordance with GL 88-01 and BWRVIP 75-A, the LRA concludes that examination of the nozzle and original nozzle-to-cap weld is not required. In NUREG-1801, AMP XI.M6 recommends PT inspection of CRDRL nozzle blend radius and bore regions, and the reactor vessel wall area beneath the nozzle. Please provide a discussion, including drawings, to clarify how UT inspection of the weld overlay is consistent with the recommendations in NUREG-1801. Also, please discuss how these regions will be monitored for cracking during the period of extended operation.

LR Response

The CRDRL nozzle blend radius has been added to ISI Program and is examined in accordance with the ASME Section XI Code requirements of IWB-2500-1, code Category B-D, Item No. B3.100. Reference ASME Section XI, Figure IWB-2500-7(a) through (d), Nozzle in Head or Shell CRDRL nozzle Relief request RR-29, Request for Relief from the ASME Boiler and Pressure Vessel Code Requirements (TAC No. MB5037). This relief allows the use of the PDI program in lieu of ASME Section XI, 1995 Edition, 1996 Addenda.

As discussed with the NRC auditor, this activity is listed as an exception to NUREG-1801 since the dissimilar weld between the CRDRL nozzle and end cap is inspected as part of the JAFNPP IGSCC program and not subject to ASME Section XI Subsection IWB requirements. This is discussed in LRA B.1.2 Note 1.

The CRD return line and nozzle, while outside pipe size requirement (less than 4"), was originally included in the IGSCC (NUREG 0313) program as an enhancement based on susceptible materials and temperature parameters. The line was cut and capped in 1985 and the nozzle to cap weld was overlaid in 2000. Current examination of the overlay weld is currently performed by ultrasonic examination per IGSCC program requirements.

The CRD return line nozzle blend radius receives a periodic (once per interval) EVT-1 and ASME Section XI category B-D weld and inner radius ultrasonic examination.

JAF-RPT-05-LRD02 will be revised to correct section 4.1.B.4.b to read "Numerous UT examinations" vice current language of "Numerous PT examinations".

The enhancement listed for B.1.2 "BWR CRD Return Line Nozzle" relates to the fact that this inspection was not part of the original schedule for the current third interval, although an inspection was performed. CR-JAF-2006-00581 describes this situation.

As discussed with the NRC auditor, this enhancement to B.1.2 contains an error which will be corrected. The category B-D items should be listed as B3.90 and B3.100 since JAF uses Program B in IWB-2500-1.

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.2 -4 BWR CRD Return Line Nozzle

The discussion of Exceptions to NUREG-1801 for AMP B.1.2 in the LRA states that JAFNPP was granted an exemption from the requirement to perform a CRD return flow capacity test per NUREG-0619 through an NRC letter dated August 25, 1983, which was issued before the CRDRL modification was made. Please discuss the technical justifications for this exemption, and provide a copy of the NRC letter accepting them.

LR Response

In NYPA letter JPN-83-64 dated July 7, 1983 there is a detailed discussion of the defect and the CRD return flow capacity test. NRC Letter dated 8/25/1983 indicates a regulatory acceptance of the NYPA technical position.

Documentation is available onsite for review

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.2 -5 BWR CRD Return Line Nozzle

The discussion of Exceptions to NUREG-1801 for AMP B.1.2 in the LRA states that the dissimilar weld between the CRDRL nozzle and the end cap is not subject to ISI per ASME Section XI, Subsection IWB. Note 1 states that this weld is inspected by UT as part of the JAFNPP IGSCC program. Please discuss the technical justification for this exception and provide a copy of the SER written by the staff accepting this use of UT to inspect this weld.

LR Response

As discussed with the NRC auditor, this activity is listed as an exception to NUREG-1801 since the dissimilar weld between the CRDRL nozzle and end cap is inspected as part of the JAFNPP IGSCC program and not subject to ASME Section XI Subsection IWB requirements. This is discussed in LRA B.1.2 Note 1.

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.3-1a BWR Feedwater Nozzle
The Program Description for AMP B.1.3 in the LRA states that, under this program, JAFNPP has removed all identified feedwater blend radii flaws. Please provide the following information:
a) Discuss the nature of the flaws identified in the feedwater blend radii.

LR Response

No indications were noted during the performance of the FW Nozzle Mod for the removal of Cladding. Change of the FW thermal sleeve was performed in accordance with NUREG-0619.

The phrase "removed all identified feedwater blend radii flaws" is standard terminology for the description of a repair of this nature. However, it will be removed to increase clarity of the LRA.

This requires an amendment to the LRA.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.3-1b BWR Feedwater Nozzle
The Program Description for AMP B.1.3 in the LRA states that, under this program, JAFNPP has removed all identified feedwater blend radii flaws. Please provide the following information:
b) Provide details on the size and location of any cracks found in the feedwater nozzles, along with their repairs. Include a discussion of any cracking found after the removal of cladding.

LR Response

No flaws were identified during the implementation of this modification.

The phrase "removed all identified feedwater blend radii flaws" is standard terminology for the description of a repair of this nature. However, it will be removed to increase clarity of the LRA.

This requires an amendment to the LRA.

JAFNPP AMP and AMR Database

Audit Question

99

LR Request

AMP B.1.3-2a BWR Feedwater Nozzle

The Program Description for AMP B.1.3 in the LRA states that this program implements enhanced inservice inspection (ISI) of the feedwater nozzles in accordance with the requirements of ASME Section XI, Subsection IWB and the recommendations of General Electric (GE) NE-523-A71-0594 to monitor the effects of cracking on the intended function of the feedwater nozzles. Please provide the following information:

a) Discuss the methodology used in performing the enhanced ASME Inservice Inspections (ISI) of the feedwater nozzles, and the results of the most recently completed ISI inspections.

LR Response

The third interval feedwater nozzle inner radius examinations were completed with phased array automated techniques (Wesdyne) based on EPRI modeling meeting ASME Section XI, NUREG-0619 and NE-523-A71-0594 Rev.1 requirements. No recordable indications were identified in the area of interest. Subsequent examinations will be performed per ASME Section XI as modified by the fourth interval ISI program.

In 1983 the FW nozzle modification (removing stainless steel cladding from the FW nozzle; installing the triple thermal sleeve, double piston-ring seal spargers; and cutting & capping the CRD return line) was implemented. Inspections of the FW nozzle blend radius area have been performed every inspection interval in accordance with NUREG 0619 and/or the alternative requirements of GE document NE-523-A71-0594 Rev 0 and Rev 1. The results of these inspections revealed no relevant and/or reportable indications.

The most recently completed ISI inspections performed on the FW nozzle blend radius were conducted in 2002 using GE document NE-523-A71-0594 Rev 1, meeting Table 6-1, Method 4, Note 2 and 3, Triple sleeve, double piston ring, unclad. In accordance with this criterion JAF meets the requirement to extend the inspection interval to 10 years.

JAFNPP AMP and AMR Database

Audit Question
100

LR Request
AMP B.1.3-2b BWR Feedwater Nozzle
The Program Description for AMP B.1.3 in the LRA states that this program implements enhanced inservice inspection (ISI) of the feedwater nozzles in accordance with the requirements of ASME Section XI, Subsection IWB and the recommendations of General Electric (GE) NE-523-A71-0594 to monitor the effects of cracking on the intended function of the feedwater nozzles. Please provide the following information:
b) Provide additional details on the recommendations in GE report NE-523-A71-0594 that JAFNPP has implemented in this AMP. Please specify the revision of the GE report that was used.

LR Response
The enhanced ASME Inservice Inspections (ISI) of the feedwater nozzles per NUREG-0619 and NE-523-A71-0594 expand the inner radius examination volume identified by ASME Section XI to the nozzle OD taper.
Feedwater nozzle inner radius examinations were completed in 2002 using phased array automated techniques (Wesdyne) based on procedure GFITI-ISI-210AD that references NE-523-A71-0594 revision 1.

JAFNPP AMP and AMR Database

Audit Question

101

LR Request

AMP B.1.3-3 BWR Feedwater Nozzle
The discussion of the Exception for AMP B.1.3 in the LRA states that NRC noted that the intent of the requirements of NUREG-0619 and NEDO-21821-A had been satisfied with the JAFNPP modifications. Please clarify how the intent of the requirements of NUREG-0619 and NEDO-21821-A were satisfied with the steps taken to address feedwater cracking. Also, please provide a copy of NEDO-21821-A.

LR Response

In 1983 the FW nozzle modification (removing stainless steel cladding from the FW nozzle; installing the triple thermal sleeve, double piston-ring seal spargers; and cutting & capping the CRD return line) was implemented. Repairs meet the requirements and guidelines of NUREG 0619/NEDO-21821-01. Inspections of the FW nozzle blend radius area have been performed every inspection interval in accordance with and/or the alternative requirements of GE document NE-523-A71-0594 Rev 0 and Rev 1. The results of these inspections revealed no relevant and/or reportable indications.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.3-4 BWR Feedwater Nozzle
With regard to AMP B.1.3, please discuss how JAFNPP will monitor the bypass flow (if any) around the feedwater nozzle thermal sleeve to detect leakage due to degraded thermal sleeve seals and welds during the period of extended operation.

LR Response

JAFNPP submitted letter JPN-99-003, dated February 18, 1999, Commitment Change Feedwater Nozzle Leakage Monitoring System, detailing JAF's basis and position for discontinuing the use of the FW Leakage Monitoring System (LMS) to detect Feedwater bypass flow at JAF. JAF has adopted the recommendations of NUREG-0619 byimplementing the following:

•Removing stainless steel cladding from the Feedwater nozzles
•Installing triple thermal sleeve, double pistion-ring seal spargers
•Cutting and capping the Control Rod Drive (CRD) return line
•Changing the internal valve trim in the low flow Feedwater control valve, and
•Implementing an augmented inspection program

This commitment change was evaluated using the Nuclear Energy Institute's (NEI) guidelines on commitment management (NEI "Guideline for managing NRC Commitments," Nuclear Energy Institute, Rev. 2, December 19, 1995

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.4 -1 BWR Penetrations
In NUREG-1801, the discussion in the Scope of Program element for AMP XI.M8 notes that guidelines for repair design criteria are provided in BWRVIP-57 for instrumentation penetrations, and BWRVIP-53 for the SLC line. Please confirm that JAFNPP AMP B.1.4 follows the guidelines provided in BWRVIP 53 and 57 for repairs, along with the inspection and evaluation guidelines of BWRVIP-49 and 27.

LR Response

The BWR Penetrations Program scope of program is consistent with NUREG-1801 XI.M8, BWR Penetrations.

The BWR Penetrations Program follows the guidelines of BWRVIP 53-A and 57-A for repairs and BWRVIP-49-A and 27-A for inspection and evaluation of applicable penetrations.

All BWRVIP guidelines are followed by JAFNPP as described in EN-DC-135, JAF-RPT-NBS-01848, JAF-RPT-NBS-04394, and ER-JAF-06-25191.

JAF is committed to apply BWRVIP documents per BWRVIP letter to NRC "BWR Utility Commitments to the BWRVIP" dated May 30, 1997, and BWRVIP letter to NRC "BWR Utility Commitments to the BWRVIP" dated October 30, 1997.

JAFNPP AMP and AMR Database

Audit Question

106

LR Request

AMP B.1.4 -3 BWR Penetrations
In NUREG-1801, the discussion in the Detection of Aging Effects element for AMP XI.M8 notes that the NDE techniques appropriate for inspection of BWR vessel internals, including the uncertainties, are included in BWRVIP-03. Please discuss the NDE techniques in BWRVIP-03 that are used in the JAFNPP inservice inspection program as part of AMP B.1.4.

LR Response

A discussion of NDE techniques used for inspection of BWR penetrations is provided in section 4.3 of JAF-RPT-05-LRD02, which was available for review on site.

Section 11 of BWRVIP-03 describes NDE techniques outlined in BWRVIP-27-A for inspection of SLC/ΔP nozzles. As described in section 4.3 of JAF-RPT-05-LRD02, JAFNPP performs an enhanced visual leakage inspection (with direct view of component during pressure test) every outage and a surface examination every 10 years until such time as a volumetric inspection technique is developed. Once an acceptable volumetric examination is developed, it will be performed each 10 year ISI interval in conjunction with continued visual inspections each outage.

Section 14 of BWRVIP-03 endorses the inspection guidelines of BWRVIP-49-A for inspection of instrumentation penetrations. As described in section 4.3 of JAF-RPT-05-LRD02, JAFNPP performs visual inspections of penetrations and nozzle-to-extension welds during pressure testing (VT-2).

Both the SLC/ΔP nozzles and instrumentation penetrations are inspected by the ISI program which is consistent with the guidance of BWRVIP-03.

All BWRVIP guidelines are followed by JAFNPP as described in EN-DC-135, JAF-RPT-NBS-01848, JAF-RPT-NBS-04394, and ER-JAF-06-25191.

JAF is committed to apply BWRVIP documents per BWRVIP letter to NRC "BWR Utility Commitments to the BWRVIP" dated May 30, 1997, and BWRVIP letter to NRC "BWR Utility Commitments to the BWRVIP" dated October 30, 1997.

JAFNPP AMP and AMR Database

Audit Question

107

LR Request

AMP B.1.4 -4 BWR Penetrations
In NUREG-1801, the discussion in the Acceptance Criteria element for AMP XI.M8 notes that BWRVIP-14, 59, and 60 provide guidelines for the evaluation of crack growth for stainless steel, nickel alloys and low alloy steels, respectively. Please confirm that these recommended guidelines are included in AMP B.1.4, and make the JAFNPP procedures that implement these recommended guidelines available for staff review.

LR Response

The BWR Penetrations Program does not specifically use the guidelines for flaw growth evaluation as specified in BWRVIP-14, 59, 60. Flaws found during inspections are evaluated per applicable section of ASME Section XI. The ISI program procedures, JAF-ISI-0002 and JAF-ISI-0003, were available for review on site.

NUREG-1801 Section XI.M8 states:
"Any indication detected is evaluated in accordance with ASME Section XI or other acceptable flaw evaluation criteria, such as the staff-approved BWRVIP-49 or BWRVIP-27 guidelines. Applicable and approved BWRVIP 14, BWRVIP-59, and BWRVIP-60 documents provide guidelines for evaluation of crack growth in stainless steels (SSs), nickel alloys, and low-alloy steels, respectively."

For this attribute of this AMP at JAF, flaw growth evaluation is performed using ASME Section XI criteria as allowed by GALL. In this case, the BWRVIP-14, 59, 60 guidance is not needed

All BWRVIP guidelines are followed by JAFNPP as described in EN-DC-135, JAF-RPT-NBS-01848, JAF-RPT-NBS-04394, and ER-JAF-06-25191.

JAF is committed to apply BWRVIP documents per BWRVIP letter to NRC "BWR Utility Commitments to the BWRVIP" dated May 30, 1997, and BWRVIP letter to NRC "BWR Utility Commitments to the BWRVIP" dated October 30, 1997.

JAFNPP AMP and AMR Database

Audit Question

108

LR Request

AMP B.1.4 -5 BWR Penetrations
In NUREG-1801, AMP XI.M8, eleven BWRVIP reports are referenced as guidance documents to manage aging effects of BWR penetrations. Appendix C of this LRA addresses the applicant action items associated with only of these reports - BWRVIP-27. Please provide the repsonses to the applicant action items applicable to JAFNPP for each of the remaining 10 BWRVIP reports cited in NUREG-1801.

LR Response

Responses to BWRVIP action items are provided in LRA Appendix C.

A copy of all SE reports for all BWRVIP documents was provided to the staff at JAFNPP. The complete list of BWRVIP documents with license renewal applicant action items is: 18-A, 25, 26-A, 27-A, 38, 41, 47-A, 48-A, 49-A, 74-A. None of the SE reports for other BWRVIP documents contain such action items.

JAFNPP AMP and AMR Database

Audit Question

109

LR Request

AMP B.1.4 -6 BWR Penetrations
The discussion of Operating Experience for AMP B.1.4 in the LRA states that self-assessments in 2004 and 2005 revealed no issues or findings that could impact effectiveness of the program. Please provide the details of the findings resulted from these self-assessments applicable to this AMP. Address any issues related to penetrations that have been determined to be sensitized.

LR Response

Section 4.6 and 4.10.7 of assessment report JAF-RPT-NBS-04394, "Assessment of Vessel Internals Health", evaluates the effectiveness of inspections of BWR vessel penetrations and documents acceptable tests. Copies of these reports were provided to the NRC auditor. Details of a 2004 ISI self assessment and 2005 BWRVIP self assessment identified no relevant findings related to penetration inspections.

JAFNPP AMP and AMR Database

Audit Question

110

LR Request

AMP B.1.5-1a BWR Stress Corrosion Cracking
The Program Description for AMP B.1.5 in the LRA sates that JAFNPP has taken actions to prevent IGSCC and will continue to use materials resistant to IGSCC for component replacements and repairs following the recommendations delineated in NUREG-0313, Generic Letter 88-01, and the staff-approved BWRVIP-75-A report. Please provide the following information:
a) Discuss the details of any weld repairs and material replacement of components at JAFNPP to implement the NUREG-0313, GL 88-01 and BWRVIP-75A recommendations.

LR Response

Core Spray from RPV Nozzle on B loop to first isolation valve was replaced with 347NG in 1992 and Core Spray A loop was replaced from the Safe End to the Isolation Valve with 316L.
All other IGSCC repairs have been by Weld Overlay.
JAF Pipe Specification Class 1504 restricts Carbon Content to .035% max and requires solution annealing.

A) The following is the IGSCC Program and welds by Category:

IGSCC Examination Category A

Category A - Identifies welds, which are fabricated from resistant materials.
(Total Population = 24) the increase in population is due to the installation of RWCU MOD No. JD-99-134
Category A-1- Identifies longitudinal seam welds.
(Total Population = 163)
Category A* - Identifies sweep-o-let welds that have been solution annealed.
(Total Population = 8)

NOTE: Long seam welds within the IGSCC Inspection Program are housed solely in the longitudinal seam weld spreadsheet database and were previously categorized as Category A-1. The ISI Program at James A. FitzPatrick has been updated to reflect the requirements of 10CFR50.55a. The longitudinal seam weld spreadsheet shall be maintained for the purposes of location and identification only, and will no longer be updated except when these two parameters are affected.

IGSCC Examination Category B

Category B are those welds not made of resistant materials that have had a Stress Improvement (SI) process performed either before service or within two years of operation.

Category B - There are no welds in this category.

IGSCC EXAMINATION CATEGORY C

Category C are those welds not made of resistant materials that have been given an SI process after more than two years of operation. NUREG 0313 Frequency and Extent Inspection requirements = All Every 10 Years.

ENN has further defined those welds in Category C by using the following suffixes:

Category C-2 - Identifies welds given a SI process after more than two years of operation.
(Total Population = 59)
Category C* - Identifies welds treated with a Resistance Heating Stress Improvement (RHSI) process after more than two years of operation.
(Total Population = 2)
Category C-3 - Identifies welds given an SI process after more than two years of operation and have a service stress over 1.0 SM. Reference NuReg 0313, Rev. 2, Section 4.5.
(Total Population = 3)

JAFNPP AMP and AMR Database

IGSCC Examination Category D

Category D - NWC=100% every 6 years;
HWC/NMCA =100% every 10 years (at least 50% in 1st 6 years)
*as supplemented by Notes: 1, 2,and 3(b)
Included in this category are all bimetallic nozzle weldments made with non-resistant material and 182 inconel weld butter.
(Total Population = 27)
The decrease in population is due to an overlay being applied to N-9-C1

IGSCC Examination Category E

Category E - All welds included in this category are weld overlays.
(Total Population = 24)
The increase in population is due to an overlay being applied to N-9-C1

IGSCC Examination Category F

There are no welds in this category.

IGSCC Examination Category G

There are no welds in this category

b) Induction Heat Stress Improvement and/or Resistance Heat Stress Improvement has been employed on all recirculation system piping welds with the exception of safe-ends to nozzle welds and the Tee to RHR SDC weld.

JAFNPP AMP and AMR Database

Audit Question
111

LR Request
AMP B.1.5-1b BWR Stress Corrosion Cracking
The Program Description for AMP B.1.5 in the LRA sates that JAFNPP has taken actions to prevent IGSCC and will continue to use materials resistant to IGSCC for component replacements and repairs following the recommendations delineated in NUREG-0313, Generic Letter 88-01, and the staff-approved BWRVIP-75-A report. Please provide the following information:
b) Provide the response to applicant action items (if any) associated with BWRVIP-75-A.

LR Response
JAF action items for BWRVIP reports are listed in Appendix C of the LRA.

A copy of all SE reports for all BWRVIP documents was provided to the staff upon arrival at JAFNPP. The complete list of BWRVIP documents with license renewal applicant action items is: 18-A, 25, 26-A, 27-A, 38, 41, 47-A, 48-A, 49-A, 74-A. None of the SE reports for other BWRVIP documents, including BWRVIP-75-A, contain such action items.

JAFNPP AMP and AMR Database

Audit Question

112

LR Request

AMP B.1.5-1c BWR Stress Corrosion Cracking

The Program Description for AMP B.1.5 in the LRA sates that JAFNPP has taken actions to prevent IGSCC and will continue to use materials resistant to IGSCC for component replacements and repairs following the recommendations delineated in NUREG-0313, Generic Letter 88-01, and the staff-approved BWRVIP-75-A report. Please provide the following information:

c) Discuss any detected flaw indications or cracks, along with their evaluations/repairs, subsequent to implementing the NUREG-0313 recommendations.

LR Response

To date JAF has detected indications via UT examination and repaired the following with Weld Overlays

Recirculation System

12-02-2-1	28-02-2-53
12-02-2-8	22-02-2-63
12-02-2-12	12-02-2-64
12-02-2-15	12-02-2-65
12-02-2-18	12-02-2-69
12-02-2-19	12-02-2-70
22-02-2-22	12-02-2-76
12-02-2-23	28-02-2-92
28-02-2-33	28-02-2-113
28-02-2-48	28-02-2-116
28-02-2-52	

Jet Pump Instrumentation

N8A-SE-2 4-02-2-118

Control Rod Drive

N-9-C1

a)□The post weld overlay exams performed on these welds reveal no reportable and/or unacceptable conditions.

JAFNPP AMP and AMR Database

Audit Question

113

LR Request

AMP B.1.5-2 BWR Stress Corrosion Cracking
In NUREG-1801, the discussion of Acceptance Criteria for AMP XI.M7 notes that applicable and approved BWRVIP-14, 59, 60, 61 and 62 documents provide guidelines for evaluation of crack growth. Please clarify whether any of these BWRVIP reports are used in JAFNPP AMP B.1.5, and discuss the scope of their use. For each BWRVIP report used, provide the response to applicant action items (if any) associated with the BWRVIP report.

LR Response

The BWR Stress Corrosion Cracking Program acceptance criteria are consistent with NUREG-1801 XI.M7, BWR Stress Corrosion Cracking with the exception of a different ASME Section XI code edition.
Responses to BWRVIP action items are listed in LRA Appendix C.

A copy of all SE reports for all BWRVIP documents was provided to the staff upon arrival at JAFNPP. The complete list of BWRVIP documents with license renewal applicant action items is: 18-A, 25, 26-A, 27-A, 38, 41, 47-A, 48-A, 49-A, 74-A. None of the SE reports for other BWRVIP documents contain such action items.

JAFNPP AMP and AMR Database

Audit Question #

114

LR Request

AMP B.1.5-3 BWR Stress Corrosion Cracking

The discussion of Exceptions to NUREG-1801 for AMP B.1.5 in the LRA states that the 1989 edition of ASME Section XI is used for flaw evaluation, while NUERG-1801 specifies the 1986 edition. Since the 1986 Subsections IWB/C/D-4000 and –7000 are replaced by Subsection IWA-4000 in the later editions of the Code, please clarify whether JAFNPP will use the guidelines in Subsection IWA-4000 for repairs and replacements.

LR Response

a) JAF current interval 3rd uses IWA-4000. In the future, JAF is committed to the ASME 2001/2003 Addenda, which requires the use of IWA-4000.

JAFNPP AMP and AMR Database

Audit Question

115

LR Request

AMP B.1.5-4 BWR Stress Corrosion Cracking
The discussion of Operating Experience for AMP B.1.5 in the LRA states that UT examinations of four recirculation nozzle safe-end welds, three jet pump instrumentation nozzle safe-end welds, seven recirculation system piping welds, and three RHR system piping welds during RO15 (2002) resulted in six recordable indications, attributed to geometric conditions and not cracks. Please provide additional details to explain the geometric conditions observed and how they resulted in recordable indications. Please include a discussion, including test data, to demonstrate how these geometric conditions are distinguished from cracks when performing UT examinations.

LR Response

RO15 (2002) examinations included UT examinations of four recirculation nozzle safe-end welds, one jet pump instrumentation nozzle safe-end weld and two piping welds (Note N8-SE-1 and N8-SE-3 are piping welds despite the nomenclature), seven recirculation system piping welds, and five RHR system piping welds.

Performance demonstration Initiative (PDI) personnel performed the examinations per Washington group procedure JAF-UT-89-1 which adopted the Performance demonstration initiative requirements of PDI-UT-2 as required per 10CFR-50.55a for piping welds at the time. The examinations performed identified geometry requiring recording per JAF-UT-89-1 requirements. The root and counterbore geometry identified was recorded and evaluated by the examiner per procedure requirements and techniques developed during the performance demonstration Initiative.

Performance demonstration Initiative (PDI) procedures provide guidance for the evaluation of indications observed during examinations. The evaluation criterion is applied by PDI qualified examiners as necessary for indication evaluation and varies dependent on the examination and circumstances encountered. Reference current PDI procedures for additional information.

This clarification of the operating experience with N8-SE-1 and N8-SE-3 welds, and five RHR system piping welds versus three RHR system piping welds as originally described, requires an LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

116

LR Request

AMP B.1.5-5 BWR Stress Corrosion Cracking
Since NUREG-0313 was implemented at JAFNPP, all replacement components for degraded items must be procured with IGSCC-resistant materials. Please discuss, and provide copies for review of the plant procedures and/or plans that are used to ensure that replacement components at JAFNPP are being procured with IGSCC-resistant components.

LR Response

A discussion of repair and replacement corrective actions under the BWR Stress Corrosion Cracking Program is provided in section 4.4 of JAF-RPT-05-LRD02. Applicable procedures supporting procurement of IGSCC-resistant material were available for review on site. JAF Piping Specification Class 1504 restricts carbon content of stainless steel to .035% max and requires solution annealing. Both these requirements provide IGSCC resistance.

Copies of procurement information for stock codes J0700166, J0700167, J0700183, J0700184 (ER308L/E308L) containing technical requirements indicating delta ferrite exceeded NUREG requirements of 8% Fe (Iron) were provided to the NRC auditor.

JAFNPP AMP and AMR Database

Audit Question

117

LR Request

AMP B.1.29.2 -1a Water Chemistry Control - BWR

The Program Description for AMP B.1.29.2 in the LRA states that the program relies on monitoring and control of water chemistry based on EPRI Report 1008192 (BWRVIP-130). NUREG-1801 recommends BWRVIP-29 (1996) or later revisions, which includes BWRVIP-79 and BWRVIP-130. Please provide the following information related to this AMP.

a. Discuss the history of the water chemistry program at JAFNPP including the periods when BWRVIP-29 and BWRVIP-79 were used, and when use of BWRVIP-130 was initiated.

LR Response

BWRVIP-29 was implemented into JAF chemistry procedures in approximately 1999.

BWRVIP-79 was implemented into JAF chemistry procedures in February 2003.

BWRVIP-130 was implemented into JAF chemistry procedures in June 2005.

JAFNPP AMP and AMR Database

Audit Question
118

LR Request
AMP B.1.29.2 -1b Water Chemistry Control - BWR
The Program Description for AMP B.1.29.2 in the LRA states that the program relies on monitoring and control of water chemistry based on EPRI Report 1008192 (BWRVIP-130). NUREG-1801 recommends BWRVIP-29 (1996) or later revisions, which includes BWRVIP-79 and BWRVIP-130. Please provide the following information related to this AMP.
b. Discuss the specific differences between BWRVIP-29 and BWRVIP-79 and any corrective actions added to the water chemistry program at the time BWRVIP-79 was implemented. Provide the technical basis for the disposition of each difference.

LR Response
BWRVIP-79 updated the BWR Water Chemistry Guidelines – 1996 (BWRVIP-29) to provide updated methodology for establishing site-specific BWR water chemistry control programs.
Section 1 "Management Responsibilities" discusses the importance of good water chemistry control in obtaining inspection relief from NRC.
The committee reformatted Section 2 to be consistent with the equivalent section in BWRVIP-62 on inspection relief for core internals. The discussion provides the basis for the HWC recommendation, and the role of impurities on IGSCC in the water chemistry limits included in Section 4.
Section 3 covers other factors, besides IGSCC, that are influenced by water chemistry. It includes a discussion of the effect of HWC and zinc injection on radiation fields, updated with the most recent plant data, and a strengthened discussion of feedwater iron control. The discussion of water chemistry effects on fuel integrity includes information on recent fuel failures. The committee reduced the Action Level 1 limit for feedwater copper from 0.5 to 0.2 ppb, and added diagnostic parameters for feedwater and reactor water iron. Recent plant data on the effect of oxygen on flow-accelerated corrosion (FAC) resulted in the committee raising the Action Level 1 limit for dissolved oxygen in the feedwater from a minimum of 15ppb to 30ppb.
The recommendations for water chemistry control and diagnostic parameters in Section 4 now include separate tables for normal water chemistry and hydrogen water chemistry (including NMCA). It is possible to relax the limits for chloride and sulfate in the HWC cases.
The committee reviewed and reduced recommended chemistry surveillance, wherever appropriate, in support of the utility drive to reduce O&M costs (Section 5).
A new appendix on the effects of impurity transients on crack growth rates is included, with examples of decision trees for evaluating actions to minimize the detrimental effects on stress corrosion cracking.
This document, which replaces the 1996 revision (BWRVIP-29), provides water chemistry recommendations for BWRs during all modes of operation. It summarizes the technical bases for all water chemistry alternatives and provides guidance on the development of plant-specific chemistry programs. The guidelines recommend tightening some limits, relaxing others, and implementing more cost-effective monitoring. This will improve protection against materials and fuel problems, and reduce the risks of loss of output from chemistry transients

JAFNPP AMP and AMR Database

Audit Question

119

LR Request

AMP B.1.29.2 -1c Water Chemistry Control - BWR
The Program Description for AMP B.1.29.2 in the LRA states that the program relies on monitoring and control of water chemistry based on EPRI Report 1008192 (BWRVIP-130). NUREG-1801 recommends BWRVIP-29 (1996) or later revisions, which includes BWRVIP-79 and BWRVIP-130. Please provide the following information related to this AMP.
c. Discuss the specific differences between BWRVIP-29 and BWRVIP-130, or between BWRVIP-79 and BWRVIP-130 and any corrective actions added to the water chemistry program at the time BWRVIP-130 was implemented. Provide the technical basis for the disposition of each difference, including the "good practice" recommendations in BWRVIP-130, including NEI 03-08, for optimizing the water chemistry.

LR Response

BWRVIP-130 updated the BWR Water Chemistry Guidelines – 2000 (BWRVIP-79), providing an enhanced methodology for establishing site-specific BWR water chemistry control programs.
Section 1 addresses a recent policy of the U.S. nuclear industry, which commits each nuclear utility to adopt the responsibilities and processes on the management of materials aging issues. It specifies which portions of the document are "Mandatory," "Needed," or "Good Practices," using the classification in NEI 03-08: Guideline for the Management of Materials Issues.
Section 2 discusses the technical basis for water chemistry control of IGSCC. The committee updated this Section with the latest information on the effects of impurities such as copper, sulfate and chloride. It also discusses the overall goal of demonstrating the effectiveness of mitigating IGSCC of piping and reactor internals using HWC and NMCA.
Section 3 covers radiation field effects of water chemistry. The guidelines update the discussion of the effects of NMCA and zinc injection on radiation fields with the most recent plant data, and strengthen the discussion on control of feedwater iron with the recognition that iron increases fuel crud formation and decreases the efficiency of zinc.
Section 4 covers Flow Accelerated Corrosion (FAC) and now includes the effects of NMCA.
Section 5 discusses water chemistry impacts on fuel integrity, including corrosion-related fuel failures and the need for control of feedwater zinc, iron and copper. The guidelines recommend quarterly average maxima for feedwater zinc of 0.6 ppb for HWC plants and 0.4 ppb for NMCA plants based on fuel integrity issues.
Section 6 comprises the recommendations for water chemistry control and diagnostic parameters, which now include separate tables for hydrogen water chemistry, HWC/NMCA and normal water chemistry. The Action Level tables now address the possibility that continued operation may reduce IGSCC if utilities exceed the Action Levels.
Section 7 is a new section containing recommended goals for water chemistry optimization. These are "good practice" recommendations for targets that plants may use in optimizing water chemistry to balance the conflicting requirements of materials, fuel and radiation control.
Section 8 discusses recommended chemistry surveillance. The guidelines reduce recommended surveillance and monitoring frequencies in order to reduce O&M costs, as long as there is no significant adverse impact on plant chemistry.

Appendices discuss the effects of impurity transients on crack growth rates, auxiliary systems, conductivity corrections for the presence of ionic species that are benign toward system integrity, ultrasonic fuel cleaning and the BWRVIP radiolysis model.

This document, which replaces the 2000 revision (BWRVIP-79), provides proactive water chemistry recommendations for BWRs during all modes of operation. It summarizes the technical bases for all water chemistry alternatives and provides guidance on the development of plant-specific chemistry programs. The guidelines recommend tightening some limits, relaxing others, and implementing more cost-effective monitoring, which will improve protection against materials and fuel problems and also reduce the risks of loss of output from chemistry transients.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.2 -1d Water Chemistry Control - BWR
The Program Description for AMP B.1.29.2 in the LRA states that the program relies on monitoring and control of water chemistry based on EPRI Report 1008192 (BWRVIP-130). NUREG-1801 recommends BWRVIP-29 (1996) or later revisions, which includes BWRVIP-79 and BWRVIP-130. Please provide the following information related to this AMP.
d. Describe the current status of the JAFNPP Water Chemistry Control Program with respect to Hydrogen Water Chemistry (HWC), Noble Metal Chemical Application (NMCA), and Zinc Injection. Specifically, identify when these programs started, and their impact on the operation of plant systems and the degradation of component materials.

LR Response

JAFNPP instituted hydrogen water chemistry (HWC) in 1988 to mitigate cracking in recirculation piping. There have been no new IGSCC indications in the recirculation system piping after HWC implementation. Due to dose rate issues JAF could not add sufficient hydrogen to mitigate cracking of reactor internals so they implemented noble metal chemical addition (NMCA) in 1999 and reapplied in 2004 for that reason. Zinc addition was instituted in 1989 for dose rate reduction and has no impact on material degradation.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.2 -2 Water Chemistry Control - BWR
BWRVIP-62, "Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection," and BWRVIP-75, "Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules" identify circumstances and conditions for which relief may be granted by the staff. Please describe all relief that has been granted by the staff for JAFNPP, based on these documents.

LR Response

Engineering report JAF-RPT-05-LRD-02, Aging Management Program Evaluation Report, (AMPER) was available for onsite review. As noted in AMPER sections 4.3, 4.5, and 4.6, JAFNPP has not sought inspection relief for reactor vessel internals based on the use of hydrogen water chemistry or the use of Noble Metal Chemical Application. If inspection relief is sought in the future, the guidelines of BWRVIP-62 will be followed.

JAFNPP has taken credit for NMCA to reduce the inspections in the 88-01 program for welds that are mitigated by noble metals. Details were available for onsite review.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.2 -3a Water Chemistry Control - BWR
GALL recommends that hydrogen peroxide be monitored to mitigate degradation in structural material. GALL also notes that the rapid decomposition of hydrogen peroxide makes reliable data exceptionally difficult to obtain, and BWRVIP-130 Section 6.3.3, "Water Chemistry Guidelines for Power Operation," does not address monitoring for hydrogen peroxide. The staff notes that the Electrochemical Corrosion Potential (ECP) quantifies the oxidizing power of a solution in contact with a specific metal surface. The ECP of different reactor internals component materials is very sensitive to the concentration of oxygen, hydrogen, and hydrogen peroxide and therefore is different at different locations within the BWR reactor system. Section 8.3 of BWRVIP-130 (Figure 8-11) discusses the potential locations suitable for measuring the ECP. Please provide the following information related to this AMP.
a. Clarify whether ECP is monitored at the reactor locations recommended in BWRVIP-130 at JAFNPP. Discuss the methods used and their frequency.

LR Response

Engineering report JAF-RPT-05-LRD-02, Aging Management Program Evaluation Report, (AMPER) was available for onsite review. As described in AMPER section 4.22.2.B.3.b, JAFNPP does not monitor ECP directly due to its status as a Category 3b plant as described in Table 2-6 of BWRVIP-130.

JAFNPP follows BWRVIP-62 criteria for Category 3b plants and measures the reactor water and RWCU molar ratio. When this ratio is > 2:1 the ECP is effectively < -230 mV SHE and in reality closer to -400 mV SHE. JAFNPP operates with a measured molar ratio significantly > 2:1 with a goal of > 4:1.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.2 -3b Water Chemistry Control - BWR

GALL recommends that hydrogen peroxide be monitored to mitigate degradation in structural material. GALL also notes that the rapid decomposition of hydrogen peroxide makes reliable data exceptionally difficult to obtain, and BWRVIP-130 Section 6.3.3, "Water Chemistry Guidelines for Power Operation," does not address monitoring for hydrogen peroxide. The staff notes that the Electrochemical Corrosion Potential (ECP) quantifies the oxidizing power of a solution in contact with a specific metal surface. The ECP of different reactor internals component materials is very sensitive to the concentration of oxygen, hydrogen, and hydrogen peroxide and therefore is different at different locations within the BWR reactor system. Section 8.3 of BWRVIP-130 (Figure 8-11) discusses the potential locations suitable for measuring the ECP. Please provide the following information related to this AMP.

b. If ECP is not monitored periodically, discuss how JAFNPP ensures that hydrogen addition alone will maintain the ECP at an acceptable level within the reactor system.

LR Response

Based on the BWRVIP radiolysis model, a measured molar ratio in the reactor water of > 2:1 demonstrates the molar ratio is > 2:1 everywhere in the reactor vessel at or below the normal water level which is where all the wetted components were treated with noble metals. JAFNPP adds sufficient feedwater hydrogen to operate with a measured molar ratio > 4:1. In accordance with the model, it demonstrates at least a molar ratio of 3:1 at the upper portion of the shroud OD. Components above this level cannot be mitigated with HWC or NMCA. When molar ratio is > 2:1 the equivalent of ECP according to the model is < -400 mV SHE. Data from other stations that measured ECP with noble metals validates the model results for the category 3B plants.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.29.2 -4 Water Chemistry Control - BWR
GALL recommends that dissolved oxygen be monitored as part of the water chemistry program. Please identify the systems in which dissolved oxygen is monitored at JAFNPP, and discuss the methods used to monitor this parameter. Also, provide examples of recent data from these systems.

LR Response
As described in LRA Section B.1.29.2, the Water Chemistry Control – BWR Program is consistent with NUREG-1801. Engineering report JAF-RPT-05-LRD-02, Aging Management Program Evaluation Report, (AMPER) was available for onsite review. AMPER section 4.22.2.B.3.b indicates that the Water Chemistry Control – BWR Program periodically monitors the concentration of dissolved oxygen in reactor water, feedwater, condensate, and control rod drive water and keeps it within the BWRVIP-130 recommended range to mitigate corrosion.

Examples of recent dissolved oxygen data from the reactor water, feedwater, condensate, and control rod drive water systems were available for onsite review.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.2 -5 Water Chemistry Control - BWR
GALL recommends that the water quality (i.e., pH and conductivity) be maintained in accordance with EPRI Guidelines by periodic sampling to determine the concentration of chemical species. BWRVIP-130, Section 8.2.1.11, indicates that pH measurement accuracy in most BWR streams is generally suspect because of the dependence of the instrument reading on ionic strength of the sample solution. In addition, the monitoring of pH is not discussed in BWRVIP-130, Appendix B for condensate storage tank, demineralized water storage tank, or torus water. Please explain what methods are used to monitor the water quality of these systems and components, and the technical basis for concluding that they are effective.

LR Response

Engineering report JAF-RPT-05-LRD-02, Aging Management Program Evaluation Report, (AMPER) was available for onsite review. As described in AMPER section 4.22.2.B.3.b, torus/pressure suppression chamber, condensate storage tank, and demineralized water storage tank conductivity, chloride, sulfate and total organic compound levels are monitored and kept below BWRVIP-130 recommended levels to mitigate SCC and corrosion.

Operating experience shows that this program has been effective in managing aging effects. Therefore, continued implementation of the program provides reasonable assurance that effects of aging will be managed so that components crediting this program can perform their intended function consistent with the current licensing basis during the period of extended operation. In addition, as described in LRA Section B.1.21, prior to the period of extended operation, a one-time inspection activity will verify the effectiveness of the water chemistry control aging management programs by confirming that unacceptable cracking, loss of material, and fouling is not occurring.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.2 -6 Water Chemistry Control - BWR
Flow accelerated corrosion (FAC) in carbon and low alloy steel components is affected by dissolved oxygen concentration, among other factors. Section 4.2.1 of BWRVIP-130 states that the rate of FAC increases dramatically if oxygen concentration is less than about 25 ppb. Please describe the procedures used at JAFNPP to maintain appropriate oxygen levels in water in the various plant systems for which this AMP is credited to mitigate loss of material due to FAC (i.e., erosion/corrosion, steam cutting, etc.).

LR Response

The Water Chemistry Control – BWR Program is not credited to manage loss of material due to FAC. Consistent with NUREG-1801, loss of material due to FAC is managed by the Flow-Accelerated Corrosion Program described in LRA Section B.1.14. As stated in NUREG-1801, Section XI.M17, the FAC program is an analysis, inspection, and verification program; thus, there is no preventive action.

As described in LRA Section B.1.29.2, the Water Chemistry Control – BWR Program is consistent with NUREG-1801. Engineering report JAF-RPT-05-LRD-02, Aging Management Program Evaluation Report, (AMPER) was available for onsite review. AMPER section 4.22.2.B.3.b indicates that the Water Chemistry Control – BWR Program periodically monitors the concentration of dissolved oxygen in reactor water, feedwater, condensate, and control rod drive water and keeps it within the BWRVIP-130 recommended range.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.2 -7 Water Chemistry Control - BWR
BWRVIP-130 recommends that reactor water iron level be monitored as a diagnostic parameter, and that feedwater copper level be monitored as one of the control parameters. Please confirm that the JAFNPP water chemistry program includes monitoring of these parameters.

LR Response

Reactor water iron level is monitored as a diagnostic parameter.

As described in LRA Section B.1.29.2, the Water Chemistry Control – BWR Program is consistent with NUREG-1801. Engineering report JAF-RPT-05-LRD-02, Aging Management Program Evaluation Report, (AMPER) was available for onsite review. As described in AMPER Section 4.22.2.B.3.b, feedwater iron and copper concentrations are periodically monitored and kept below recommended levels. Thus, feedwater copper is monitored as a control parameter.

JAFNPP AMP and AMR Database

Audit Question #

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LR Request

AMP B.1.29.2 -8 Water Chemistry Control - BWR

Aging of Standby Liquid Control (SBLC) system components not in the reactor coolant pressure boundary section of SBLC system relies on monitoring and control of SBLC makeup water chemistry. *The effectiveness of the water chemistry program will be verified by a one-time inspection of the SBLC system. Please confirm that the One-Time Inspection program will include the* SBLC pump casing, and the associated tank discharge piping and valve bodies in addition to the SBLC tank.

LR Response

LRA Table 3.3.2-1, Standby Liquid Control System Summary of Aging Management Evaluation, shows that stainless steel accumulators, orifices, piping, pump casings, tank, thermowells, tubing, and valve bodies containing sodium pentaborate solution credit the Water Chemistry Control – BWR Program for aging management. Note 315 for each of these line items indicates that the One-Time Inspection Program is applicable.

Therefore, the One-Time Inspection Program will include the SBLC pump casing, and the associated tank discharge piping and valve bodies in addition to the SBLC tank.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.2 -9 Water Chemistry Control - BWR
The discussion of operating experience for AMP B.1.29.2 in the LRA indicates that a self-assessment of the water chemistry program was conducted in 2001. Please discuss any abnormalities identified and corrective actions taken as a result of this self-assessment, and provide a copy of the most recently completed self-assessment related to the water chemistry program at JAFNPP.

LR Response

As discussed in LRA Section B.1.29.2, the 2001 self-assessment revealed that sample system flow rates for the corrosion product metal samplers for feedwater and condensate may not be high enough to adequately give a representative sample. The sample lines were replaced with sample lines that deliver greater than or equal to 6 linear ft/sec during 1st quarter 2004.

A copy of the most recently completed self-assessment related to the water chemistry program was available for onsite review.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.26 -1 Service Water Integrity

The Program Description for AMP B.1.26 in the LRA states that Service Water Integrity Program relies on implementation of the recommendations of GL 89-13 to ensure that the effects of aging on the service water systems (SWS) will be managed for the period of extended operation. Please confirm that all of the recommendations in GL 89-13 have been implemented at JAFNPP, including a) surveillance and control of biofouling, b) a test program to verify heat transfer capabilities, c) routine inspection and maintenance, d) system walkdowns, and e) review of maintenance, operating, and training practices and procedures. Provide the technical basis for any recommendations that have not been implemented. Also, please make the JAFNPP responses to GL 89-13 available for staff review at the onsite audit.

LR Response

JAFNPP has implemented long term commitments provided in response to GL 89-13 recommendations that include heat transfer testing, inspections and maintenance, and biofouling control. The one-time actions for walkdowns and review of maintenance, operating, and training practices and procedures have also been completed.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.26 -2 Service Water Integrity
The Program Description for AMP B.1.26 in the LRA states that the service water systems include the normal service water (NSW), emergency service water (ESW), and residual heat removal service water (RHRSW). Please confirm that these are the only systems at JAFNPP that transfer heat from safety-related systems, structures, and components to the ultimate heat sink, and, therefore, are the only systems in the scope of this AMP.

LR Response

As stated in JAF-RPT-05-LRD02 section 4.20 and section B.1.26 the service water systems of normal service water (NSW), emergency service water (ESW), and residual heat removal service water (RHRSW) are the raw water systems included in the scope of this AMP. These are the only systems at JAFNPP that transfer heat from safety-related systems, structures, and components to the ultimate heat sink.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.26 -3 Service Water Integrity

The Program Description for AMP B.1.26 in the LRA states that the program includes component inspections for erosion, corrosion, and blockage. In NUREG-1801, AMP XI.M20 notes that visual inspections are typically performed; however, nondestructive testing such as ultrasonic testing and eddy current testing, are effective methods to measure surface condition and the extent of wall thinning, when determined necessary. Please discuss the inspection methods included in AMP B.1.26, including the type of inspections used, the scope of the inspections, and the frequency of the inspections.

LR Response

As described in JAF-RPT-05-LRD02 section 4.20 the service water integrity program includes visual inspections and non destructive testing methods including ultrasonic testing and eddy current testing of heat exchanger tubes. These methods are applied to in-scope service water cooled components. This is documented in site procedures AP-19.12 and AP-19.14 which provide information on the scope and frequency of the inspections.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.26 -4a Service Water Integrity
The discussion of Exceptions to NUREG-1801 for AMP B.1.26 in the LRA states that components are lined or coated only where necessary to protect the underlying metal surfaces. Please provide the following information:
a) Identify the components that are lined or coated in the JAFNPP service water systems

LR Response

Coatings and linings are not credited to prevent or minimize aging effects on components and as such the aging management review did not identify components that are lined or coated.

There are no linings or coatings used within the service water piping.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.26 -4b Service Water Integrity
The discussion of Exceptions to NUREG-1801 for AMP B.1.26 in the LRA states that components are lined or coated only where necessary to protect the underlying metal surfaces. Please provide the following information:
b) Confirm that AMP B.1.26 includes inspections to detect degraded protective linings or coatings.

LR Response

Because linings and coatings are not credited to prevent or minimize aging effects no specific inspections are needed. However, AMP B.1.26 includes the inspections of various service water components which would detect any degradation of lined or coated components.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.26 -4c Service Water Integrity
The discussion of Exceptions to NUREG-1801 for AMP B.1.26 in the LRA states that components are lined or coated only where necessary to protect the underlying metal surfaces. Please provide the following information:
c) Discuss the preventive measures taken at JAFNPP to protect unlined/uncoated components in the service water systems that are exposed to aggressive cooling water environments, such as the use of appropriate materials

LR Response

Unlined/uncoated components in the service water systems are inspected as part of AMP B.1.26 to ensure that aging effects do not affect their ability to perform their intended functions. The use of appropriate materials is controlled by design processes which consider the environment and operating experience to ensure appropriate materials are selected.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.26 -5a Service Water Integrity

The discussion of Operating Experience for AMP B.1.26 in the LRA states that the results of SWS visual and other nondestructive examinations (2000-2004) revealed areas of erosion and areas of corrosion on internal and external surfaces. Corrective actions included replacement of RHRSW pumps, replacement of ESW and normal service water piping components, replacement of EDG jacket water heat exchangers, and close monitoring of RHRSW and ESW pump discharge strainer housings by ultrasonic inspections with repair as needed. Please provide the following information:

a) Identify the RHRSW pumps and EDG jacket heat exchangers that were replaced.

LR Response

All 4 original RHRSW pumps have been replaced: 10P-1A, 1B, 1C and 1D.

All of the EDG jacket water heat exchangers have been replaced. 93WE-1A – 12/05; 93WE-1B – 12/05; 93WE-1C – 6/05 and 93WE-1D – 2/04.

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.26 -5b Service Water Integrity

The discussion of Operating Experience for AMP B.1.26 in the LRA states that the results of SWS visual and other nondestructive examinations (2000-2004) revealed areas of erosion and areas of corrosion on internal and external surfaces. Corrective actions included replacement of RHRSW pumps, replacement of ESW and normal service water piping components, replacement of EDG jacket water heat exchangers, and close monitoring of RHRSW and ESW pump discharge strainer housings by ultrasonic inspections with repair as needed. Please provide the following information:

b) Provide the percentage of ESW and NSW piping that was replaced, and the material used for the replacement piping.

LR Response

b) Approximately 1% of the ESW and NSW piping has been replaced due to visual and non-destructive examinations. The piping was replaced with carbon steel for the most part. Carbon steel has aged well at JAF as evidenced by the 30+ year service without the currently implemented controls. Implementation of the current controls will only serve to extend the service life. These controls are the visual and non-destructive examinations that are currently conducted. The continuous chlorination performed for both the NSW and ESW systems. The use of BULAB chemicals to assist the chlorine in penetrating any buildup within the piping and to keep dissolved substances and silt in suspension so as to exit the system piping. The PMs for examination and cleaning of piping and appurtenances on frequencies designed to minimize pipe wall thinning and maximize design functionality. The periodic flow testing via surveillance testing and flushing of stagnant system legs are some of the methodologies used at JAF to control system degradation. The chemical cleaning processes, used in the ESW system, also ensures design functionality. Stainless steel has been used in areas of erosion to extend the service life of the piping exposed to cavitation.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.26 -5c Service Water Integrity
The discussion of Operating Experience for AMP B.1.26 in the LRA states that the results of SWS visual and other nondestructive examinations (2000-2004) revealed areas of erosion and areas of corrosion on internal and external surfaces. Corrective actions included replacement of RHRSW pumps, replacement of ESW and normal service water piping components, replacement of EDG jacket water heat exchangers, and close monitoring of RHRSW and ESW pump discharge strainer housings by ultrasonic inspections with repair as needed. Please provide the following information:
c) Aside from the components that were replaced, discuss the other internal and external surfaces for which erosion and corrosion were found, including the extent of the degradation and the corrective actions taken. Discuss your plans for replacing any components or piping before the period of extended operation.

LR Response

There are no other areas where erosion or corrosion have been found that need to be addressed in the RHRSW system.

Within the ESW and NSW system there are sections of piping that have scheduled follow up non-destructive examinations with ample time allotted for replacement as warranted. The unit cooler coils have been replaced in a number of ESW unit coolers / heat exchangers. Replacement of additional unit cooler / heat exchanger coils has been included in the JAF long term plan.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.26 -5d Service Water Integrity
The discussion of Operating Experience for AMP B.1.26 in the LRA states that the results of SWS visual and other nondestructive examinations (2000-2004) revealed areas of erosion and areas of corrosion on internal and external surfaces. Corrective actions included replacement of RHRSW pumps, replacement of ESW and normal service water piping components, replacement of EDG jacket water heat exchangers, and close monitoring of RHRSW and ESW pump discharge strainer housings by ultrasonic inspections with repair as needed. Please provide the following information:
d) Discuss the results of the monitoring activities for the RHRSW and ESW pump discharge strainer housings.

LR Response

UT inspections of the RHRSW pump discharge and RHRSW system strainers have been ongoing since about 2001. Several below min. wall areas of the strainers have been repaired. No *repairs were necessary for the RHRSW pumps. All 4 pumps have since been replaced.*

The ESW duplex strainers have experienced only a single repair for wall thinning on the four ESW strainer basket housings. A Top Ten team is discussing how to improve the service life of the strainer housings to preclude wall thinning. The existing ESW strainer housings have lasted for 30+ years and are in no imminent danger of pinhole leaks.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.26 -6 Service Water Integrity
The discussion of Operating Experience for AMP B.1.26 in the LRA states that a two-week ESW system assessment in February 2000 revealed weaknesses in the Service Water Integrity Program. Please discuss the weaknesses identified and the significant improvements made to correct the weaknesses.

LR Response

The majority of issues centered on the implementation of Generic Letter 89-13. Since then, there have been several GL-89-13 inspections. Some inspections were in-house (Corporate Inspections) and some were by outside agencies (NRC Ultimate Heat Sink and other inspections). All of the inspections since 2000 indicated that GL-89-13 has been appropriately implemented.

Specifically, prior to 2000, lack of program ownership and weak program maintenance were identified as improvements needed for appropriate implementation of GL-89-13. The corrective actions taken essentially re-constituted the licensing commitments associated with Generic Letter 89-13, ensured that all related plant procedures were updated to reflect GL 89-13 licensing commitments.

There were two less prevalent issues identified in 2000 assessment. The Surveillance Test Program and the Corrective Action Program (CAP) were issues that resulted in effectiveness reviews being conducted for both programs. Corrective actions were initiated to correct and improve both programs. Several ESW Condition Reports issued prior to 2000 required adjustments in significant level and closure of corrective actions. All issues identified regarding the CAP have been addressed. Additionally, all issues associated with the Surveillance Test Program have been addressed and included in the creation of a Surveillance Program Coordinator and a Surveillance Program Round Table.

Several NRC inspections confirm that the strength of the significant improvements made within the ESW system. Integrated Inspection Report 05000333/2003008 is one example. During the ESW and support systems review, the ESW system was heavily scrutinized. The inspection reviewed open work requests, temp mods, and operator workarounds to assess the collective impact on system operation. The inspection reviewed the condition report database to verify that equipment alignment problems were being identified and appropriately resolved. No findings of significance were identified. Post work testing within the service water systems was reviewed. Again, no findings of significance were identified. Inspectors witnessed surveillance testing of service water systems and reviewed test data to assess whether the SSCs satified TS, UFSAR, Technical Requirements Manual, and Entergy procedural requirements. Again, no findings of significance were identified. Inspectors performed a detailed review of 69 corrective action program items assessing Entergy's threshold for problem identification, adequacy of cause analysis and extent of condition reviews, and timeliness of the corrective actions required. No findings of significance were identified.

Problem Identification and Resolution Inspection Report 05000333/2004006 is another example of the significant improvements made within the ESW system. The identification and resolution of problems was reviewed by the NRC. Their inspection team reviewed all aspects of the corrective action program (CAP). No findings of significance were identified. There were minor deficiencies noted. The team concluded that the plant staff identified deficiencies and entered them in the CAP, and at the appropriate threshold. The team also found that the self assessments and audits were sufficiently self-critical and provided relevant performance observations and insights. The team found that with regard to prioritization and evaluation of issues including "service water system erosion and/or corrosion, heat exchanger fouling" that there were no findings of significance identified. There were some minor instances of documentation issues.

JAFNPP AMP and AMR Database

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LR Request
AMP B.1.26 -7 Service Water Integrity
The discussion of Operating Experience for AMP B.1.26 in the LRA states that during the fall of 2005, NRC conducted an integrated inspection, which included an assessment of maintenance effectiveness for the ESW system. Please discuss any weaknesses identified in the NRC inspection, and the corrective actions taken.

LR Response
Integrated Inspection Report 05000333/2005006 is the report referred to in the LRA section. During the inspection maintenance effectiveness was reviewed. The inspectors reviewed problems involving selected in-scope SSCs to assess the effectiveness of the maintenance program. The Emergency Service Water (ESW) system was one of the two sample systems selected. Reviews focused on proper Maintenance Rule scoping in accordance with 10CFR50.65; characterization of reliability issues; changing system and component unavailability; 10CFR50.65 (a)(1) and (a)(2) classifications; identifying and addressing common cause failures; trending key parameters and the appropriateness of performance criteria for SSCs classified (a)(2) as well as the adequacy of goals and corrective actions for SSCs classified (a)(1). The inspectors reviewed system health reports, maintenance backlogs, and MR Basis documents. No findings of significance were identified.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.1 -1 Water Chemistry Control-Auxiliary Systems Program

The Program Description for AMP B.1.29.1 in the LRA states that the water chemistry control - auxiliary systems includes the following: 1) control room and relay room chilled water system, 2) security generator jacket cooling water, 3) aux boiler heating water, 4) decay heat removal cooling water, and 5) the stator cooling water system. Please confirm that these are the only auxiliary systems at JAFNPP utilizing cooling water as the heat transfer medium that are not already included in another AMP. (e.g., jacket cooling water for an SBO diesel generator or a dedicated Appendix R diesel generator)

LR Response

These are the only auxiliary systems with license renewal intended functions utilizing cooling water as the heat transfer medium that are not included in another AMP.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.1 -2 Water Chemistry Control-Auxiliary Systems Program
The Program Description for AMP B.1.29.1 in the LRA states that the program includes sampling, analysis, and coolant replacement activities. Please discuss the sampling and analysis methods included in AMP B.1.29.1, including the sampling procedures and controls, sampling and analysis frequency, types of analyses performed, inspections used, and criteria for coolant replacement for each of the systems covered in the program.

LR Response

For stator cooling water and auxiliary boiler heating water, the parameters monitored, associated acceptance criteria, plans for inspection, and administrative controls are described in LRA section B.1.29.1.

Stator cooling water conductivity is monitored weekly, while dissolved oxygen and soluble copper are monitored monthly. The sampling and analysis procedure was available for onsite review. JAF has two on-line stator cooling water conductivity monitors.

Auxiliary boiler heating water conductivity, pH, and dissolved oxygen are monitored quarterly. The sampling and analysis procedure was available for onsite review.

For control room and relay room chilled water, decay heat removal cooling water, and security generator jacket cooling water, LRA section B.1.29.1 notes that the program will be enhanced prior to the period of extended operation to provide guidance for sampling and analysis. Industry recommendations and One-Time Inspection Program results will be considered in determining the parameters to be monitored, monitoring frequency, and associated acceptance criteria.

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.1 -3 Water Chemistry Control-Auxiliary Systems Program
The "Parameters Monitored/Inspected " program element for AMP B.1.29.1 in the LRA states that the selection of parameters to be monitored/inspected for the systems included in the program is in accordance with industry recommendations. Please identify the documents that are used as the basis for the industry recommendations, and make these available for NRC review at the time of the onsite audit.

LR Response

The Auxiliary Systems Water Chemistry Control Program is based on equipment vendor specifications, chemical vendor recommendations, technical manuals, industry standards, and operating experience. Guidelines utilized include EPRI guidelines, as well as vendor and other industry guidelines.

Basis documents for stator cooling water monitoring include EPRI Technical Report 1004004 and General Electric Technical Information Letters and Service Information Letters. Basis documents for auxiliary boiler monitoring include the Cleaver Brooks manuals.

These documents were available for onsite review.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.1 -4 Water Chemistry Control-Auxiliary Systems Program
The "Detection of Aging Effects" program element for AMP B.1.29.1 in the LRA states that the One-Time Inspection Program will verify effectiveness of water chemistry control program. Please identify the specific inspection methods that will be used in the One Time Inspection Program for each of the auxiliary systems in the scope of AMP B.1.29.1.

LR Response

As described in LRA section B.1.21, the One-Time Inspection Program is a new program that will be consistent with NUREG-1801 XI.M32, One-Time Inspection.

Engineering report JAF-RPT-05-LRD-02, Aging Management Program Evaluation Report, (AMPER) was available for onsite review. As described in AMPER Appendix B, for the one-time inspection activity to verify effectiveness of water chemistry control programs, combinations of nondestructive examinations (including VT-1, ultrasonic, and surface techniques) will be performed by qualified personnel following procedures that are consistent with Section XI of ASME B&PV Code and 10CFR50, Appendix B.

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

146

LR Request

AMP B.1.29.1 -5a Water Chemistry Control-Auxiliary Systems Program
The "Monitoring and Trending" program element for AMP B.1.29.1 in the LRA states that values from the analyses are archived for long term trending and review. Please provide the following information:
a) Identify the parameters that are to be trended for each of the auxiliary systems in the scope of this AMP.

LR Response

The parameters monitored are archived for long term trending and review. As stated under Parameters Monitored/Inspected of AMP B1.29.1, stator cooling water conductivity, dissolved oxygen, and soluble copper are monitored and auxiliary boiler heating water conductivity, pH, and dissolved oxygen are monitored.

For control room and relay room chilled water, decay heat removal cooling water, and security generator jacket cooling water, LRA Section B.1.29.1 notes that the program will be enhanced prior to the period of extended operation to provide guidance for sampling and analysis. Industry recommendations and One-Time Inspection Program results will be considered in determining the parameters to be monitored, monitoring frequency, and associated acceptance criteria. Parameters monitored for these systems will be archived for long term trending and review.

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

147

LR Request

AMP B.1.29.1 -5b Water Chemistry Control-Auxiliary Systems Program
The "Monitoring and Trending" program element for AMP B.1.29.1 in the LRA states that values from the analyses are archived for long term trending and review. Please provide the following information:
b) Discuss the administrative controls and procedures to be used to implement the periodic review and trending.

LR Response

In accordance with Entergy corporate procedure EN-CY-101, Chemistry Activities, the chemistry department trends chemistry and radiochemistry parameters to allow identification and correction of adverse trends before limits are exceeded. Data is reviewed as it is generated, and appropriate comments are made as necessary to document reasons for adverse data indications. The site chemistry staff reviews the data trends to ensure adverse indications are noted and addressed in a timely manner.

In addition, site chemistry department group data review sessions are performed at least quarterly to share information on specific plant chemistry. A corporate chemist periodically participates in the data review sessions to provide an independent assessment.

Chemistry trends, underlying causes of problems, and results of corrective actions are periodically reviewed with higher levels of line management.

JAFNPP AMP and AMR Database

Audit Question
148

LR Request
AMP B.1.29.1 -5c Water Chemistry Control-Auxiliary Systems Program
The "Monitoring and Trending" program element for AMP B.1.29.1 in the LRA states that values from the analyses are archived for long term trending and review. Please provide the following information:
c) Discuss the process to be used to determine whether corrective actions are required.

LR Response
As described in LRA section B.0.3, JAFNPP quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. Conditions adverse to quality, such as failures, malfunctions, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. In the case of significant conditions adverse to quality, measures are implemented to ensure that the cause of the nonconformance is determined and that corrective action is taken to preclude recurrence. In addition, the root cause of the significant condition adverse to quality and the corrective action implemented are documented and reported to appropriate levels of management.

The implementing procedure for the corrective action process was available for onsite review.

JAFNPP AMP and AMR Database

Audit Question #

149

LR Request

AMP B.1.29.1 -6a Water Chemistry Control-Auxiliary Systems Program
The "Acceptance Criteria" program element for AMP B.1.29.1 in the LRA provides acceptance criteria for the stator cooling water system and the aux boiler heating water in accordance with industry recommendations. Please provide the following information:
a) Identify the industry documents that are used as the basis for the industry recommendations, and make these available for NRC review at the time of the onsite audit.

LR Response

The Auxiliary Systems Water Chemistry Control Program is based on equipment vendor specifications, chemical vendor recommendations, technical manuals, industry standards, and operating experience. Guidelines utilized include EPRI guidelines, as well as vendor and other industry guidelines.

Basis documents for stator cooling water monitoring include EPRI Technical Report 1004004 and General Electric Technical Information Letters and Service Information Letters. Basis documents for auxiliary boiler monitoring include the Cleaver Brooks manuals.

JAFNPP AMP and AMR Database

Audit Question #

150

LR Request

AMP B.1.29.1 -6b Water Chemistry Control-Auxiliary Systems Program
The "Acceptance Criteria" program element for AMP B.1.29.1 in the LRA provides acceptance criteria for the stator cooling water system and the aux boiler heating water in accordance with industry recommendations. Please provide the following information:
b) Identify the acceptance criteria for the other auxiliary systems in the scope of this AMP.

LR Response

For control room and relay room chilled water, decay heat removal cooling water, and security generator jacket cooling water, LRA Section B.1.29.1 notes that the program will be enhanced prior to the period of extended operation to provide guidance for sampling and analysis. Industry recommendations and One-Time Inspection Program results will be considered in determining the parameters to be monitored, monitoring frequency, and associated acceptance criteria.

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.1 -6c Water Chemistry Control-Auxiliary Systems Program
The "Acceptance Criteria" program element for AMP B.1.29.1 in the LRA provides acceptance criteria for the stator cooling water system and the aux boiler heating water in accordance with industry recommendations. Please provide the following information:
c) Discuss how the acceptance criteria are determined and how they are administratively controlled.

LR Response

Acceptance criteria are determined by engineering evaluation of industry recommendation and experience. For instance, the stator cooling water dissolved oxygen limits were changed in September 2005 to more conservative values from GE TIL-1098 following the determination that a trip at River Bend was due to having dissolved oxygen limits at 1 ppm for an extended period of time.

Acceptance criteria are administratively controlled via sampling and analysis procedures, which were available for onsite review.

JAFNPP AMP and AMR Database

Audit Question
152

LR Request
AMP B.1.29.1 -7 Water Chemistry Control-Auxiliary Systems Program
The "Corrective Actions" program element for AMP B.1.29.1 in the LRA states that chemistry parameters are adjusted as appropriate and that additional sampling and verification are performed if necessary. Please discuss the administrative controls that are in place to determine the necessity for these additional activities and to implement them.

LR Response
As described in LRA section B.0.3, JAFNPP quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. Conditions adverse to quality, such as failures, malfunctions, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. In the case of significant conditions adverse to quality, measures are implemented to ensure that the cause of the nonconformance is determined and that corrective action is taken to preclude recurrence. In addition, the root cause of the significant condition adverse to quality and the corrective action implemented are documented and reported to appropriate levels of management.

The implementing procedure for the corrective action process was available for onsite review.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.1 -8a Water Chemistry Control-Auxiliary Systems Program
The "Operating Experience" program element for AMP B.1.29.1 in the LRA describes operating experience for the stator cooling water system conductivity, dissolved oxygen, and copper content and aux boiler heating water conductivity and pH. These are the same parameters and auxiliary systems described in the Acceptance Criteria subsection of AMP B.1.29.1. Please provide the following information:
a) Discuss the operating experience that has been gathered and reviewed for other auxiliary systems described in the scope of this AMP.

LR Response

For control room and relay room chilled water, decay heat removal cooling water, and security generator jacket cooling water, LRA Section B.1.29.1 notes that the program will be enhanced prior to the period of extended operation to provide guidance for sampling and analysis. Since these systems are not currently monitored, operating experience providing objective evidence of program effectiveness for these systems does not exist.

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.1 -8b Water Chemistry Control-Auxiliary Systems Program
The "Operating Experience" program element for AMP B.1.29.1 in the LRA describes operating experience for the stator cooling water system conductivity, dissolved oxygen, and copper content and aux boiler heating water conductivity and pH. These are the same parameters and auxiliary systems described in the Acceptance Criteria subsection of AMP B.1.29.1. Please provide the following information:
b) Discuss the acceptance criteria or performance parameters for other auxiliary systems described in this AMP, and how are they applied to the review of their operating experience.

LR Response

For control room and relay room chilled water, decay heat removal cooling water, and security generator jacket cooling water, LRA Section B.1.29.1 notes that the program will be enhanced prior to the period of extended operation to provide guidance for sampling and analysis. Industry recommendations and One-Time Inspection Program results will be considered in determining the parameters to be monitored, monitoring frequency, and associated acceptance criteria.

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.1 -8d Water Chemistry Control-Auxiliary Systems Program
The "Operating Experience" program element for AMP B.1.29.1 in the LRA describes operating experience for the stator cooling water system conductivity, dissolved oxygen, and copper content and aux boiler heating water conductivity and pH. These are the same parameters and auxiliary systems described in the Acceptance Criteria subsection of AMP B.1.29.1. Please provide the following information:
d) Clarify whether the stator cooling water system has continuous monitoring instrumentation or alarms for conductivity, dissolved oxygen, or other parameters, and whether these additional data are recorded, trended, and reviewed periodically.

LR Response

The stator cooling water system has continuous in-line conductivity meters at the generator inlet and outlet. Although these meters do not have alarms, data from these meters is recorded, trended, and reviewed periodically.

The stator cooling water system does not have continuous monitoring instrumentation or alarms for dissolved oxygen or soluble copper.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.29.3 -1 Water Chemistry Control-Closed Cooling Water Program
The Program Description for AMP B.1.29.3 in the LRA states that the water chemistry control - closed cooling water systems program includes the following: 1) jacket cooling water subsystem for the emergency diesel generator, 2) reactor building closed loop cooling, and 3) turbine building closed loop cooling. Please confirm that these are the only closed cooling water systems at JAFNPP in which the water chemistry is controlled, that are not subjected to significant sources of contamination, and in which heat is not directly rejected to a heat sink.

LR Response
With the exception of systems in the Water Chemistry Control – Auxiliary Systems Program, there are no other closed cooling water systems with license renewal intended functions at JAFNPP in which the water chemistry is controlled, that are not subjected to significant sources of contamination, and in which heat is not directly rejected to a heat sink.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.3 -2 Water Chemistry Control-Closed Cooling Water Program
The Program Description for AMP B.1.29.3 in the LRA states that the program includes preventive measures that manage loss of material, cracking, and fouling for components in closed cooling water systems. As described in NUREG-1801, Rev. 1, Section XI.M21, CCCW system aging management programs monitor the effects of corrosion and SCC by testing and inspection. Please describe the testing and inspection activities utilized at JAFNPP to monitor the effects of corrosion and SCC on closed cooling water systems components.

LR Response

As noted in LRA section B.1.29.3, the JAFNPP Water Chemistry Control – Closed Cooling Water Program takes exception to the recommended performance and functional testing, with the following justification.

While NUREG-1801, Section XI.M21, Closed-Cycle Cooling Water System endorses EPRI report TR-107396 for performance and functional testing guidance, EPRI report TR-107396 does not recommend that equipment performance and functional testing be part of a water chemistry control program. This is appropriate since monitoring pump performance parameters is of little value in managing effects of aging on long-lived, passive CCW system components. Rather, EPRI report TR-107396 states in section 5.7 (Section 8.4 in EPRI report 1007820) that performance monitoring is typically part of an engineering program, which would not be part of water chemistry. In most cases, functional and performance testing verifies that component active functions can be accomplished and as such would be governed by the maintenance rule (10 CFR 50.65). For example, loss of material cannot be detected by system performance testing. Passive intended functions of pumps, heat exchangers and other components will be adequately managed by the Closed Cooling Water Chemistry and One-Time Inspection programs through monitoring and control of water chemistry parameters and verification of the absence of aging effects.

Corrosion coupons are used to monitor the effects of corrosion on the reactor building and turbine building closed loop cooling systems.

In addition, LRA section B.1.21, One-Time Inspection, describes inspections planned to verify effectiveness of the water chemistry control programs to ensure that significant degradation is not occurring and component intended function is maintained during the period of extended operation.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.29.3 -3 Water Chemistry Control-Closed Cooling Water Program
The Program Description for AMP B.1.29.3 in the LRA states that the activities for monitoring and controlling closed cooling water chemistry using JAFNPP procedures and processes are based on EPRI guidance for closed cooling water chemistry. Please identify the EPRI documents used as guidance and make them available for NRC review at the time of the onsite audit.

LR Response
The EPRI document used as guidance is EPRI Report 1007820, Closed Cooling Water Chemistry Guideline (TR-107396, Rev. 1).

EPRI Report 1007820, Closed Cooling Water Chemistry Guideline (TR-107396, Rev. 1) was available for onsite review.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.3 -4a Water Chemistry Control-Closed Cooling Water Program
With regard to AMP B.1.29.3, provide the following details of the JAFNPP closed cooling water aging management program:
a) Identify the parameters monitored for each of the closed cooling water systems in the program, the sampling and testing frequencies, and how these are determined.

LR Response

As indicated in LRA section B.1.29.3, the Water Chemistry Control – Closed Cooling Water Program is consistent with the program described in NUREG-1801, Section XI.M21, Closed-Cycle Cooling Water System, with one exception related to performance and functional testing.

Sampling and testing frequencies are documented in Chemistry procedures SP-01.25, Reactor Building Closed Loop Cooling Sampling and Analysis, RT-01.15, Turbine Building Closed Loop Cooling Sampling and Analysis, and SP-01.23, Diesel Fire Pump Emergency Diesel Generator Coolant Corrosion Inhibitor Sampling and Analysis. These procedures were available for onsite review.

The parameters monitored and frequencies are those recommended in EPRI Report 1007820.

JAFNPP AMP and AMR Database

Audit Question

161

LR Request

AMP B.1.29.3 -4b Water Chemistry Control-Closed Cooling Water Program
With regard to AMP B.1.29.3, provide the following details of the JAFNPP closed cooling water aging management program:
b) Identify the acceptance criteria for the monitored parameters and how these are determined.

LR Response

Acceptance criteria are identified in Chemistry procedures SP-01.25, Reactor Building Closed Loop Cooling Sampling and Analysis, RT-01.15, Turbine Building Closed Loop Cooling Sampling and Analysis, and SP-01.23, Diesel Fire Pump Emergency Diesel Generator Coolant Corrosion Inhibitor Sampling and Analysis. These procedures were available for onsite review.

The acceptance criteria are those recommended in EPRI Report 1007820.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.3 -4c Water Chemistry Control-Closed Cooling Water Program
With regard to AMP B.1.29.3, provide the following details of the JAFNPP closed cooling water aging management program:
c) Describe which of the parameters are trended for each of the closed cooling water systems in the program.

LR Response

The parameters trended are those recommended in EPRI Report 1007820.

See the response for item # 163 for additional details.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.3 -4d Water Chemistry Control-Closed Cooling Water Program
With regard to AMP B.1.29.3, provide the following details of the JAFNPP closed cooling water aging management program:
d) Describe the administrative controls and procedures used to implement periodic review and trending of water chemistry parameters and to determination what corrective actions are required.

LR Response

In accordance with Entergy corporate procedure EN-CY-101, Chemistry Activities, the chemistry department trends chemistry and radiochemistry parameters to allow identification and correction of adverse trends before limits are exceeded. Data is reviewed as it is generated, and appropriate comments are made as necessary to document reasons for adverse data indications. The site chemistry staff reviews the data trends to ensure adverse indications are noted and addressed in a timely manner.

In addition, site chemistry department group data review sessions are performed at least quarterly to share information on specific plant chemistry. A corporate chemist periodically participates in the data review sessions to provide an independent assessment.

Chemistry trends, underlying causes of problems, and results of corrective actions are periodically reviewed with higher levels of line management.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.3 -4e Water Chemistry Control-Closed Cooling Water Program
With regard to AMP B.1.29.3, provide the following details of the JAFNPP closed cooling water aging management program:
e) Describe the initiation and implementation of the corrective action process for bringing water chemistry parameters back within the limits of the acceptance criteria specified by the program.

LR Response

Corrosion inhibitor concentrations outside allowable limits are returned to acceptable range utilizing chemical additions or feed and bleed. The TBCLC and RBCLC systems have a demineralizer available, along with feed and bleed, to remove system contaminants. Both systems have an oxygen addition and oxygen removal skids available to control levels of dissolved oxygen.

Corrective actions are taken in accordance with 10 CFR Part 50, Appendix B; EPRI Report 1007820 (TR-107396 Rev. 1); and the JAFNPP corrective action program.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.3 -5 Water Chemistry Control-Closed Cooling Water Program
The 'Exceptions to NUREG-1801' subsection for AMP B.1.29.3 in the LRA states that the JAFNPP water chemistry control - closed cooling water program does not include performance and functional testing. As described in NUREG-1801, Rev. 1, Section XI.M21, program element 3 for Parameters Monitored/Inspected states that the aging management program monitors the effects of corrosion and SCC by testing and inspection to evaluate system and component condition. Further, element 4 for Detection of Aging Effects states that control of chemistry does not preclude corrosion or SCC at locations of stagnant flow conditions or crevices and that the extent and schedule of inspections and testing should assure detection of corrosion or SCC before the loss of the intended function of the component. Please provide the technical justification for concluding that water chemistry control alone is sufficient to assure detection of corrosion or SCC before the loss of the intended function of the component or system. Also, please discuss the administrative controls or procedures that are in place to evaluate and initiate corrective actions in the closed cooling water chemistry aging management program based on the results of inspections or other means for the detection of aging resulting from corrosion and SCC.

LR Response

The Water Chemistry Control-Closed Cooling Water Program includes monitoring and control of water chemistry to minimize exposure to aggressive environments and corrosion inhibitors for the emergency diesel generator closed cooling water to manage general, crevice, and pitting corrosion, as well as SCC. Corrosion coupons are used to monitor the effects of corrosion on the reactor building and turbine building closed loop cooling systems.

As noted in LRA section B.1.29.3, the JAFNPP Water Chemistry Control – Closed Cooling Water Program takes exception to the recommended performance and functional testing, with the following justification.

While NUREG-1801, Section XI.M21, Closed-Cycle Cooling Water System endorses EPRI report TR-107396 for performance and functional testing guidance, EPRI report TR-107396 does not recommend that equipment performance and functional testing be part of a water chemistry control program. This is appropriate since monitoring pump performance parameters is of little value in managing effects of aging on long-lived, passive CCW system components. Rather, EPRI report TR-107396 states in section 5.7 (Section 8.4 in EPRI report 1007820) that performance monitoring is typically part of an engineering program, which would not be part of water chemistry. In most cases, functional and performance testing verifies that component active functions can be accomplished and as such would be governed by the maintenance rule (10 CFR 50.65). For example, loss of material cannot be detected by system performance testing. Passive intended functions of pumps, heat exchangers and other components will be adequately managed by the Closed Cooling Water Chemistry and One-Time Inspection programs through monitoring and control of water chemistry parameters and verification of the absence of aging effects.

In addition, LRA section B.1.21, One-Time Inspection, describes inspections planned to verify effectiveness of the water chemistry control programs to ensure that significant degradation is not occurring and component intended function is maintained during the period of extended operation.

As described in LRA section B.0.3, JAFNPP quality assurance (QA) procedures, review and approval processes, and administrative controls are implemented in accordance with the requirements of 10 CFR Part 50, Appendix B. Conditions adverse to quality, such as failures, malfunctions, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. In the case of significant conditions adverse to quality, measures are implemented to ensure that the cause of the nonconformance is determined and that corrective action is taken to preclude recurrence. In addition, the root cause of the significant condition adverse to quality and the corrective action implemented are documented and reported to appropriate levels of management.

The implementing procedure for the corrective action process were available for onsite review.

JAFNPP AMP and AMR Database

Audit Question

166

LR Request

AMP B.1.29.3 -6a Water Chemistry Control-Closed Cooling Water Program
The Operating Experience subsection for AMP B.1.29.1 in the LRA describes operating experience for the RBCLC system where low levels of dissolved oxygen in the piping caused loss of material in system piping. An oxygen injection system was installed in August 2003 to correct this problem. Please provide the following information:
a) Discuss how the loss of piping material was detected and how it was linked to the low levels of dissolved oxygen in the system water.

LR Response

Loss of piping material was calculated from corrosion studies on coupons of base metals that were indicative of metals in the RBCLC system. The type of iron oxide found and the quantity of filterable iron in the RBCLC system indicated that low oxygen levels in the system were contributing to a magnetite iron oxide and not the protective layer of iron oxide that was desirable.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.3 -6b Water Chemistry Control-Closed Cooling Water Program

The Operating Experience subsection for AMP B.1.29.1 in the LRA describes operating experience for the RBCLC system where low levels of dissolved oxygen in the piping caused loss of material in system piping. An oxygen injection system was installed in August 2003 to correct this problem. Please provide the following information:

b) *Clarify whether this was a special inspection or whether administrative controls or procedures are in place to correlate physical inspections and tests to water chemistry on a periodic basis.*

LR Response

Administrative controls or procedures are in place to correlate physical inspections and tests to water chemistry on a periodic basis. Periodic chemistry monitoring of corrosion coupons, dissolved oxygen and iron concentration in the RBCLC water were particularly useful in this case.

In accordance with Entergy corporate procedure EN-CY-101, Chemistry Activities, the chemistry department periodically assesses corrosion/deposition conditions in plant systems by direct inspections, test coupons, microbiological sampling, computer modeling or other means.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.3 -7a Water Chemistry Control-Closed Cooling Water Program

The Operating Experience subsection for AMP B.1.29.1 in the LRA describes operating experience for the TBCLC system where high dissolved oxygen concentration in the piping caused pitting corrosion in carbon steel. An oxygen removal skid was installed and system leaks were repaired to lower the dissolved oxygen concentration. Please provide the following information:

a) Discuss how the pitting corrosion in carbon steel material was detected and how it was linked to the high concentrations of dissolved oxygen in the system water.

LR Response

Corrosion coupons installed in the TBCLC water during periods of high dissolved oxygen concentration had pits on the surface. Unlike the corrosion coupons, the system piping has a protective iron oxide layer, and therefore may not have experienced pitting.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.29.3 -7b Water Chemistry Control-Closed Cooling Water Program
The Operating Experience subsection for AMP B.1.29.1 in the LRA describes operating experience for the TBCLC system where high dissolved oxygen concentration in the piping caused pitting corrosion in carbon steel. An oxygen removal skid was installed and system leaks were repaired to lower the dissolved oxygen concentration. Please provide the following information:
b) Clarify whether this was the result of a special inspection or whether administrative controls or procedures are in place to correlate physical inspections and tests to water chemistry on a periodic basis.

LR Response

Administrative controls or procedures are in place to correlate physical inspections and tests to water chemistry on a periodic basis. For additional details see response to item # 169.

In accordance with Entergy corporate procedure EN-CY-101, Chemistry Activities, the chemistry department periodically assesses corrosion/deposition conditions in plant systems by direct inspections, test coupons, microbiological sampling, computer modeling or other means.

JAFNPP AMP and AMR Database

Audit Question #

172

LR Request

AMP B.1.11-1 External Surfaces Monitoring
With regard to AMP B.1.11, please discuss how surfaces that are inaccessible or not readily visible and insulated will be handled under this program.

LR Response

Surfaces that are inaccessible or not readily visible due to radiological, safety, security or other considerations are inspected when plant conditions permit such as refueling outages. Surfaces that are inaccessible or not readily visible during both plant operations and refueling outages are inspected at such intervals that would provide reasonable assurance that the effects of aging will be managed such that applicable components will perform their intended function during the period of extended operation.

Surfaces that are insulated are inspected when the external surface is exposed (i.e., maintenance) at such intervals that would provide reasonable assurance that the effects of aging will be managed such that applicable components will perform their intended function during the period of extended operation

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.11-2 External Surfaces Monitoring
Please confirm that AMP B.1.11 includes confirmation of the integrity of any paint or coatings that are used on the surface of components.

LR Response

Yes, *the condition of coatings is inspected. During system inspections, visual inspections identify items which could affect system performance, safety, or reliability* as well as general housekeeping, personnel safety hazards and radiological concerns. Examples of parameters inspected are

- condition and placement of coatings,
- evidence of corrosion, and
- indications of leakage.

This is discussed in Parameters Monitored/Inspected in the NUREG-1801, Section XI.M38 program description. The JAF AMP is consistent with the NUREG-1801 AMP with no exceptions

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.11-3 External Surfaces Monitoring
Please discuss the frequency of inspections for the various applications described in AMP B.1.11and the basis for these frequencies.

LR Response

System inspections are conducted at least once per refueling cycle and are normally performed more frequently. This frequency is acceptable since aging effects are typically caused by long-term degradation mechanisms such as corrosion. Surfaces that are inaccessible or not readily visible during plant operations and refueling outages are inspected at such intervals that would ensure the components intended function is maintained. The intervals of inspections may be adjusted as necessary based on plant-specific inspection results and industry experience. In addition, all plant personnel are required to identify adverse conditions via the corrective action process. Since adverse conditions include those which the system walkdowns are intended to manage, aging effects may be identified through routine operations and maintenance activities.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.11-5 External Surfaces Monitoring
Please discuss the monitoring and trending activities to be implemented under AMP B.1.11 including the acceptance criteria to be used for each component/aging effect to be managed by AMP B.1.11.

LR Response
This is discussed in "Monitoring and Trending" in the AMPER LRD-02, Section 4.10. Acceptance criteria are discussed under "Acceptance Criteria" in the AMPER LRD-02, Section 4.10.

Monitoring and Trending

Visual inspection activities are performed and associated personnel are qualified in accordance with site controlled procedures and processes. The External Surfaces Monitoring Program uses standardized monitoring and trending activities to track degradation. Deficiencies are documented so that results can be trended.

Acceptance Criteria

Engineering evaluations of visual indications of leakage or loss of material consider procedural requirements, current licensing basis, industry codes, and standards to ensure that the need for corrective actions is identified before loss of intended functions

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.11-6 External Surfaces Monitoring
With regard to the Enhancement for AMP B.1.11, please identify a) the guidance documents that will be enhanced, b) the components that will be affected, and c) the aging effects that will be addressed by the enhancement.

LR Response

a) The guidance documents were available on site for review.

b) As stated in the enhancement, "Inspections shall include areas surrounding the subject systems to identify hazards to those systems. Inspections of nearby systems that could impact the subject systems will include SSCs that are in scope and subject to aging management review for license renewal in accordance with 10 CFR 54.4 (a)(2)."

c) The aging effect will be loss of material.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.11-7 External Surfaces Monitoring
The FSAR supplement for AMP B.1.11 in Section A.2.1.11 of the LRA does not discuss the commitment to implement the enhancement to this program prior to the period of extended operation. Please revise the FSAR supplement to discuss this commitment.

LR Response

Section A.2.1 of the LRA states, "All aging management programs will be implemented prior to entering the period of extended operation." This includes enhancements to individual programs. For additional clarification, LRA Appendix A will be revised as follows.

Section A.2.1.11, External Surfaces Monitoring, add
"The program guidance documents will be enhanced to include periodic inspections of systems in scope and subject to aging management review in accordance with 10 CFR 54.4(a)(1) and (a)(3). Inspections shall include areas surrounding the subject systems to identify hazards to those systems. Inspections of nearby systems that could impact the subject systems will include SSCs that are in scope and subject to aging management review in accordance with 10 CFR 54.4(a)(2). These enhancements will be implemented prior to the period of extended operation."

This requires a LRA Amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.15-1 Heat Exchanger Monitoring
In LRA Section B.1.15, the Program Description states that representative tubes within the sample population of heat exchangers will be eddy current tested at a frequency determined by internal and external operating experience. Please clarify what is meant by internal and external operating experience. Also, please discuss a) the rational to be used in determining the inspection frequency using plant-specific and industry operating experience, and b) the anticipated minimum inspection frequency to be imposed to ensure timely detection of aging effects.

LR Response

"Internal and external operating experience" means "JAFNPP site and industry operating experience."

The following is an example of the steps which may be used to develop the inspection plan:

1. An initial visual inspection would be performed of the sample population of in scope heat exchangers. This inspection would document the "as-found" conditions. Additional examination methods may be used if "as-found" conditions warrant, (i.e. ultrasonic thickness measurements or radiography). The results of these inspections would be used to establish the frequency of future inspections.

2. Where physically accessible, baseline eddy current data would be obtained. The results of these tests would be used to determine the frequency of future inspections and the number of tubes to be sampled.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.15-2 Heat Exchanger Monitoring
In LRA Section B.1.15, the discussion of "Parameters Monitored" program element states that, where practical, eddy current inspections of shell-and-tube heat exchanger tubes will be performed to determine tube wall thickness. Please discuss the criteria for determining practicality for eddy current inspections. Also, please discuss how aging of tubes for heat exchangers in the scope of this AMP will be managed when it is determined that eddy current inspection is impractical.

LR Response

(a) Practicality is dependant on physical location, physical size, orientation, physical dimensions, accessibility and disassembly of heat exchanger.

(b) If eddy current inspection is determined to be impractical aging of tube is managed based on the results of:

1. Visual inspection of the external portion of heat exchanger tubes is conducted during maintenance activities when eddy current inspections are not practical. This inspection is focused on detecting the extent of tube erosion, corrosion, fouling and scaling, and on the detection of corrosion at the tube sheet and rolled tube joints.

And/or

2. Pressure/Leak testing is another method that can be used when eddy current is impractical. This task is focused on finding leaks in cracked tubes and in defects at the tube joints. These defects may be caused by improper installation, abusive transients, by plugging of tubes, and also by improper cleaning in the case of rolled tube joints.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.15-3 Heat Exchanger Monitoring
In LRA Section B.1.15, the discussion of "Parameters Monitored" program element states that visual inspections will be performed on heat exchanger heads, covers, and tubesheets where accessible to monitor surface condition for indications of loss of material. Since this AMP is credited to manage loss of material-wear on the external surface of heat exchanger tubes, please clarify how the visual inspections described will help to manage the aging effects for which it is credited in the LRA.

LR Response

Visual inspections is focused on detecting the extent of tube erosion, corrosion, fouling and scaling, and on the detection of corrosion at the tube sheet and rolled tube joints. In some cases, heat exchanger heads, partition plates, baffles, covers, or tubesheets are of the same material environment combination as tubes, which provides additional data for determining inspection frequency and the presence of aging effects.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.15-4 Heat Exchanger Monitoring
In LRA Section B.1.15, the discussion of "Detection of Aging Effects"program element states that representative tubes within the sample population of heat exchangers will be eddy current tested. Please discuss a) the rational to be used in determining the sample population, and b) the rational to be used for selecting representative tubes within the sample population.

LR Response

(a) The sample population of heat exchangers will be determined based on the materials of construction of the heat exchanger tubes and the associated environments as well as the type of heat exchanger (for example, shell and tube type). At least one heat exchanger of each type, material and environment combination will be included in the sample population. This ensures that potential impacts of different design, material and environment combinations will be addressed.

(b) Representative tubes within the heat exchanger sample population will be selected based on previous eddy current inspections, WO history such as corrective maintenance, tube plugging history, engineering evaluation, EPRI guidance and service condition of the heat exchanger. The sample tubes are considered on locations in the bundle most prone to discovering mechanistic failures such as pitting, tube erosion, and lagging vibration wear/fret damage.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.15-5 Heat Exchanger Monitoring
In LRA Section B.1.15, the discussion of "Detection of Aging Effects" program element states that representative tubes within the sample population of heat exchangers will be eddy current tested. Please discuss the data collection techniques that will be implemented for this AMP.

LR Response

Eddy Current test inspections are done according to the code requirements of ASME Section V, Article 8 1980 and 1989 editions. Vendor who provides services uses digital data acquisition with offline analysis.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.15-7 Heat Exchanger Monitoring
In LRA Section B.1.15, the discussion of "Operating Experience" program element states that the Heat Exchanger Monitoring Program at JAFNPP is a new program. Please discuss the JAFNPP-specific operating experience with the heat exchangers for which this AMP is credited to manage aging, including any degradation or failures that resulted in corrective actions.

LR Response

As stated in Section 3.2 of JAF-RPT-05-LRD02, the Heat Exchanger Monitoring Program manages loss of material for copper alloy heat exchanger tubes in the lube oil subsystems of the HPCI pump turbine and EDG engine. Of these components only the HPCI turbine lube oil cooler has been inspected. These inspections occurred in 1998 and 2006 and detected no evidence of degradation. A review of site condition reports and records did not document any failures on these heat exchangers.

JAFNPP AMP and AMR Database

Audit Question #

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LR Request

AMP B.1.15-8 Heat Exchanger Monitoring
The FSAR supplement for AMP B.1.15 in Section A.2.1.16 of the LRA does not discuss the commitment to implement this new program prior to the period of extended operation. Please revise the FSAR supplement to discuss this commitment.

LR Response

Section A.2.1 of the LRA states, "All aging management programs will be implemented prior to entering the period of extended operation." This includes the Heat Exchanger Monitoring Program. For additional clarification, LRA Appendix A will be revised as follows.

Section A.2.1.16, Heat Exchanger Monitoring Program, add
"This program will be implemented prior to the period of extended operation."

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.28 -1 Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (Cass)
The description of AMP B.1.28 in the LRA states that this is a new program and will be fully implemented prior to the period of extended operation. Please provide a list of CASS components in the primary pressure boundary and RVI that are in the scope of this AMP, and the screening criteria that will be used to determine the susceptibility of CASS components exposed to thermal and neutron embrittlement.

LR Response
As indicated in LRA Table 3.1.2-2, the CASS components in the scope of this program are:

* Control rod guide tubes (bases) exposed to an environment of Treated water > 482 F and neutron fluence.
* Fuel support pieces (orificed supports) exposed to an environment of Treated water > 482 F and neutron fluence.
* Jet pump castings (transition piece, inlet elbow/nozzle, mixer adapter, restrainer bracket, diffuser collar) exposed to an environment of Treated water > 482 F and neutron fluence.

As stated in LRA Section B.1.28, the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program at JAFNPP is a new program that will be consistent with the program described in NUREG-1801, Section XI.M13. As a program that is consistent with NUREG-1801, the screening criteria (casting method, molybdenum content, and ferrite content) given in Section XI.M13, Scope of the Program, apply to the JAFNPP program for determining susceptibility to thermal aging.

Components exposed to more that 1E17 n/cm2 (E>1MeV) over the life of the plant will be included in the program as susceptible to neutron irradiation embrittlement.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.28 -3a Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (Cass)
In NUREG-1801, the discussion in the "Detection of Aging Effects" program element for AMP XI.M13 notes that for reactor vessel internal CASS components that have a neutron fluence of greater than 10E17 n/cm2 or are determined to be susceptible to thermal embrittlement, an applicant can implement either (a) a supplemental examination of the affected component as part of a 10-year ISI program during the license renewal period, or (b) a component specific evaluation to determine the component's susceptibility to loss of fracture toughness. Please provide the following information:
a) Identify any components for which a supplemental examination is used, and describe what kind of supplemental inspection will be used for detecting the critical flaw size with adequate margin

LR Response
Since the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program at JAFNPP is a new program, the list of components for which a supplemental examination will be used has not yet been established. One example of a supplemental examination for those components that require inspection is an enhanced visual examination (EVT-1) capable of detecting 0.0005 inch resolution.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.28 -3b Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (Cass)
In NUREG-1801, the discussion in the "Detection of Aging Effects" program element for AMP XI.M13 notes that for reactor vessel internal CASS components that have a neutron fluence of greater than 10E17 n/cm2 or are determined to be susceptible to thermal embrittlement, an applicant can implement either (a) a supplemental examination of the affected component as part of a 10-year ISI program during the license renewal period, or (b) a component specific evaluation to determine the component's susceptibility to loss of fracture toughness. Please provide the following information:
b) Identify any components for which a component specific evaluation is used, and discuss the methodology that will be used to demonstrate adequate toughness of the embrittled material.

LR Response

Since the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program at JAFNPP is a new program, the list of components for which a component specific evaluation will be used has not been developed. Component-specific evaluations will be in accordance with guidance in NUREG-1801, Section XI.M13.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.28 -4 Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (Cass)
In NUREG-1801, the discussion in the "Acceptance Criteria" program element for AMP XI.M13 notes that flaws detected in CASS components are evaluated in accordance with the applicable procedures of IWB-3500/3600 or IWC-3500/3600. Please confirm that the flaw evaluation procedure to be used for CASS components with detected flaws is consistent with the NUREG-1801 recommendations.

LR Response

Flaws found by supplemental inspections will be evaluated in accordance with the ASME Boiler and Pressure Vessel Code, Section IWB-3500. Flaw evaluation for CASS components with up to 25% ferrite content will be in accordance with ASME Sections IWB-3640 and IWB-3641. Flaw evaluation for CASS components with >25% ferrite content will be developed on a case-by-case basis using fracture toughness data. This is consistent with NUREG-1801 recommendations.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.28 -7 Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (Cass)
With regard to AMP B.1.28, please discuss JAFNPP-specific operating experience with CASS components in the scope of this AMP.

LR Response

The CASS program comparable to NUREG-1801 Section XI.M13 is applicable only to the reactor vessel internals. The identified CASS components of the internals (control rod guide tube, fuel support pieces, and pieces of the jet pump assemblies) are not subject to ISI, so there are no ISI results to date. No other JAFNPP site operating experience exists for the components in the scope of this new program.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1 27.1 -2 Masonry Wall
The program description for AMP B.1.27.1 in the JAFNPP LRA does not indicate that this program includes all of the guidance provided in I.E. Bulletin 80-11, "Masonry Wall Design," and Information Notice 87-67, "Lessons learned from Regional Inspections of Licensee Actions in Response to I.E. 80-11." Please describe how you incorporated these guidance in the program. Also, provide the visual examination frequency for the program and its technical basis.

LR Response

In performing the IPA for license renewal, Entergy compared the JAFNPP masonry wall program to the acceptable masonry wall program described in NUREG-1801,. The program attributes were specifically compared to the ten elements of the program described in NUREG-1801, Section XI.S5, Masonry Wall Program. As stated in the Abstract of NUREG-1801, an applicant may reference the GALL report in a license renewal application to demonstrate that the programs at the applicant's facility correspond to those reviewed and approved in the GALL report and that no further staff review is required. As indicated in Aging Management Program Evaluation Report LRD-02, Section 4.21.2, Operating experience shows that this program has been effective in managing aging effects. I.E. Bulletin 80-11 block walls within scope of JAFNPP maintenance rule are visually inspected at least once every 5 years to ensure there is no loss of intended function between inspections. There are no inaccesible block walls. The absence of operating experience involving significantly degraded masonry walls indicates that this frequency is appropriate. (Ref. JAFNPP procedure JAF-RPT-BYM-263, Section 4, and Aging Management Program Evaluation Report LRD 02, Section 4.21.2)

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1 27.2 -1 Structures Monitoring Program
In the discussion of operating experience, four noteworthy incidences of degradation are noted: cracks, gaps, corrosion, and flaking of coating.

For each of the first three incidences of degradation, please provide the plant documentation that describes the degradation, the assessment performed, the acceptance criteria applied, future monitoring recommendations, and any corrective actions taken. Also describe the monitoring activities that are or will be conducted under the Structures Monitoring Program.

LR Response

The Structural Maintenance Rule Monitoring is performed in accordance with procedure DESO 12. This document provides for inspection of reinforced concrete, structural steel, masonry, and architectural items. One or more inspection data sheets (dependent on whether degradation is noted) are completed for each Structure that is outlined in the Structural Maintenance Rule Basis Document. Judgment of the engineering team (two minimum) is used to evaluate degradation and determine the course of action whether to restore the condition of the structure or to adjust the monitoring frequency. The results of each subsequent monitoring inspection are recorded and evaluated to establish the time for the next inspection. The interval before the next inspection for a structure may decrease, increase, or remain the same based on the condition of the structure relative to the previous inspection. A Condition Report (CR) is issued for any structures that require immediate attention or a Work Order is initiated for minor degradation that requires attention. Inspection Checklist data sheets from the most recent inspections are available for review. The following reinforced concrete and masonry degradations, including cracks and gaps, were reported during the 2005 SMP inspections:

The SMP inspection of the RWCU Heat Exchanger (Inspection # 05-RB-300-005-03) reinforced concrete pedestal foundation monitors a degraded concrete condition. The steel frame supporting each end of the three stacked RWCU heat exchangers rests on concrete pedestals. One of the concrete pedestals had degraded by the loss of concrete from top and side surfaces located adjacent to the bearing surface of the steel frame. Past repairs were not effective in restoring the concrete due to the thermal expansion of the heat exchangers. The most recent inspection in 2005 confirmed there was no change in the concrete condition from the previous inspection in 2003 (i.e., 2-year frequency). The broken concrete condition exceeds the acceptance criteria of hairline cracks and therefore condition reports have been written to provide immediate management attention. As a result, an engineering change package has been designed and issued to restore the support structure and is scheduled for implementation. The monitoring frequency will remain at 2-years for this item.

The SMP inspection of the Emergency Diesel Generator Room (Inspection # 05-ED-272-002-03, # 05-ED-272-004-03) of masonry block walls identified separations between the reinforced concrete wall and the end of the adjoining masonry walls. The vertical joint between the walls has separated from the joint filler such that a small (cracklike) opening has formed at several locations along the joint. The joint filler serves to fill the gap between the two walls and does not contribute to the structural integrity of the walls Therefore, a work order has been issued to repair the filler material. The repair work has not been scheduled. The monitoring frequency will remain at 2-years for these items.

No corrosion was reported during the 2005 inspections for reinforced concrete and masonry items.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1 27.2 -2 Structures Monitoring Program
Some BWR units have a history of problems with containment penetration bellows, and the licensee has a long-term replacement program that will continue into the LR period. The applicant is requested to address this industry operating experience and submit a specific technical basis why the JAFNPP containment penetration bellows are not subject to the aging effects and aging mechanisms observed at these BWRs.

LR Response

The Dresden/Quad Cities License Renewal Application (LRA) and Safety Evaluation Report (SER) provide a description of the Dresden/Quad Cities operating experience with stainless steel bellows. The Dresden/Quad Cities review determined a total of 120 bellows were within the scope of license renewal. Of these 120 bellows, 24 bellows were identified as being degraded. The root cause was identified as stress corrosion cracking (SCC). From 1990 to 2003 Dresden/Quad Cities replaced or removed the degraded bellows from service. The SER states that several of the replaced bellows received metallurgical analysis. Analysis results from a couple of examples determined the presence of corrosive products, such as "magnesium salts", chlorides, fluorides, and sulfides. Also, these corrosive species are not typical of containment operating conditions. As a result, the SER concludes the corrosive species, leading to the site specific degradation of the bellows, were most probably introduced during plant construction. (Reference Dresden/Quad Cities SER pages 3-403 to 3-408)

Cracking due to SCC for the JAFNPP containment bellows is not an aging affect requiring management. There is no JAFNPP site-specific operating experience similar to that of Dresden/Quad Cities. In summary, the presence of corrosive contaminants is necessary for SCC to occur. The normal environment for the JAFNPP drywell is dry and there has been no indication of contamination of the bellows during construction. In addition, containment bellows for JAFNPP are not exposed to a corrosive environment. As such, SCC is not applicable to JAFNPP stainless steel bellows. (Ref. LRA paragraph 3.5.2.2.1.7)

There is nothing to indicate that the bellows have been or would be subjected to corrosive contaminants since the environment is dry and inerted. They are static devices designed for thermal expansion between the drywell and torus during a DBA, therefore they do not experience inservice stresses that would make them susceptible to SCC. The leak rate testing (ref. ST-39B-X201) performed to date provides reasonable assurance that the structural integrity of these expansion bellows remains intact.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1 27.2 -3 Structures Monitoring Program
More information is needed about the aging management of inaccessible concrete areas. The applicant is requested to submit the dates and complete results (at specific locations/not averages or ranges) of all past groundwater monitoring tests. Discuss why the groundwater is non-aggressive, and/or aggressive, if applicable. Confirm that the JAFNPP SMP credited for LR will continue to perform the groundwater monitoring and inspect all inaccessible areas that may be exposed by excavation for any reason, whether the environment is considered aggressive or not, and will also inspect any inaccessible area where observed conditions in accessible areas, which are exposed to the same environment, show that significant concrete degradation occurred.

LR Response

JAFNPP has determined that groundwater is not aggressive and sampling will be done in the future to verify this evaluation. Groundwater at JAFNPP is expected to be non-aggressive similar to Nine Mile which is non-aggressive as stated in the SER for License Renewal of Nine Mile Point Nuclear Station, Units 1 and 2.

Values for pH, chloride and sulfate are not available. Structures Monitoring Program (SMP) will be enhanced to ensure an engineering evaluation is made on a periodic basis (at least once every five years) of groundwater samples to assess aggressiveness of groundwater to concrete. For the SMP, JAFNPP will obtain samples from a well that is most representative of the ground water surrounding below-grade site structures. Samples will be monitored for sulfates, pH and chlorides.
Structures Monitoring Program will also inspect any inaccessible concrete areas that may be exposed by excavation for any reason, or any inaccessible area where observed conditions in accessible areas, which are exposed to the same environment, show that significant concrete degradation is occurring.

This is license renewal commitment 16.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1 27.2 -4 Structures Monitoring Program
The applicant is requested to address and discuss operating experience in detail for the cracks identified in 2005, including the acceptance criteria of concrete structures and components. Was any scope expansion required due to unacceptable conditions identified? Identify any additional inspections scheduled for the next inspection period.

LR Response
Monitoring report JAF-RPT-BYM-03399 Revision 2 documents the results of inspection performed under the structures monitoring program. Acceptance criteria are delineated in DESO 12. The cracks identified did not deviate significantly from the baseline inspection and were identified as "minor cracking". Follow-up actions, if required, are identified within the body of the report and were available for review during the site audit. As a result of the inspection no additional scope nor new inspections were added.

The structural maintenance rule baseline (initial) inspections were performed in 1997 and future monitoring inspection frequencies were established based on the results of the baseline inspections. In cases where random cracks were identified in either reinforced concrete or masonry, a shorter monitoring interval of 2 years was established to confirm the condition was not a degrading condition (i.e., shrinkage cracks). For the majority of cases, the 2-year frequency has been continued until the present. As a result, the multiple inspections of these structures have confirmed the condition is not progressing and will not affect functional capabilities. No additional inspections are required during the next planned inspection for any items that have cracks identified.

As discussed in the Item #199 response, the only cracks of any significance that were reported during the 2005 inspection was associated with the RWCU Heat Exchanger concrete pedestal. However, there were a number of reinforced concrete and masonry items that were inspected in 2005 that contain hairline cracks that were reported during previous inspections and continue to be monitored. Any hairline cracks that are identified and being monitored in reinforced concrete are reviewed by experienced structural engineers to confirm they are not associated with a structural loading condition. Likewise, most hairline cracks being monitored in masonry construction are located in joint lines and are attributed to shrinkage. Minor pre-existing masonry wall hairline crack in the block face in the Electric Bay (Inspection # 05-TB-272-002-03) and in the West Diesel Fire Pump Room (Inspection # 05-SW-255-006-03) are being monitored on 2-year frequencies. A work order has been issued to repair the West Diesel Fire Pump Room hairline crack.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1 27.2 -5a Structures Monitoring Program
Please address each the current status of the enhancement to the existing Structures Monitoring Program. Including results of any enhanced inspections that have already been completed.

LR Response

Approximately 7 years remain before JAFNPP enters the period of extended operation, implementing procedures required for new AMPs, and procedure revisions for enhancements to existing AMPs have not yet been developed.
Commitment #16 to implement the enhancements to the Structures Monitoring Program are described in LRA Section B.1.27.2.

JAFNPP AMP and AMR Database

Audit Question #

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LR Request

AMP B.1 27.2 -6a Structures Monitoring Program
The scope of the enhancements listed for AMP B.1.27.2 is quite significant, and it encompasses several elements that would be expected to be part of an existing Structures Monitoring Program. Notable examples are the inclusion of anchors and the addition of steel components to the current inspection criteria. Consequently, the applicant is requested to:
(a) describe the scope of AMP B.1.27.2, including the structures and components in the scope of AMP B.1.27.2; the aging effects that are monitored; the inspection methods employed; and the inspection frequency;

LR Response

The enhancements to the Structures Monitoring Program (SMP) are relatively minor items that are not typically found in a maintenance rule structures monitoring program. The structures, structural components and their aging effects requiring management under scope of SMP are included in LRA Tables 3.5.2-1 through 3.5.2-6. Visual inspections of plant structures are performed at five-year intervals, except for the intake and discharge tunnel structures which are inspected at ten-year intervals. Visual inspections of buried plant structures are performed when opportunistic excavation occurs. However, more frequent inspections may be performed based on past inspection results, industry experience, or exposure to a significant event (e.g. tornado, earthquake, fire, chemical spill). (Ref. Aging Management Program Evaluation Report LRD-02, section 4.21.1).

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1 27.2 -6b Structures Monitoring Program
The scope of the enhancements listed for AMP B.1.27.2 is quite significant, and it encompasses several elements that would be expected to be part of an existing Structures Monitoring Program. Notable examples are the inclusion of anchors and the addition of steel components to the current inspection criteria. Consequently, the applicant is requested to:
(b) for the structures and components that will be added to the Structures Monitoring Program scope for license renewal, describe the aging management activities that are currently being implemented.

LR Response

Currently the aging management activities being implemented for structures and components that will be added to the Structures Monitoring Program for license renewal are routine observations during normal plant operation and maintenance. This is commitment #16

The corrective action program requires initiating condition reports for degraded conditions observed during routine operation and maintenance.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1 27.2 -7 Structures Monitoring Program
The applicant has not addressed aging management of the portion of the drywell shell embedded in the drywell concrete floor. This area is inaccessible for inspection, but is potentially subject to wetting on both the inside and outside surfaces. Are there any inspections planned prior to the period of extended operation for this portion of the drywell shell?

LR Response

The seal between the concrete floor inside the drywell and the drywell shell is inspected under the SMP and was most recently inspected in October 2006 during the refueling outage. In response to NRC Generic Letter GL 87-05, the drywell 'sand cushion' drains were inspected to verify they were free from plugging. The JAF design includes drains to capture refueling seal leakage and a seal over the sand cushion that precludes water intrusion that could affect the exterior surface of the embedded portion of the drywell shell. JAF engineering will evaluate the need for any appropriate additional actions.

See response to RAI 3.5.2-2.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1 27.2 -8 Structures Monitoring Program
Describe the "aggressive environment" and "water-flowing" environments for Reinforced Concrete Foundation, Slabs, and Reinforced Concrete Walls. What is the plant-specific program to manage potential degradation?

LR Response

Aggressive environment is defined in NUREG-1801 Chapter XI as it applies to steel in concrete as that occurring when concrete pH <11.5 or chlorides concentration >500 ppm. Concrete at JAFNPP is not susceptible to the aging effects caused by "aggressive environment" since it meets the NUREG-1801 criteria provided in Item III.A6-1. NUREG-1801 is unclear with respect to this item as the Volume 2 T-18 item (III.A6-1) has an air environment and the associated T-18 Volume 1 item (Table 3.5-1, Item 34) discusses aging management programs for water environments.

"Water flowing" is defined in NUREG-1801 as water that is refreshed, thus having larger impact on leaching; this can be rainwater, raw water, groundwater, or flowing water under a foundation. For the purposes of the JAFNPP aging management review, water-flowing was considered flowing water at greater than 3 fps. (Ref. EPRI report 1002950 "Aging Effects for Structures and Structural Components (Structural Tools), Section 3.3.1.4)

The potential aging effect resulting from flowing water is loss of material. For concrete, structures monitoring manages loss of material as identified in LRA Tables 3.5.2-1 through 3.5.2-4.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1 27.2 -9a Structures Monitoring Program

Please provide the following information related to inspection of underwater supports for loss of mechanical function:

(a) Identify the specific underwater supports that will be added to the scope of the inspection program for the license renewal period, including the system name and ASME Code Class.

LR Response

For JAFNPP no underwater supports are identified to be added to scope of this program for license renewal period.
No inspections are performed at JAFNPP using the GALL AMP XI.S7. The water control structures at JAFNPP are the intake and discharge structures. Inspections of these structures are performed under the "Structures Monitoring Program" AMP B.1.27.2. [Ref. Aging Management Program Evaluation Report LRD-02, section 4.21.1].

JAFNPP AMP and AMR Database

Audit Question #

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LR Request

B.1.16.1-1a Containment Inservice Inspection (CII)
JAFNPP AMP B.1.16.1 identifies that the Containment Inservice Inspection (CII) program is a plant-specific program encompassing the requirements for the inspection of class MC. Please provide the following information related to:
(a) Identify the MC supports that are currently included in the existing inspection program.

LR Response

The Class MC supports that are currently in scope of containment inspection program at JAFNPP are 16 torus saddle supports, 4 torus earthquake ties and 8 upper drywell stabilizers.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

B.1.16.1-1b Containment Inservice Inspection (CII)
JAFNPP AMP B.1.16.1 identifies that the Containment Inservice Inspection (CII) program is a plant-specific program encompassing the requirements for the inspection of class MC. Please provide the following information related to:
(b) Identify the MC supports that will be added to the scope of this inspection program for the license renewal period.

LR Response

(b) Torus supports and RPV stabilizer supports. The program document is JAF-RPT-PC-04088.

All torus supports, earthquake ties and upper drywell stabilizer supports will be scheduled for examination during the 4th ten-year inspection interval. The Code of Record for the 4th Interval shall be ASME Section XI 2001 Edition /2003 Addenda. There are no other supports to add.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

B.1.16.1-1c Containment Inservice Inspection (CII)
JAFNPP AMP B.1.16.1 identifies that the Containment Inservice Inspection (CII) program is a plant-specific program encompassing the requirements for the inspection of class MC. Please provide the following information related to:
(c) Specify the current inspection program and describe the current inspection details for the MC supports that are identified in (b) above.

LR Response

© These are under the ASME Section XI program and require VT-3 inspection.

The Class MC supports at JAF consist of 16 torus saddle supports, 4 torus earthquake ties and 8 upper drywell stabilizers. The original IWE program at JAF was developed in accordance with the requirements ASME XI 1992 edition with 1992 addenda after the IWE section of the code was mandated in 1996. This edition of the code did not require inspection of Class MC supports.

The current IWE Program at JAF was developed in accordance with the 1998 edition with 1998 addenda of ASME XI. This code edition requires that 100% of the Class MC supports be examined during the ten year interval. Accordingly, all torus supports, earthquake ties and upper drywell stabilizer supports are scheduled for examination during the JAF 4th ten-year inspection interval. The first examinations under the 4th interval IWE program will be performed either prior to or during RFO18 in 2008.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

B.1.16.1-1d Containment Inservice Inspection (CII)
JAFNPP AMP B.1.16.1 identifies that the Containment Inservice Inspection (CII) program is a plant-specific program encompassing the requirements for the inspection of class MC. Please provide the following information related to:
(d) Confirm that, all MC supports will be included in the scope of this inspection program for the period of extended operation.

LR Response

(d) These shall be included in the 4th interval ISI program which expires in October 17, 2014. The next interval will be updated and maintained as required by 10 CFR 50.55(a) and ASME Section requirements.

All torus supports, earthquake ties and upper drywell stabilizer supports continue to be examined in accordance with the JAF IWE Program during the period of extended operation.

JAFNPP AMP and AMR Database

Audit Question
219

LR Request
B.1.16.1-2 Containment Inservice Inspection (CII)
The applicant is requested to identify the inspection program and the Inspection frequency for the current license and for the extended period of operation. In the OE it said: "Results of the CII....during RF16 (2004) revealed no significant lost of material.." Please, provide the inspection documentation of this inspection and the results.

LR Response
The IWE containment inspection program is currently performed in accordance with ASME section XI 1998, no addenda with repair / replacement activities in accordance with ASME section XI 1992 including addenda. Going forward to the fourth ten-year ISI interval, inspection and repair / replacement will be performed in accordance with ASME section XI 2001 edition including 2003 addenda.

Documentation available for review at the site.

JAFNPP AMP and AMR Database

Audit Question

220

LR Request

B.1.16.1-3 Containment Inservice Inspection (CII)
The applicant is requested to address the results of the CII general walkdown of primary containment during 2006 (RFO 17) including any corrective action, preventive action related to question 219 above. Are there any degradations found? If found, What are they? What were your corrective and preventive actions? What were the results of your root cause analysis? Please discuss the acceptance criteria, qualification method used, and/or any other means to support your conclusion?

LR Response

With exception of the conditions identified in item 221 (B.1 16.1-4), the general walk down of primary containment during 2006 (RFO 17) identified minor surface rust/corrosion and areas of deteriorated coatings evaluated by the responsible design engineer as acceptable.
No degradations were found.

JAFNPP AMP and AMR Database

Audit Question

221

LR Request

B.1.16.1-4 Containment Inservice Inspection (CII)
Please explain, Why the June 27, 2005, operating experience such as crack on the torus shell addressed in the LRA? Are there any other similar situations identified? What are the preventive and corrective actions taken for the torus shell wall thinning? Please, provide the results of the NDE examination including the acceptance criteria and qualification method used and any pertaining documentation for the staff to review.

LR Response

The JAF Torus Preservation verifies that sample locations are tracked for wall thinning. The reports are in the NDE database and used to assure adequate wall thickness. IWE examinations are performed and any discrepancies noted in coatings are repaired using the CR system. All data is available on site. JPCE ISI engineer and IWE Structural engineer can supply documentation for both the Torus Cracking and/or Torus Wall.

The torus crack was discussed in LRA Section 3.5.2.2.1.8. The Torus was repaired in July 2005 using a cap and removing the damaged section of shell. The RCA determined Condensation Oscillation from the HPCI Turbine Steam Discharge provided the energy that initiated the cracking. UT was subsequently performed at this location and at the RCIC discharge each time they were run. In RO17 a Visual examination was scheduled on the extent of condition and 2 cracks were noted near the HPCI discharge. These cracks were not through wall were removed and repaired by welding. To eliminate the cause the HPCI discharge line was modified with a sparger assembly which is designed to eliminate condensation oscillation.
JAF documentation can be found under the following:
CR-JAF-05-2593
WO- JAF-05-24673
CR-JAF-06-4526
WO-JAF-06-28641

Additional information will be addressed under RAI 3.5.2-5.

JAFNPP AMP and AMR Database

Audit Question

222

LR Request

B.1.16.1-5 Containment Inservice Inspection (CII)
Explain how inspections are performed in the torus suppression pool above and below the water line. Explain historically what inspection findings have lead to the need for augmented inspections. Explain if any augmented inspections are currently being performed.

LR Response

The interior torus suppression pool area above and below the water line are inspected in accordance with the IWE program during refueling outages (Code of Record ASME Section XI 1998 Edition). A general visual examination is performed on the area above the water line. Below the water line is normally inaccessible unless the torus water level is lowered or drained for a work activity, which is required once per Interval in accordance with ASME Section XI, 1998 Edition.

The torus was last drained and cleaned in 1998 for the installation of the ECCS strainers. A general visual exam of the surface above and below the water line was performed. The visual examination identified nine (9) of the most severe areas of pitting. The depths of the pits were measured at that time and a portion of those areas are monitored and measured by means of a UT from the outside of the torus shell every outage. Over a five year period, all nine of the pitted areas are examined by performing a UT.

Augmented containment inspections are conducted based on, "Pre-existing component conditions which have been programmatically monitored and evaluated, that do not meet those conditions defined in IWE-1240 or IWE-3510.2 (i.e. pitting in the Torus)".

The Augmented Containment Inspection Program for Examinations of other than those required by IWE-1241are conducted on the Torus in accordance with the ISI Program and is as follows:

• JAF has implemented a sub-tier Augmented inspection frequency, based on HPCI and/or RCIC actuation requiring Ultrasonic examination of the Torus from the exterior surface in the following areas.
A. Torus interior ring girder gussets
b. External support columns at the intersection of bay "A" and "P" (HPCI Exhaust)
c. External surfaces of bay "N" and "O" (RCIC Exhaust)

• In addition, ultrasonic thickness measurements are performed from the exterior surface of the Torus Shell. These examinations are being performed in support of the Torus Preservation Program and are not required based on the IWE Containment Inspection Program.

JAFNPP AMP and AMR Database

Audit Question

223

LR Request

B.1.16.1-6 Containment Inservice Inspection (CII)
Explain if water leakage has ever been discovered between the drywell and concrete secondary shield wall or in the sand pocket area. Explain what JAFNPP does to inspect for water leakage in these two areas or to verify that loss of material is not occurring on the backside of the drywell. Provide the latest engineering system health report for the CII program.

LR Response

There has been no observed leakage causing moisture in the vicinity of the sand cushion at JAF and no moisture has been detected or suspected on the inaccessible areas of the drywell shell. Further, as discussed above, any potential leakage through the refueling bellows assembly is directed to a drain system. Therefore, no additional components have been identified that require aging management review as a source of moisture that might affect the drywell shell in the lower region.
In 1988, JAF verified that the air gap through drain lines using fiber optic cable and did not find any evidence of moisture in the air gap or corrosion of the drywell shell.
Additional information will be addressed under RAI 3.5.2-3.

JAFNPP AMP and AMR Database

Audit Question

224

LR Request

B.1.16.1-7 Containment Inservice Inspection (CII)
The containment inservice inspection aging management program described in LRA B.1.16.1 did not provide any information regarding the applicant's actions in response to GL 87-05 and other industry operating experience including actions planned as a result of recent staff guidance (LR-ISG-2006-01) to address the potential loss of material due to corrosion in inaccessible areas of the Mark 1 steel drywell shell for the period of extended operation.

LR Response

Two inspections were required per NRC Generic Letter 87-05 prior to start-up from the 1988 Refuel Outage. The first being inspection of the eight (8) 2" diameter sand cushion drain lines and the second being inspection of the six (6) refueling bellows leakage drain lines. The inspections using a flexible boroscope were to determine that the lines were unplugged and functioning as designed. All eight sand cushion drain lines were inspected and seven of the eight were found to be operable. Five of the six refueling bellows leakage drain lines were inspected and found to be operable. Inspection ports were installed prior to the inspection in five of the six lines, an inspection port was not installed in the sixth line because of the line's inaccessibility.

The sand cushion for JAF is covered with stainless steel plates and an adhesive seal to prevent in-leakage. Drains are provided above these plates and also at the bottom of the sand cushion. Because of this encasement type design arrangement, no ultrasonic (UT) thickness measurements are required for the drywell shell plates adjacent to the sand cushion.

Additional information will be addressed under RAI 3.5.2-3.

JAFNPP AMP and AMR Database

Audit Question
225

LR Request
AMP B.1.8 - 10CFR 50 appendix J (XI.S4)
The applicant is requested to address and discuss the test option related to this program. What was the most significant operating experience related to this program? What were your corrective and preventive actions? When does your next "periodic interval"start?

LR Response
As indicated in LRA section B.1.8, the Containment Leak Rate Program is consistent with the NUREG-1801 Section XI.S4, 10 CFR Part 50, Appendix J, Option B program.

As documented in the Integrated Leakage Rate Test (ILRT) 5 year extension request (Accession # ML032170128), the previous 4 ILRTs, dating back to May 1985, showed consistent low leakage and validate the structural integrity of the primary containment. Consistent with NUREG-1801, Section XI.S4, 10 CFR 50, Appendix J, the Containment Leak Rate Program is a monitoring program without preventive actions. Corrective actions are performed in accordance with 10 CFR Part 50, Appendix J, NEI 94-01, and 10CFR50 Appendix B.

Since the 5 year extension request was approved, the next ILRT is to be performed no later than March 7, 2010. Local leak rate tests have different intervals for individual components based on prior performance.

JAFNPP AMP and AMR Database

Audit Question
227

LR Request
AMP B.1.16.2 -1 Inservice Inspection Program
The [Scope of the Program] states that the ISI program manages cracking, loss of material, and reduction of fracture toughness of the reactor coolant system piping, components, and support.

A. Clarify what other plant systems the ISI Program covers in additon to the reactor coolant system. If the scope of the ISI Program covers other plant systems at JAFNPP under the requirements of 10CFR50.55a, identify and justify whether or not the [Scope of Program] program attribute needs to be revised.

B. Confirm that the ISI progrm includes implementation of the general requirements of ASME Section XI, Subsection IWA for these systems, the specific requirements of ASME Section XI, Subsection IWB for portions of these systems that are part of the reactor coolant pressure boundary, the specific requirements of ASME Section XI, Subsection IWC for portions of these systems that are categorized as ASME Code Class 2, Subsection IWD for portions of these systems that are categorized as ASME Code Class 3, and Subsection IWF for ASME Code Class 1, 2, and 3 component supports

LR Response
This item incorporates the following: Item 228, 229, 230, 231, 234, 236, 237, 238 inclusively

a) The ISI Program at JAF includes both the Reactor Coolant Pressure Boundary (RCPB) and piping systems that have been identified as ISI Class 2 & 3. However, the LRA credits the ISI Program for aging management of the Class 1 RCPB only. Therefore, no revision of the scope of program attribute is required.

b) The question in part B is confirmed.

The list of systems in the JAFNPP ISI program includes:

Flow Diagram Reactor Building Service Water Cooling
Control Room Area-Service and Chilled Water
Reactor Building Cooling Water
Reactor Building Cooling Water
Pass Cooling Water Supply
Fuel Pool Cooling (FPC)
Core Spray (CS)
Standby Liquid Control
Reactor Core Isolation Cooling (RCIC)
Reactor Water Cleanup (RWC)
Residual Heat Removal (RHR)
Residual Heat Removal (RHR)
High Pressure Coolant Injection (HPCI)
Reactor Water Recirculation (RC)
Control Rod Drive (CRD)
Feedwater (FW)
Service Water (SW)
Emergency Service Water (ESW)
Nuclear Boiler Vessel Instrumentation (NBVI)
Emergency Diesel Generator Fuel Oil and Combustion Air Systems
Emergency Diesel Generator and Lubricating Systems
Emergency Diesel Generator Air Start-up Lines

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.16.2 -9 Inservice Inspection Program
Program element "Detection of Aging Effects" - It is not clear how the NDE methods described in ASME Section XI, Subsection IWA and invoked in accordance with specific inspection requirements in ASME Section XI, Subsection IWB, IWC, or IWD have the ability to monitor for a drop in the fracture toughness property for a given ASME Code Class 1, 2, or 3 component. The project team requests that Entergy provide additional clarification on how the ISI program for JAFNP will manage loss of fracture toughness in the ASME Code 1, 2, and 3 components for the facility, and in particular, how the ISI program, when implemented, will ensure compliance with pertinent fracture toughness requirements in Section XI of the ASME Code and ensure system integrity if the fracture toughness for a particular component's material is projected to drop over the EPO.

LR Response

As stated in NUREG-1801 Volume 2 Rev 1 XI.M12, the ASME Section XI inspection requirements are sufficient for managing the effects of loss of fracture toughness due to thermal aging embrittlement of CASS pump casings and valve bodies, to wit:
For pump casings and valve bodies, based on the assessment documented in the letter dated May 19, 2000, from Christopher Grimes, Nuclear Regulatory Commission (NRC), to Douglas Walters, Nuclear Energy Institute (NEI), screening for susceptibility to thermal aging is not required. The existing ASME Section XI inspection requirements, including the alternative requirements of ASME Code Case N-481 for pump casings, are adequate for all pump casings and valve bodies.

In this way, the ISI program is used to manage the aging effect of “loss of fracture toughness” through analysis instead of monitoring techniques.

JAFNPP AMP and AMR Database

Audit Question

241

LR Request

AMP B.1.16.2 -13c Inservice Inspection Program
The project team requests that Entergy provide the following information with respect to the operating experience that is relevant to the JAFNP ISI Program:
c). Provide the following information if it is determined that Entergy did augment its ISI examination requirements for any given ASME Code Class 1, 2, or 3 component or its supports (i.e., other than pertinent reactor pressure vessel and internals components, which have been augmented for inspection pursuant to commitments for pertinent BWRVIP guidelines): (1) identify what component is of concern and what the relevant operating experience was that prompted Entergy to augment ISI examination requirements for the component, and (2) clarify what Entergy did to augment its ISI program requirements for these components.

LR Response

c) JAFNPP performs augmented inspections for the following components:
•IGSCC (ASME Section XI B-F, B-J & C-F weldments
•Risk-Informed Inservice Inspection (RI-ISI) Class 1, 2, and 3 piping welds (ASME Code Category B-F, B-J & C-F)
•Main Steam & Feedwater High Stress Welds inspected in accordance with JAF's TRM Section 3.4A and Engineering Report JAF-RPT-03-00289, Rev. 0, "Main Steam and Feedwater Augmented Inspection Program", and 50.59 Safety Evaluation, JAF-SE-03-0004, Rev. 0, "Update of the Main Steam and Feedwater Augmented Inspection Program".
•Core Spray Augmented Inspection Program - Core spray augmented examinations are welds that have been identified that warrant monitoring of the pump discharge piping for vibration. The exam requirements are to be performed in accordance JAF calculation / JAF-CALC-CSP-00327 Rev. 0, "JAF Core Spray Vibration Evaluation Core Spray Pump Discharge Lines", dated 9/27/91
•Feedwater Nozzle Inspection Program - The Feedwater Nozzle Inspection Program at JAF implements enhanced inservice inspection (ISI) of feedwater nozzles in accordance with the requirements of ASME Section XI, Subsection IWB and the recommendation of General Electric (GE) NE-523-A71-0594.
•Augmented Containment Inspection Program for Examinations Other Than Those Required By IWE-1241 JAF has implemented a sub-tier Augmented inspection plan, based on HPCI and RCIC actuation requiring ultrasonic examination of the Torus from the exterior surface

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.16.2 -14 Inservice Inspection Program TLAA AMR
The operating experience discussion states that the subsurface planar flaw for the feedwater pipe-to-pump weld was evaluated and found acceptable. Clarify what type of structural safety assessment was performed to evaluate this flaw for further service and what acceptance criterion was used to set a maximum limit on flaw size (length and depth), including adjustments to account flaw growth and proximity rules adjustments for adjacent flaw additions (if they are applicable). Clarify whether the evaluation used to assess the flaw meets the definition of a time-limited aging analysis (TLAA), as established according to the six TLAA definition criteria in 10 CFR 54.3. Provide your technical basis why the flaw evaluation for the feedwater pipe-to-pump weld is or is not a TLAA in accordance with 10 CFR 54.3.

LR Response

CR-JAF-2004-04472 was written to evaluate this condition.
Ultrasonic examination of weld 18-34-389 per the ISI program identified a subsurface planer indication for evaluation. The evaluation results were correlated to conditions accepted by the construction radiographs; the radiographs were dispositioned as slag inclusion which was acceptable per ASME Section XI IWB-3112(b). Because the flaw was acceptable per ASME Section XI IWB-3112(b), no structural safety assessment or calculation was required. Because no calculation is required, there is no TLAA for JAFNPP.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.16.2 -15 Inservice Inspection Program TLAA AMR
Discuss the results of the reviews performed to identify any and all other fracture mechanics evaluations or flaw evaluations, if any, that have the potential to meet the definition of a TLAA in 10 CFR 54.3. If any additional fracture mechanics evaluations or flaw evaluations have the potential to meet the definition of a TLAA, provide its technical and regulatory basis for concluding that the specific fracture mechanics evaluation or flaw evaluation is or is not a TLAA in accordance with 10 CFR 54.3.

LR Response
The results of the reviews performed to identify fracture mechanics evaluations and flaw evaluations that meet the definition of a TLAA in 10 CFR 54.3 are provided in JAF-RPT-05-LRD03 and JAF-RPT-05-LRD04, available for review on site.

Reviews of the following cases were performed, with no TLAAs being identified. More detail is provided in Section 2.4 of JAF-RPT-05-LRD04.

CRD Return Line Nozzle to End Cap Weld
In 2000, JAFNPP discovered a crack on the inside diameter of the weld between the CRD return line nozzle and the end cap. The NRC staff accepted the Fitzpatrick plant Mod JD-00-010 and issued an SER on October 26, 2000. The modification required no calculation involving a time-limited assumption defined by the current operating term. Weld overlays of this type put the original flaw in compression and qualifying evaluations assume flaw growth to 360 degrees through wall. Future acceptability of the weld is assured through inspections per the guidelines of BWRVIP-75-A. Therefore, no TLAA was identified.

Weld Overlays to Address IGSCC Indications
JAFNPP has applied 21 weld overlays to the recirculation system piping and 2 overlays to jet pump instrumentation piping to address flaw indications found during inspections performed for the IGSCC program. The overlays were designed and installed in accordance with Generic Letter 88-01, NUREG-0313, Rev. 2, and ASME Code requirements and approved by the NRC via a SER. In the qualifying evaluation, the original flaw is assumed to grow to 360 degrees circumferentially and 100% through wall. No credit is taken for the original pipe wall thickness. In addition, the weld metal used is resistant to IGSCC as discussed in BWRVIP-75-A and the specific NRC SER's. Future acceptability of the weld overlay is assured through inspections required by the ISI program and BWRVIP-75-A. There are no TLAA associated with these weld overlays.
There are no welds that are monitored for crack growth under the ISI Program and / or BWRVIP-75-A. All welds that were determined to contain cracking were repaired by weld overlay.

Shroud Cracking
JAFNPP performed baseline inspection of the shroud per BWRVIP-76 guidelines during the RO12 and RO13 refueling outages. Calculation JAF-CALC-NBS-04298 determined the inspection intervals to be used for monitoring the noted crack indications. Calculation JAF-CALC-NBS-04298 is not a TLAA since its time-limited assumptions are based on inspection intervals, not the current 40 year operating term. Subsequently, shroud tie-rods were installed to carry the load previously borne by the cracked welds.

Steam Dryer
Calculations associated with crack indications on the steam dryer are not TLAA since the associated calculations justify the time interval between periodic inspections, not the acceptability for the current 40-year operating term.

Core Spray Piping
Calculations associated with crack indications on the core spray piping are not TLAA since these calculations justify the time interval between inspections and do not justify operation for the current 40-year operating term. These crack indications are monitored by the BWR vessel internals program per BWRVIP-18A guidelines.

Main Steam Nozzle
UT inspection performed as part of the JAFNPP ISI program revealed a subsurface indication on main steam nozzle N3C. There has been no discernable change in the size of the indication during subsequent inspections. This indication is believed to be a flaw remaining from vessel construction and will continue to be monitored by ISI. There is no associated calculation with a time-limited assumption and, therefore, no TLAA is associated with this indication.

Torus Crack
In June of 2005 a small through-wall crack was identified in the torus shell in the vicinity of the torus support between bays "A" and "P". Failure analysis indicated that the crack was likely caused

by fatigue due to condensation oscillation associated with operation of the HPCI exhaust discharge to the torus. This crack was repaired. In followup inspections, two additional cracks were found. These two cracks were also repaired. No analysis involving a time-limited assumption defined by the current operating term is associated with the repairs, and therefore, there is no TLAA associated with these torus cracks.

Residual Heat Removal (RHR) Shutdown Cooling Line Through-Wall Crack
In July of 2005 a through-wall crack was discovered on the RHR shutdown cooling (SDC) system common suction piping. The cause of this crack was determined to be low stress, high cycle fatigue at the heat affected zone of the weld resulting from increased pipe movement during operation due to inadequate pipe engagement of an adjacent support (PFSK-2084) during original installation. This pipe and the associated support were repaired in accordance with code requirements.. An additional inspection in 2006 discovered two additional cracks which were also repaired. No analysis involving a time-limited assumption defined by the current operating term is associated with the repair, and therefore, there is no TLAA associated with this piping crack.

No JAFNPP flaw growth analyses were identified that would qualify as TLAA (i.e., no other analyses were performed to qualify acceptability of flaws for the current operating term of the plant).

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.7-1 BWR Vessel Internals Program
Identify all BWRVIP Reports including components that are within the scope of AMP B.1.7, "BWR Vessel Internals." Clarify whether BWRVIP-94 and BWRVIP-04 implementation guidelines are within the scope of this AMP.

LR Response
The AMP was based on the previously reviewed and approved program described in NUREG-1801. The various applicable BWRVIP reports are listed under Scope of Program in NUREG-1801 Section XI.M9.

BWRVIP-04 provides the recommended format and content of submittals to the United States Nuclear Regulatory Commission (NRC) for review and approval of core shroud repairs and BWRVIP-94 provides guidance on implementation of the BWRVIP reports. BWRVIP-94 is endorsed by procedure Entergy ENN-DC-135.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.7-2 BWR Vessel Internals Program
Past experience at a BWR station has demonstrated that extended power uprates for BWRs may cause excessive vibrations of the facility's steam dryers and result in vibration-induced cracking (high cycle fatigue-induced cracking) of the components. The AMP indicates that Entergy has detected relevant, recordable cracking of the JAFNPP steam dryer. Clarify: (1) whether the steam dryers are within the scope of this AMP and what type of aging management strategy(including identification of the inspection method, inspection frequency, and inspection sample size) Entergy will be using to manage vibration-induced cracking of the steam dryer at JAFNPP. If the steam dryers are within the scope fo license renewal and Entergy is relying on the guidance of BWRVIP-139 to manage this aging effect, Entergy will need to provide a commitment to implement the version of BWRVIP-139 that is approved by the NRC, as the topical report is currently under review by the staff for approval.

LR Response

Entergy will manage the steam dryers in accordance with BWRVIP-139 as approved by the NRC and accepted by the BWRVIP Executive Committee. LRA Section A.2.1.7 and Section B.1.7 will be revised to specify an enhancement to ensure the effects of aging on the steam dryer are managed in accordance with the guidelines of BWRVIP-139.

This requires a LRA amendment.

JAF LR Commitment Number 22 will require enhancements to the JAFNPP BWR Vessel Internals Program as described in LRA Section A.2.1.7 and Section B.1.7.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.7-3 BWR Vessel Internals Program
Confirm whether or not Entergy has modified the JAFNPP design to include any repair hardware assemblies for the JAFNPP core shroud, and if so, identify what type of repair hardware assemblies have been installed at the facility and identify which core shroud welds the repair hardware assemblies are assuming the loading conditions for and which welds are not covered by the repair hardware assemblies. Clarify, either directly or by reference to pertinent BWRVIP guidelines, what type of examinations (including examination methods, examination frequencies, and examination sample sizes) are being credited for aging management of both the JAFNPP core shroud structure and repair hardware assemblies.

LR Response

During the 1994 Refuel Outage, ten (10) tie-rod assemblies with associated radial seismic restraints (bumpers) were added to the outside of the core shroud to ensure structural integrity of the core shroud in the event of postulated through wall cracking of the circumferential horizontal weld joints (See UFSAR Figure 3.3-19). The tie-rods attach between brackets mounted in holes recessed in the shroud top flange and holes in the shroud support shelf reinforcing gusset plates. The design of the preloaded tie-rods in conjunction with the radial seismic restraints (bumpers), which limit the lateral movement of the shroud, ensures that the core shroud will perform its design basis functions with through wall cracking (360 degree) at all the existing horizontal core shroud weld joints. (Section 3.3.4.1 of the UFSAR)
JAFNPP manages the core shroud and core shroud repair hardware with the guidelines of BWRVIP-76, without exception. AMP B.1.7-3 will be enhanced to commit to the guidelines of BWRVIP-76, when approved by the NRC staff.

BWRVIP-76 was approved by NRC in a safety evaluation dated July 27, 2006. No additional commitment is necessary.

JAFNPP AMP and AMR Database

Audit Question
247

LR Request
AMP B.1.7-4a BWR Vessel Internals Program
The operating experience for JAFNPP indicates that cracking has been detected in some of the vertical welds in the JAFNPP core shroud. Core shroud repair hardware assembly designs assume the tensile loading conditions for circumferential welds in core shrouds but do not assume the circumferential loading conditions (hoop stress conditions) for vertical welds in the shrouds. Since Entergy has detected recordable indications of cracking in the vertical welds of the core shroud, the staff seeks additional technical clarification for the following:
a.) What type of cracking mechanism was determined to be the root cause of the cracking in the vertical welds;

LR Response
a. Type of cracking mechanism found on the JAF core shroud vertical welds is typically IGSCC (i.e., cracking initiates on the heat-affected zone of the weld).

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.7-4b BWR Vessel Internals Program
The operating experience for JAFNPP indicates that cracking has been detected in some of the vertical welds in the JAFNPP core shroud. Core shroud repair hardware assembly designs assume the tensile loading conditions for circumferential welds in core shrouds but do not assume the circumferential loading conditions (hoop stress conditions) for vertical welds in the shrouds. Since Entergy has detected recordable indications of cracking in the vertical welds of the core shroud, the staff seeks additional technical clarification for the following:
b.) Identify what type of inspection methods were used to re-examine the impacted weld for signs of flaw growth, as visual examinations are not valid methods to verify whether flaw growth is occurring;

LR Response

b. Belt-line welds SV4A, SV4B, SV5A and SV5B were inspected and sized by UT in R17 (October 2006). There were no indications noted for welds SV4A and SV4B. For welds SV5A and SV5B, there is close correlation of flaws from previously seen by EVT-1 in R14, with limited crack growth and no through wall indications. There are some additional flaws (short intermittent) at weld SV5A. All indications were determined acceptable per BWRVIP-76.

The shroud vertical weld inspections will be done in accordance with the requirements of BWRVIP-76 and the NRC SER.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.7-4c BWR Vessel Internals Program
The operating experience for JAFNPP indicates that cracking has been detected in some of the vertical welds in the JAFNPP core shroud. Core shroud repair hardware assembly designs assume the tensile loading conditions for circumferential welds in core shrouds but do not assume the circumferential loading conditions (hoop stress conditions) for vertical welds in the shrouds. Since Entergy has detected recordable indications of cracking in the vertical welds of the core shroud, the staff seeks additional technical clarification for the following:
c.) Clarify why Entergy considers the relevant flaw indications to be acceptable for further service without mandating proper repair of the indications. Provide a technical justification to support your determination;

LR Response

c. Core shroud welds are re-inspected per BWRVIP-76 criteria. An end of interval (EOI) inspection frequency is calculated for each weld based on conservative crack growth rate determination and hydraulics, as applicable. The affected vertical welds at JAF have been determined to be acceptable for further service (CR-JAF-2006-04238 & 04287). These documents were available for on-site review.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.7-4d BWR Vessel Internals Program
The operating experience for JAFNPP indicates that cracking has been detected in some of the vertical welds in the JAFNPP core shroud. Core shroud repair hardware assembly designs assume the tensile loading conditions for circumferential welds in core shrouds but do not assume the circumferential loading conditions (hoop stress conditions) for vertical welds in the shrouds. Since Entergy has detected recordable indications of cracking in the vertical welds of the core shroud, the staff seeks additional technical clarification for the following:
d.) If the indications in the vertical welds have been determined to be acceptable for further service, clarify and discuss what type of non-destructive examination method Entergy will be implementing to reexamine the vertical welds in the core shroud (including identification of the examination method, the examination frequency, and the sample size for the examinations). Clarify what type of repair contingencies Entergy will implement if the indications in the vertical welds are determined to be unacceptable for further service.

LR Response

d. The indications in the vertical welds at JAF have been determined to be acceptable for further service until RO18 (CR-JAF-2006-04238 & 04287) per BWRVIP-76 evaluation guidelines. An Entergy calculation for belt-line welds SV5A and SV5B will be prepared in 2007 (CR-JAF-2006-04238 CA 00003). The Entergy calculation will be performed in accordance with the guidelines of BWRVIP-76. The results of the Entergy calculation will be considered in determining inspection methods, sample size, and inspection frequency. Repair contingencies have not been determined since significant margin remains before repairs would be required.

BWRVIP-76 was approved by NRC in a safety evaluation dated July 27, 2006. No additional commitment is necessary.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.7-5 BWR Vessel Internals Program
The staff's position in GALL AMP XI.M9, "BWR Vessel Internals," for inspection top guide cross hatch areas calls recommends that BWR applicants perform enhanced visual examinations (EVT-1) of 5-percent of the top guide cross hatch locations within 6 years of entering the period of extended operation (PEO) and an additional 5-percent of the locations within 12 years of entering the PEO. Clarify whether Entergy will be conforming to the position in GALL AMP XI.M9 for top guide cross hatch areas and explain how the inspections of the top guide cross hatch areas in accordance with this NRC position are considered to be sufficient to manage irradiation assisted stress corrosion cracking (IASCC) in the top guide for years 12-20 of the period of extended operation.

LR Response

Inspections of the top guide cross hatch area locations will be performed in accordance with the position in NUREG-1801 Section XI.M9 and commitment No. 21. This program invokes the inspections specified in BWRVIP-26. Locations selected for examination will be areas that have exceeded the neutron fluence threshold for irradiation-assisted stress corrosion cracking (IASCC). The inspections are considered sufficient to manage IASCC in the top guide through the period of extended operation because the BWRVIP activities are based on industry-wide BWR operating experience and are subject to review and approval by the NRC staff.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.7-6a BWR Vessel Internals Program
Exception 1 states that "JAFNPP provides an alternate inspection for the core plate rim hold-down bolts that is technically justified according to BWRVIP-94." BWRVIP-94 provides the BWRVIP's implementation guidelines and does not provide a BWRVIP-recommended inspection and flaw evaluation strategy for a particular BWR vessel internal components. Please discuss the following:
a). Provide a technical and regulatory basis to justify why Entergy is deviating from implementing the flaw evaluation and inspection guidelines of Topical Report No. BWRVIP-25 and clarify why it is acceptable to use BWRVIP-94 as the basis for taking this exception, particularly when Topical Report BWRVIP-94 is the only implementation guideline document;

b). Clarify and discuss what types of alternative inspection method, inspect frequency, and inspection sample size will be used to inspect the core plate rim hold down bolts in lieu of the recommended BWRVIP-25 examinations;

c). Clarify, using a technical discussion and justification, how the examination method, inspection frequency, and inspection sample size for the alternative program will be capable of managing cracking in the core support plate rim hold-down bolts for the PEO.

LR Response

JAFNPP developed technical justifications for deviation from the guidelines of BWRVIP-25 in accordance with the guidance given in Appendix A to BWRVIP-94. This appendix does not provide technical justification in and of itself, rather it provides administrative guidelines for processing a technical justification.

Entergy is deviating from the guidelines of BWRVIP-25 because the method proposed for core plate rim hold down bolts is not feasible. JAFNPP plans to perform the inspections required by ASME Section XI as an alternate method for inspection of the core plate rim hold down bolts.

The examination method, inspection frequency, and inspection sample size for the alternative inspection method will be in accordance with the requirements of ASME Section XI, Table IWB-2500-1, Examination Category B-N-2.

LRA Section A.2.1.7 and Section B.1.7 will be revised to include the following enhancement.

JAFNPP will perform inspections of the core plate rim hold down bolts in accordance with ASME Section XI Table IWB-2500-1, Examination Category B-N-2 or in accordance with a future NRC-approved revision of BWRVIP-25 that provides a feasible method of inspection.

This requires a LRA amendment.

License Renewal Commitment Number 21 specifies implementation of enhancements to the BWR Reactor Vessel Internals Program described in LRA Section A.2.1.7 and Section B.1.7.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.7-7 BWR Vessel Internals Program
Exception 2 states that "A focused inspection of the bottom surface of the shroud support H9 weld" will be performed. The footnote for this inspection states that the examination will be done in accordance with BWRVIP guidelines. Confirm whether or not Entergy is referring to the inspection criteria for shroud support structures in Topical Report BWRVIP-38.

LR Response
Yes, JAFNPP will inspect the H9 weld as recommended in BWRVIP-38 (flow chart on page 3-17).

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.7-8 BWR Vessel Internals Program
Exception 3 states, in part, that the inspection of the top guide hold down assemblies at the 0□ and 180 azimuthal locations were deferred from refueling outage 16 (RO16) to refueling outage 17 (RO17) with technical justification. State what the BWRVIP-26 criteria are for inspecting these components and provide the details of the technical basis that was used to defer the examinations of the components to RO17 and a justification why this basis formed an acceptable reason to defer the examinations to RO17.

LR Response

Deferral of the top guide hold down assemblies at the 0° and 180° from R16 to R17. At JAF, hold-down assemblies are inspected with a conservative decision making philosophy. In that, JAF has been inspecting the hold down assemblies despite BWRVIP-26-A, Figure A-1 showing that the FitzPatrick plant faulted vertical loads at hold down assemblies are on the demarcation line between "lift off" and "will not lift". Therefore, the hold down assemblies will not lift-off during a postulated seismic event.
The deferred inspectons from R16 were completed in R17 (2006). No indications were noted.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.7-9 BWR Vessel Internals Program
The BWR Internals Program includes the following footnote
(Footnote 2) on the "Detection of Aging Effects" program attribute for the AMP, as it pertains to performing the augmented inspections of jet pump assembly components under BWRVIP-41.

Welds at TS-1, TS-3 and TS-4 are inaccessible for inspection. There is no inspection technique developed to inspect the thermal sleeve welds. However, the BWRVIP/ EPRI NDE Center has new plans to develop an inspection capability. The BWRVIP is also pursuing analyses which may reduce or alleviate inspection of the TS-1 through TS-4 welds. Inspection is recommended when techniques or accessibility becomes available. Also, there are other welds mainly along the diffuser lower section where coverage is low due to interference from core shroud gussets, tierods, and others. The BWRVIP is also pursuing an analysis to reduce or alleviate inspection of the adapter welds. A technical justification for inspecting inaccessible jet pump welds, and the deferral of beam UT inspection has been prepared per BWRVIP-94 guidelines. Finally, several high priority ranked welds in JP-1,2,3, 4, 19 and 20 previously scheduled for inspection in RO16, were deferred to RO17 (one cycle deferral) with technical justification.

The technical justification in this exception for justifying deferral of the augmented inspections for the jet pump assembly components covered in Footnote 2 does not credit any inspection-based aging management criteria for these components. Provide your basis for concluding that the deferral of the augmented examinations for those jet pump assembly components addressed in Footnote 2 is valid and that other augmented inspections of other jet pump assembly components performed to date and in the future in accordance with BWRVIP-41 will be sufficient to ensure the integrity of the jet pump assemblies during the period of extended operation for JAFNPP.

LR Response

Details of the technical justification (Deviation Disposition) are found in ER# JAF-05-34054, dated 3/17/06, which was available for review on site. However, JAFNPP inspected the jet pump beams and the high priority welds that were the subject of the technical justification by UT in R17 (October 2006). BWRVIP-41 requires inspection of the inaccessible jet pump welds only upon development of a feasible inspection method. Therefore, the exception addressed by Footnote 2 is no longer applicable. Appendix B of the LRA will be revised to delete the exception for the jet pump assembly.

Because they are based on industry-wide BWR operating experience, the inspection activities of BWRVIP-41 are considered sufficient to ensure the integrity of the jet pump assemblies during the period of extended operation for JAFNPP..

This requires an LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.13.2 -1 Fire Water
The GALL XI.M27states that the aging management program applies to water based fire protection systems that consist of sprinklers, nozzles, fittings, valves, hydrants, hose stations, standpipes, water storage tanks, and above ground and underground piping.... The LRA does not mention the water storage tanks. Does JAFNPP have water storage tanks associated with its Fire Water System? If so, what is the justification for not including in AMP B.1.13.2 and how are the aging effects managed?

LR Response

JAF does not utilize a water storage tank for fire protection water. The fire water source is Lake Ontario. Further details regarding the fire water system are provided in JAF-RPT-05-AMM14, Aging Management Review of Fire Protection – Water System, which was available for review on site.

JAFNPP AMP and AMR Database

Audit Question #

259

LR Request

AMP B.1.13.2 -2 Fire Water
The exception for AMP B.1.13.2, "Parameters Monitored/Inspected" program element states that the periodic flow testing of the water system is performed in accordance with Section 11, Chapter 5 of the Fire Protection handbook. NUREG -1801, Revision 1, states that the periodic flow testing of the water system should be performed using the guidelines of NFPA 25. Describe the differences between these documents. Provide the technical basis why flow testing of the water system performed in accordance with Section 11, Chapter 5 of the Fire Protection handbook is acceptable.

LR Response

The method of performing the flow testing is in accordance with Chapter 5, Section 11 of the Fire Protection Handbook, 14th Edition. This is the same as the flow test required by NFPA 25.

JAFNPP AMP and AMR Database

Audit Question

260

LR Request

AMP B.1.13.2 -3 Fire Water

The exception for AMP B.1.13.2, "Detection of Aging Effects" program element states that visual inspection, re-racking and replacement of gaskets in couplings occurs at least once per operating cycle. NUREG -1801, Revision 1, specifies an annual inspection frequency. Provide a technical basis why the proposed frequency is acceptable.

LR Response

Per NUREG-1800, Table 2.1-3, gaskets are consumables not subject to aging management review. Therefore, the exception to the Fire Water System program related to annual gasket inspections incorrectly states an exception to the inspection frequency. The exception should state that gaskets are not subject to aging management review since they are periodically inspected , tested and replaced.

Inspection, testing, and replacement of gaskets are conducted per JAFNPP Technical Requirements Manual, Rev. 12, at least once every 18 months (24 months in high radiation areas) and hydrostatic tests are performed at least once every 36 months (48 months in high radiation areas).

As stated in Section 2.1.2.4.4 of the LRA, replacements occur based on the results of inspections and testing.

This requires an LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.13.2 -4 Fire Water

The program description in GALL XI.M27 states "...these systems are normally maintained at required operating pressure and monitored such that loss of system pressure is immediately detected....where as the LRA states "...many of these systems are normally maintained at required operating pressure and monitored....The use of the phrase 'many of these' infers that there are some fire water systems that are NOT normally maintained at required operating pressure. If the foregoing statement is true, what are the fire water systems that are NOT normally maintained at required operating pressures and why?

LR Response

Deluge, dry pipe and preaction sprinkler systems are not maintained at normal system operating pressure. The systems are normally dry and will only fill with water when a fire is detected. The fire hose standpipe located in the MG set fan room is normally maintained dry due to the potential for freezing. If needed, the standpipe is filled and pressurized by use of a local valve.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.13.2 -5 Fire Water
The fire hoses were excluded from aging management as an exception to NUREG 1801, Rev 1, as a category (c) consumable per the guidelines of NUREG 1800. Why wasn't it excluded as a category (d) consumable instead?

LR Response
LRA Section B.1.13.2 states "the hoses are not subject to aging management since they are periodically inspected, hydrotested, and replaced." This matches the category (d) criterion of "typically replaced based on performance or condition monitoring."
Inspection, testing, and replacement of fire hoses are conducted per JAFNPP Technical Requirements Manual, Rev. 12, at least once every 18 months (24 months in high radiation areas) and hydrostatic tests are performed at least once every 36 months (48 months in high radiation areas). As stated in Section 2.1.2.4.4 of the LRA, replacements occur based on the results of inspections and testing.

Section B.1.13.2, exception note 2 of the LRA will be revised to state "Fire hoses are replaced based on periodic performance or condition monitoring and are excluded from aging management review per Table 2.1-3 of NUREG-1800 Rev. 1".

This requires an LRA amendment.

JAFNPP AMP and AMR Database

Audit Question #

263

LR Request

AMP B.1.13.2 -6 Fire Water

The enhancement for wall thickness evaluation of fire protection piping is identified in the Appendix A write-up in the present tense, meaning the inspections are being performed. However the enhancement is addressed in Appendix B (Detection of aging effects) in the future tense, meaning the inspections will be performed in the future (before the end of the current operating term). The Appendix A should be revised to address this future commitment.

LR Response

Appendix A was written from the perspective of entry into the period of extended operation. At that time, all aging management programs will be in place. From that perspective, it is appropriate for the UFSAR supplement to be written in present tense. A list of commitments is provided during the license renewal review that clearly shows the commitments for program enhancements.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.13.2 -7 Fire Water
The enhancement for revising procedures to include inspections of hose reels for corrosion is not addressed in Appendix A. Appendix A should be revised to address this future commitment.

LR Response

Section A.2.1 of the LRA states, "All aging management programs will be implemented prior to entering the period of extended operation." This includes enhancements to the Fire Water System Program. For additional clarification, LRA Appendix A will be revised as follows.

Section A.2.1.14, Fire Water System Program, add
"This program will be enhanced to include inspection of hose reels for corrosion. The acceptance criteria will be enhanced to verify no unacceptable signs of degradation.
For sprinkler systems, this program will be enhanced to include visual inspection of spray and sprinkler system internals for evidence of corrosion. Acceptance criteria will be enhanced for these inspections to verify no unacceptable signs of degradaton. A sample of sprinkler heads will be inspected using guidance of NFPA 25 (2002 Edition) Section 5.3.1.1.1. This program will be enhanced to include wall thickness evaluations of fire protection piping using non-intrusive techniques (e.g., volumetric testing) to identify evidence of loss of material due to corrosion. These enhancements will be implemented prior to the period of extended operation."

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.13.2 -8 Fire Water

FSAR Section 9.8.3.1.5 and LRA Section 2.3.3.5 states that a manually initiated water foam system is provided as backup to the HPCI pump room water spray system. Currently there is no discussion of aging management review performed for the foam system in the LRA. Please discuss the aging management review for the foam system. The staff requests the applicant to provide a technical justification of why an AMP is not required or provide an AMP that contains the required ten elements.

LR Response

Aging management review of foam systems is provided in Table 3.3.2-5 (environment - fire protection foam) with discussion in Section 2.3.3.5. The aging effects from fire protection foam are less than the aging effects of raw water and are managed by the Fire Water System Program.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
AMP B.1.20 -1 Oil Analysis Program
The basis provided for exceptions to "Parameters Monitored or Inspected" program element is not valid since the Flash Point of an industrial lubricant is an important test to determine if light-end hydrocarbons are getting into the oil through seal leaks or other means. It is an effective way to monitor seal performance in light end hydrocarbon compressors. Low Flash Points pose a safety hazard in the event of component failure that can generate heat above the flash point of the oil, such as bearing failure.

Justify the reason for not monitoring the flash point of lubricating oil and why this exception is acceptable to manage the effects of aging for which it is credited.

LR Response
The flash point test is performed at JAF for the emergency diesel engine oils in addition to filter residue or particle count, viscosity, total acid/base (neutralization number), water content, and metals content. The flash point test is one method for the detection of oil that has been contaminated with light-end hydrocarbons such as fuel oil. While it is important from an industrial safety perspective to monitor flash point, it has little significance with respect to the effects of aging. As such it is only utilized in scope components such as diesel engines which have the potential for hydrocarbon accumulation such as fuel oil. Flash point is determined for the lubricating oil of the West Diesel Fire Pump once per year. In addition, a 6 month oil sample is taken and tested to check for contaminants. The West Diesel Fire Pump has a scheduled 6 year oil change frequency, but will be changed more often if the 6 month sample deems necessary. The Security Generator oil is changed annually and therefore, does not require a flash point test.

Therefore, the exception listed in the LRA B.1.20 is not required and will be removed. This requires an LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.13.1 -1 Fire Protection
LRA Section 2.3.3.6 describes the carbon dioxide (CO2) fire suppression system as being in scope of the license renewal and subject to an AMR. The AMP for CO2 fire suppression system does not appear in LRA Section B.1.13.1, "Fire Protection Program."
The NUREG-1801, GALL Report Section XI.M26, "Fire Protection," describes the requirements for aging management of the CO2 fire suppression system. It requires that an AMP be established to evaluate the periodic visual inspection and function test is performed at least once every six months to examine the signs of degradation of CO2 fire suppression system. Material conditions that may affect the performance of the system, such as corrosion, mechanical damage, or damage to dampers, are observed during these tests. The staff requests that the applicant describe AMP and operating experience for the CO2 fire suppression system in LRA Section B.1.13.1

LR Response

As noted in Table 3.3.2-6 of the application, the aging effects of the fire protection - CO2 system components are managed by the Bolting Integrity Program (Section B.1.30) and by the Fire Protection Program (B.1.13.1). The Fire Protection Program is consistent with NUREG-1801 Section XI.M26 which as noted in the question includes activities to manage the effects of aging on the intended functions of the fire protection - CO2 system. A review of station operating experience identified no aging-related degradation adversely affecting the operation of the CO2 system.

CO2 fire suppression valve position check and operational tests are performed quarterly (once per 92 days). In addition, CO2 storage tank level and pressure are checked monthly in accordance with surveillance test ST-76A. Full CO2 system functional tests are performed once per 24 months in accordance with the station's current licensing basis. An inspection of external surfaces of the CO2 fire suppression system is performed at least once every six months to check for signs of degradation.

A reference to the plant CO2 fire suppression systems will be added in the program description of LRA Section B.1.13.1 (Fire Protection Program). In addition, an exception to the six-month periodicity listed in NUREG-1801 for the full CO2 system functional test will be added to LRA Section B.1.13.1 to perform this functional test on a 24-month basis as listed in the current licensing basis for JAF. This frequency is considered sufficient to ensure system availability and operability based on station operating history and to ensure that aging related effects will be properly managed through the period of extended operation. The NRC Staff, as documented in the SER for Oyster Creek, has accepted the position that, in the absence of aging-related events adversely affecting system operation and provided that visual inspections of component external surfaces are performed every six months, the periodicity specified in the current licensing basis for functional testing of the CO2 system is sufficient to ensure system availability and operability.

These items each require an LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.13.1 -2 Fire Protection
UFSAR 9.8.3.11 states that Halon System is used for fire protection in the Emergency and Plant Information Computer (EPIC) Room where it is not desirable to use a water spray or a sprinkler system. Is this system credited for a safe shutdown in any fire scenarios to demonstrate compliance with 10 CFR 50.48? If so, provide a technical justification of why an AMP is not required or provide an AMP that contains the required ten elements.

LR Response

The Emergency and Plant Information Computer (EPIC) system is not credited for a safe shutdown in any fire scenarios to demonstrate compliance with 10 CFR 50.48. Therefore, the Halon System has no intended function for license renewal.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.13.1 -4 Fire Protection
The enhancements are not addressed in the Appendix A program description. Please provide justification or reasons for not placing the enhancements in section A.2.1.13 of the LRA?

LR Response

Section A.2.1 of the LRA states, "All aging management programs will be implemented prior to entering the period of extended operation." This includes enhancements to the Fire Protection Program. For additional clarification, LRA Appendix A will be revised as follows.

Section A.2.1.13, Fire Protection Program, add
"This program will be enhanced to inspect fire barrier walls, ceilings, and floors at least once every refueling outage. Inspection results will be acceptable if there are no visual indications of degradation such as cracks, holes, spalling, or gouges. This program will be enhanced to inspect at least one randomly selected seal of each type every 24 months. These enhancements will be implemented prior to the period of extended operation."

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMP B.1.13.1 -5 Fire Protection
The "Operating Experience" section states that inspections and tests from 2000-2004 identified signs of degradation of fire barriers. Please describe the corrective actions taken to ensure that components will continue to perform its intended safety function.

LR Response

The issues identified in the OE report deal specifically with fire door gaps that were beyond their required values and minor cracking found in masonry walls. These issues do not adversely impact the ability of the barriers to satisfy their fire protection function. In all cases the barriers or doors were repaired. Periodic inspections are performed to ensure any issues are identified and corrected in a timely manner.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
Generic Question on AMRs - Sections 3.1 to 3.4 (1)
1. The staff noted that certain Table 1 AMR line-items correctly credit the OTI program to verify the effectiveness of the Water Chemistry-BWR AMP, when necessary. However, the Table 2 AMR line-items corresponding to these Table 1 line-items do not credit the OTI program. Instead, a plant-specific note is included for the Table 2 line-items indicating that the OTI program will verify the effectiveness of the Water Chemistry-BWR program. This is inconsistent with the guidance provided in NUREG-1801, Revision 1 and NEI 95-10, Revision 6.

The staff has three concerns with the approach used in the JAFNPP LRA for crediting the OTI program as a verification program.

I. The plant-specific note used for the Table 2 AMR line-items does not provide a clear commitment as to how the OTI program will be implemented to verify the effectiveness of the AMP credited for that AMR. The staff finds this plant-specific note is vague and, therefore, unacceptable.

Ii. Crediting the OTI via a plant-specific note minimizes the importance placed on this verification inspection. When OTI is credited to verify the effectiveness of an AMP, the staff considers this a critical element for accepting the AMR. Including the OTI in a note does not reflect the importance level placed on this verification by the staff.

Iii. The staff is concerned that the OTI could be overlooked if it is not included directly in each of the Table 2 AMR line-items for which it is credited.

Please explain why the OTI program is not credited in the Table 2 AMR entries when it is used to verify the effectiveness of other AMPs in the LRA. In the response, please address each of the aforementioned staff concerns with this approach. This applies to Sections 3.1 through 3.4 of the LRA.

LR Response
The One-Time Inspection Program is credited in the Table 2 AMR entries when it is used to verify the effectiveness of other AMPs in the LRA. A plant-specific note is included for the each Table 2 line item crediting a water chemistry control program. This note indicates that the One-Time Inspection Program will verify the water chemistry control program's effectiveness. Since the One-Time Inspection Program is a sampling program, every individual component is not subject to an inspection. Consequently, the One-Time Inspection Program is more appropriately associated with the applicable water chemistry program. The plant-specific note is intended to simplify the tables in Sections 3.1 through 3.4 of the LRA. Since the plant specific note is applied to every line item crediting a water chemistry control program, it should be understood by the reader that effectiveness of the water chemistry program associated with each line item is confirmed by the One-Time Inspection Program.

This is not inconsistent with NUREG-1801, Revision 1, which does not prescribe how the tables in Sections 3.1 through 3.4 of the LRA should look, but merely states that water chemistry control AMPS are "to be augmented by verifying the effectiveness of water chemistry control. See Chapter XI.M32, "One-Time Inspection," for an acceptable verification program." The LRA clearly indicates that this is the case as described above.

It is also not inconsistent with NEI 95-10, Revision 6 which also does not prescribe how the tables in Sections 3.1 through 3.4 of the LRA should look, but merely states that Sections 3.1 through 3.4 of the LRA "contain tables that summarize the aging management reviews for the systems. This subsection also contains a summary of the materials, environments, aging effects requiring management and aging management programs for each subsystem." NEI 95-10, Revision 6 also does not indicate how plant-specific notes should be used, but states only that, "Any notes the plant requires that are in addition to the standard notes will be identified by a number and deemed plant-specific."

Each of the staff's concerns with this approach is addressed below.

i. That is correct, the plant-specific note used for the Table 2 AMR line-items does not provide a clear commitment as to how the One-Time Inspection program will be implemented to verify effectiveness of the water chemistry control programs. However, listing the One-Time Inspection Program in the Aging Management Program column of the table for each line item crediting a water chemistry control program also does not provide a clear commitment as to how the One-Time Inspection Program will be implemented. The commitment to implement the One-Time Inspection Program is contained in LRA Section B.1.21 and in LRA Appendix A.

Ii. As stated above, the plant-specific note is not intended to obfuscate use of the One-Time Inspection Program. It is intended to simplify the tables in Sections 3.1 through 3.4 of the LRA. Since the plant specific note is applied to every line item crediting a water chemistry control program, it should be understood by the reader that effectiveness of the water chemistry control program associated with each line item is confirmed by the One-Time Inspection Program. Including the One-Time Inspection Program in a note rather than in the Aging Management Program column of the tables does not minimize its importance. See response to iii, below.

Iii. The commitment to implement the One-Time Inspection Program is contained in LRA Section B.1.21 and in Appendix A. In accordance with NUREG-1801, XI.M32, with which the One-Time Inspection Program is consistent, the inspection includes a representative sample of the population, and, where practical, focuses on the bounding or lead components most susceptible to aging due to time in service, severity of operating conditions, and lowest design margin. Engineering report JAF-RPT-05-LRD-02, Aging Management Program Evaluation Report, (AMPER) is available for onsite review. The description of this one-time inspection activity in Attachment 2 of the AMPER states that, "A representative sample of components crediting water chemistry control programs for aging management will be inspected. However, due to a history of low oxygen and high iron (magnetite) content in the Reactor Building Closed Loop Cooling System, a specific sample of components in this system will be inspected."

To implement this activity, the entire list of components crediting water chemistry control programs for aging management will have to be considered to determine the representative sample. Therefore, the One-Time Inspection Program cannot be overlooked even though it is not listed in the Aging Management Program column of the Table 2 AMR line-items.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Generic Question 2 on AMRs - Sections 3.2 to 3.4 (2)
2. In reviewing the AMR line-items presented in Sections 3.2, 3.3, and 3.4 of the JAFNPP LRA, the staff noted that the Diesel Fuel Monitoring Program (AMP B.1.9) and the Oil Analysis Program (AMP B.1.20) are correctly credited to manage loss of material for components exposed to fuel oil and lubricating oil, respectively. NUREG-1801, Revision 1, recommends that the effectiveness of these programs be verified, and a one-time inspection (OTI) of selected components at susceptible locations is noted to be an acceptable method of verification. The further evaluations in the LRA state that during the past five years, many visual inspections of components have been performed during corrective and preventive maintenance activities. These past inspections at JAFNPP serve in lieu of a one-time inspection to provide confirmation of the effectiveness of the Diesel Fuel Monitoring Program and the Oil Analysis Program.

The staff has the following concerns with crediting past inspections performed as part of corrective and preventive maintenance activities to serve in lieu of a one-time inspection.

i. A one-time inspection includes several elements regarding the sample size, inspection locations, examination techniques, and follow-up inspections that may not be met by inspections performed during corrective and preventive maintenance. The staff considers each of these elements to be important in verifying the effectiveness of an AMP. Unless all elements are addressed, the staff would consider the approach unacceptable.

ii. Both AMPs (B.1.9 and 1.20) described in the LRA include enhancements that will be implemented prior to the period of extended operation. As such, inspections performed during the past five years may not be representative of the AMP's effectiveness for the period of extended operation, which will include implementation of the enhancements.

Please provide the technical justification for crediting inspections performed during the past five years as part of corrective and preventive maintenance to serve in lieu of a one-time inspection for the purpose of verifying the effectiveness of AMPs B.1.9 and B.1.20. In your response, please address each of the staff's concerns with this approach. This applies to Sections 3.1 through 3.4 of the LRA.

LR Response

Oil Analysis One-time Inspection
Activities to confirm the effectiveness of the Oil Analysis Program will be added to the One-Time Inspection Program and applicable sections of the LRA revised.
This requires an amendment to the LRA.

Diesel Fuel Monitoring One-time Inspection

The inspections that are being credited in lieu of a one-time inspection include visual inspections of components at the most susceptible locations for components containing fuel oil such as the bottom of tanks. The aging effects of loss of material and cracking can only occur in the presence of water. If significant water accumulation is not allowed to occur, then these aging effects cannot occur. The use of visual inspections is an effective and appropriate method for detecting loss of material, fouling and cracking which would be indicative of an ineffective aging management program.

The sample population includes the most susceptible locations for water accumulation, which are the low points in systems such as the bottom of tanks or drain lines where aging effects such as loss of material or cracking would most likely occur. If aging effects are not detected at these locations then it is highly unlikely that they would be occurring in other portions of the systems. This provides objective evidence of the effectiveness of the aging management programs. Unacceptable inspections will be evaluated under the site corrective action program and the inspection population will be expanded.

The Diesel Fuel Monitoring Program applies to all the systems that contain fuel oil including the emergency diesel generators (EDG), and the fire protection diesel. The aging effect managed by the Diesel Fuel Monitoring Program is loss of material. Three of the four EDG fuel oil storage tanks have been inspected since 2001 with the most recent in 2004. These inspections occur every 10 years and revealed no abnormal conditions such as corrosion. In addition, components on the EDG's that contain fuel oil are routinely inspected during engine overhauls. These inspections have also not revealed any instances of significant loss of material. These inspections are periodic activities that occur on an ongoing basis rather than just one time.

The performance of these inspections within the past five years is sufficient since the operating license for JAFNPP expires in 2014 and the inspections being credited have been performed since 2001. This provides almost 30 years of operation and exposure to the environments such that latent aging effects would be apparent. In addition, this is consistent with GALL XI.M34 which credits inspections performed during the10 years prior to the period of extended operation. The enhancements for the Diesel Fuel Monitoring Program will improve the programs such that aging effects are more effectively managed. Past inspection results have found that the existing programs are effective in managing aging effects. The enhancements to the program will only improve the effectiveness of the program and have no adverse impact on the program such.

Current periodic inspections are credited in lieu of one-time inspection associated with the Diesel Fuel Monitoring Program and are consistent with the One-Time Inspection Program as described in GALL Section XI.M32.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Generic Question 2 on AMRs - Sections 3.2 to 3.4 (3)
3. LRA Tables 3.3.2.14-1,2,3,4,7,8,10,14,16,17,19,20,21,22,42, and 44 address nonsafety- related components affecting safety-related systems. However, these Tables address all such systems in section 3.3, Auxiliary Systems, even though some of these systems belong to Section 3.2, ESF systems and Section 3.4, Steam Power Conversion Systems. This LRA format is inconsistent with NUREG 1800, Revision 1 and NEI 95-10, Revision 6. The staff's SER is written based on systems as defined in SRP and GALL Report Sections 3.2, 3.3, and 3.4. As written in the LRA, it will make the SER documentation difficult and confusing because the SER Sections 3.2 and 3.4 will include Tables from Section 3.3.

Please justify why the non-safety systems associated with ESF and Steam Power Conversion Systems were included in the Auxiliary System.

LR Response

Section 14 includes all the systems that have intended functions that meet 10 CFR 54.4(a)(2) for physical interaction. To indicate individual systems included in the aging management review for (a)(2), Table 3.3.2-14 is subdivided by system. For example, Table 3.3.2-14-22 is for the circulating water system, a system which only has components included for (a)(2). For the core spray system, Table 3.3.2-14-8 shows the components included for (a)(2) but since the system is also in scope for other reasons, Table 3.2.2-2 shows the components included for 54.4(a)(1) and (a)(3).

The aging management review of the systems that have functions that met 10 CFR 54.4(a)(2) for physical interaction was done separately from the review of systems with intended functions that met 10 CFR 54.4 (a)(1) or (a)(3). The results of this review were presented separately so that they could be reviewed separately on the basis of physical proximity rather than system function. This allows a reviewer to clearly distinguish which component types in a system were included for 10 CFR 54.4(a)(2) for physical interaction. Since most of these systems are auxiliary systems they were added as part of the auxiliary systems section.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMR Line Item 3.1.1-49-1
The aging management program column of the AMR line item states that the inservice inspection program and water chemistry program will be credited with aging management of SCC, IGSCC, and IASCC in the access hole covers. In contrast the discussion column of the AMR line item states that the BWR Internal Program and the Water Chemistry Program will be used for aging management of SCC, IGSCC, and IASCC. Resolve the difference between the column entries and clarify which inspection-based AMP, along with the Water Chemistry Program, will be used to manage these cracking mechanisms in the access hole covers.

LR Response

The aging management program column entries in Table 3.1.1 (in fact entries for all but the discussion column) are quoted from GALL. In line 3.1.1-49, GALL recommends the ISI program and water chemistry while the Discussion column entry indicates JAFNPP has chosen to credit the BWR internals program along with water chemistry.

This difference of programs is reflected in the use of note E in the next to last entry on page 3.1-55 of the application. The comparison of the manway covers (access covers) portion of this line is to GALL item IV.B1-5 using the BWR Vessel Internals and water chemistry programs, consistent with other parts of the shroud support that are compared to IV.B1-2.

JAFNPP AMP and AMR Database

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LR Request

AMR Line Item 3.1.1-49-2

The discussion section in GALL AMR line item IV.B1-5 (R-94) states that "because cracking initiated in crevice regions is not amenable to visual inspection, for BWRs with a crevice in the access hole covers, an augmented inspection is to include ultrasonic testing (UT) or other demonstrated acceptable inspection of the access hole cover welds." In the discussion of AMR-line item 3.1.1-49, Entergy states that "JAFNPP has welded access hole covers with no crevice behind the weld." It is not clear how the access hole cover could be welded to the support plate without creating a creviced region in the access hole cover design. Demonstrate, using an appropriate piping and instrumentation diagram (P&ID), how and why the welded access hole cover configuration does not create a creviced region in the core support plate design. If upon further review it is determined that the welded configuration does create a creviced region in the support plate design, the staff *requests that the inspection-based program for the access hole covers* (i.e. presumably the BWR internals program) be augmented to include a UT examination of the access hole cover weld, as is recommended by the NRC position established in GALL AMR line item IV.B1-5.

LR Response

JAFNPP does not have a piping and instrumentation diagram that shows the core support plate access hole covers. They are shown (by sketch) in BWRVIP-15, Section 10. Excerpts from Section 10 are attached below. Note in the blow-up portion of Figure 2.10.2.4 that the access hole cover is welded to the shroud support ledge with a full penetration weld that leaves no crevice behind the weld.

The JAFNPP plant specific configuration is shown on drawing 5.02-16.

JAFNPP AMP and AMR Database

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LR Request

Section 3.5-1 AMR
LRA Section 3.5.2.2.1.4 (Loss of material due to General, Pitting and Crevice Corrosion) - Please explain the last statement in this section "Therefore, significant corrosion of the drywell shell is not expected." What does this mean? Does this mean that JAFNPP has identified some corrosion, but not significant? Define what is "significant corrosion." Provide a discussion of the inspections performed and actions taken to prevent corrosion.

LR Response

As stated in Section 3.5.2.2.1.4, JAFNPP inspections of the drywell shell below floor level identified no evidence of corrosion of the drywell shell. The drywell shell steel has a coated surface and no degradation of this coating was identified. The statement in question is not addressing the current condition but rather the conditions expected in the future. It is difficult to say there will be absolutely no corrosion in the future, but there is reasonable assurance that corrosion, if any, will not be significant or meaningful with respect to degradation.
Reference RAI 3.5.2-2.

JAFNPP AMP and AMR Database

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LR Request

Section 3.5-2 AMR
LRA Section 3.5.2.2.1.4 (Loss of material due to General, Pitting, and Crevice Corrosion) - Discuss how JAFNPP compares to ISG-2006-01, "Plant specific aging management program for inaccessible areas of boiling water reactor mark I steel containment drywell shell", proposed action (4).

LR Response

For JAFNPP, the sand cushion area at the base of the drywell is drained to protect the exterior surface of the drywell shell at the sand cushion interface from water that might enter the air gap. To ensure the drywell shell exterior remains dry during refueling evolutions, the drywell to reactor building bellows assembly separates the refueling cavity filled with water from the exterior surface of the drywell shell. Any leakage through the bellows assembly is directed to a drain system which is equipped with an alarm for notification of operators. Functional checks are performed on the alarm system and the air gap drains are monitored twice every refuel outage, once after flood-up and again prior to flood-down at the end of the outage. JAFNPP inspects the liner drains for the water reservoirs on the refuel floor (e.g., spent fuel pool, dryer/separator pool, and reactor cavity) for leakage. Leakage into the liner drains could be a precursor for water leaks which could wet the drywell shell exterior surface. These drains are examined for leakage after filling the refueling cavity.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.5-3 AMR
LRA Section 3.5.2.2.1.4 (Loss of material due to General, Pitting, and Crevice Corrosion) - Discuss how JAFNPP compares to ISG-2006-01, " Plant specific aging management program for inaccessible areas of boiling water reactor mark I steel containment drywell shell", proposed action (5)

LR Response

To ensure the drywell shell exterior remains dry during refueling evolutions, the drywell to reactor building bellows assembly separates the refueling cavity filled with water from the exterior surface of the drywell shell. A backing plate surrounds the outer circumference of the bellows to protect it and provide a mechanism for testing and monitoring of leakage. Any leakage through the bellows assembly is directed to a drain system which is equipped with an alarm for notification of operators. Functional checks are performed each refueling outage on the flow switch associated with this alarm system. If moisture/leakage is detected in the inaccessible area on the exterior of the drywell shell JAFNPP will:
(a)Identify the component source which may have introduced the moisture/leakage and include the component in an aging management review program,
(b)Identify the surface areas requiring examination and implement augmented inspections for the period of extended operation in accordance with the American Society of Mechanical Engineers (ASME) Section XI IWE-1240 as identified in Table IWE-2500-1, Examination Category E-C and,
©Demonstrate through use of augmented inspections performed in accordance with ASME Section XI IWE that corrosion is not occurring, or that corrosion is progressing so slowly that the age-related degradation will not jeopardize the intended function of the drywell shell through the period of extended operation.
Operating experience review at JAF found no occurrences of leakage into the annulus air gap. In addition, no leakage has been found through the refueling bellows into the area monitored by the air gap leakage detection system. Functional checks are performed prior to each refueling on the instrumentation associated with this leakage detection system.

JAFNPP AMP and AMR Database

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LR Request
Section 3.5-4 AMR
LRA Section 3.5.2.2.2.1 (Aging of structures not covered by Structures Monitoring Program) - Are there JAFNPP-specific OE related to this area? Please, provide the details.

LR Response
As stated in LRA Section 3.5.2.2.2.1, JAF has no structures that are not covered by structures monitoring program that are within the scope of license renewal and subject to aging management review.

The operating experience for "concrete structures not covered by the Structures Monitoring Program" indicates signs of minor degradation (concrete), and cracks and separations (block wall). But, none affected the structural integrity of the walls. The separations and cracks were repaired prior to the loss of intended function.

JAFNPP AMP and AMR Database

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LR Request
Section 3.5-5 AMR
LRA Section 3.5.2.2.2.1.8 (Lock Up due to wear for Lubrite Radial beam Seats in BWR drywell and other Sliding Support Surfaces) - Please identify applicable design drawings for project team's review. As indicated in this section that "...lock-up due to wear is not an aging effect requiring management at JAFNPP. However, Lubrite plates are included within the Structures Monitoring Program and Inservice Inspection (ISI-IWF) Programs..." Please, provide the cross references between these two programs.

LR Response
Lubrite plates are used for the Drywell main radial beam shell connections at elevations 269'-6" and 290'-4". Lubrite plates are used for the Torus column support connections at the floor level. Although Lubrite plates are included in Structural Maintenance Rule Monitoring, the Drywell main radial beams and connections are non-pressure retaining parts and were designed per the AISC Manual of Steel Construction (Ref, Structural General Design Criteria GDCD-S-5).
There is no cross-reference between Structures Monitoring Program and Inservice Inspection (ISI-IWF) Programs relative to lubrite plates. Lubrite plates are included within the Structures Monitoring Program and not Inservice Inspection (ISI-IWF).
This is license renewal commitment 16. This requires an LRA amendment.

JAFNPP AMP and AMR Database

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LR Request
Section 3.5-6a AMR
LRA Section 3.5.2.2.2.6 (Aging Support not covered by Structures Monitoring Program) - Please provide the following information:

a.) More information is needed about bolting materials used in structural applications including Group B1.1 applications at JAFNPP.
(I) What are the materials used for bolting?
(ii) What are the nominal yield strengths and upper-bound as-received yield strengths? (iii) Describe the JAFNPP resolution of the bolting integrity generic issue, as it relates to structural bolting.
(iv). Was any structural bolting identified as potentially susceptible to cracking due to SCC? Was any structural bolting replaced as part of the resolution?

LR Response
Bolting material at JAFNPP consist of the following combination A325 – Type 1 conforming to ASTM-A325 and ASTM-A307 per JAFNPP specification A-8 "Structural Steel". The nominal yield for A325 is 92 ksi and for A307 is 60 ksi.
For structural bolting application JAFNPP is consistent with NUREG 1801 for bolting integrity by managing aging with the structures monitoring program or ISI (IWF) as applicable. No JAFNPP structural bolting have been identified that is susceptible to SCC.

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LR Request

Section 3.5-6b AMR
LRA Section 3.5.2.2.2.6 (Aging Support not covered by Structures Monitoring Program) - Please provide the following information:
b.) Describe the scope and aging management review performed for Class MC Pressure Retaining Bolting. How is loss of preload managed?

LR Response

JAFNPP has not identified Class MC pressure retaining bolts having a yield stress >150 ksi within the boundaries for structural applications. As a result loss of preload is not an aging effect requiring management.

In general, JAF manages loss of material for bolting with visual inspections.. For structural bolting, the visual inspections are part of the Structures Monitoring Program. Loss of preload due to stress relaxation (creep) would only be a concern in very high temperature applications (> 700°F) as stated in the ASME Code, Section II, Part D, Table 4. No JAFNPP structural bolting operates at >700°F. Therefore, loss of preload due to stress relaxation (creep) is not an applicable aging effect for structural bolting. Other causes of loss of preload include inadequate bolted joint design and ineffective maintenance practices. Loss of preload due to these causes is prevented by incorporation of industry guidance for good bolting practices into JAF procedures for design and maintenance of bolted joints.

JAFNPP AMP and AMR Database

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LR Request

Section 3.5-7 AMR
Item 3.5.1-13 - In Table 3.5.2-1 on Page 3.5-58 of the LRA, for component Bellows, the AMPs shown is CII-IWE, which is a plant-specific AMP. A Note C has been assigned to this AMR line item, "Component is different, but consistent with material, environment, aging effect, and aging management program for NUREG-1801 line item. AMP is consistent with NUREG-1801 the GALL description."
Provide drawings showing how the LRA line item bellows are different from the GALL
Table 1 Line Item 3.5.1-13 bellows. Explain how the plant-specific CII-IWE AMP is consistent with the GALL specified AMP.

LR Response

Table 3.5.2-1 on Page 3.5-58 of the LRA, for component "Inner refueling bellows" is not consistent with the referenced NUREG-1801 Vol. 2 item. The Table 3.5.2-1 line item "inner refueling bellows" and the corresponding line item in Table 2.4-1 should be deleted. The inner refueling bellows perform no license renewal intended function. These components are not safety-related and are not required to demonstrate compliance with regulations identified in 10 CFR 54.4(a)(3). Failure of these bellows will not prevent satisfactory accomplishment of a safety function. Leakage, if any, through the bellows is directed to a drain system that prevents the leakage from contacting the outer surface of the drywell shell.

This requires an amendment to the LRA

JAFNPP AMP and AMR Database

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LR Request

Section 3.5-8 AMR
Item 3.5.1-16 - In Table 3.5.2-1 on page 3.5-64 of the LRA for Primary Containment Electrical Penetration seals and sealant, the AMP shown is Containment Leak Rate. The applicant is asked to confirm that AMP CII-IWE will not be used to manage the aging of the moisture barrier.

LR Response

The "Structures Monitoring Program", AMP B.1.27.2 [Ref. LRA Table 3.5.2-1 Page 3.5-64], will manage aging effect of the drywell moisture barrier.
The "Containment Leak Rate program", AMP B.1.8 [Ref. LRA Table 3.5.2-1 Page 3.5-64], will manage aging effect of the Primary Containment Electrical Penetration seals and sealant.

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LR Request

Section 3.5-9 AMR

Item 3.5.1-44 - In Table 3.5.2-4 on Page 3.5-84 of the LRA, for component seals and gaskets, material rubber in a protected from weather environment; the aging effects are cracking and change in material properties. One of the aging management programs shown is Structures Monitoring. The GALL line item referenced is III.A6-12 and the Table 1 reference is 3.5.1-44. The note shown is E, different AMP than shown in GALL. However, GALL Line Item III.A6-12 and Table 1 Line Item 3.5.1-44 both specify the Structures Monitoring Program. Explain why the note shown is not A instead of E.

LR Response

Table 3.5.2-4 on Page 3.5-84 of the LRA, for component seals and gaskets (doors, manways and hatches), material rubber in a protected from weather environment; the aging effects are cracking and change in material properties. The LRA will be clarified to indicate that Note "A" applies to the line for SMP.

This will require an amendment to the LRA.

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LR Request
Section 3.5-11 AMR
Item Number 3.5.1-16 - Under the discussion column, it states that seals and gaskets are not included in the Containment Inservice Inspection Program at JAFNPP. One of the components for this item number is moisture barriers. Explain how JAFNPP seals the joint between the containment drywell shell and the drywell concrete floor if there is no moisture barrier. Explain why the inspection of this joint is not part of the Containment Inservice Inspection Program at Fitzpatrick?

LR Response
JAFNPP uses a moisture barrier to seal the joint between the containment drywell shell and drywell concrete floor. Moisture barrier is listed in LRA Table 3.5.2-1 as "moisture barrier". As indicated in LRA Table 3.5.2-1, aging effects on the moisture barrier will be managed under the "Structures Monitoring Program" (AMP B.1.27.1). The Structures Monitoring Program includes drywell interior inspections. Program inspections have confirmed no visible evidence of water collection or equipment leakage have been noted in the area of the moisture barrier caulk seal that would challenge the capability of the seal. The moisture barrier was noted to be in good condition and capable of performing its design function to provide an effective barrier to moisture from entering the interface between the concrete floor and steel shell.

JAFNPP AMP and AMR Database

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LR Request

Section 3.5-12 AMR
3.5.1-33 - For LRA Table 3.5.1, Item Number 3.5.1-33, provide the maximum temperatures that concrete experience in Group 1-5 structures.

LR Response

The maximum bulk area ambient temperatures for Groups 1-5 occurs in the drywell and is an average temperature of 150°F, reference UFSAR Table 5.2-3. For structures outside the drywell the bulk area maximum temperature applied to structures 120°F for Groups 1-5 structures based on Section 7.1.12 of JAFNPP UFSAR. Concrete within the drywell consist of the reactor pedestal, sacrificial shield wall and the drywell floor. Assurance that bulk concrete temperatures within the drywell remain below 150 degrees F is obtained through maintaining average bulk containment temperature within the limits allowed by JAFNPP Technical Specification Section B3.6.1.5. Although upper elevations of the drywell may exceed 150°F, the concrete of the drywell is at lower elevations. The drywell cooling system provides cooling to ensure temperature limits are not exceeded. The highest concrete in the drywell is the sacrificial shield wall. The concrete in this wall is not load bearing.

JAFNPP AMP and AMR Database

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LR Request

AMR - LRA Section 3.6 -1
In LRA, Table 3.6.2-1, under Cable connections (metallic parts), you have stated "that no aging effects requiring management and no AMP is required." Further, in LRA, Table 3.6.1 under discussion of cable connection metallic parts, you have stated that cable connections outside of active devices are taped or sleeved for protection and operating experience with metallic parts of electrical cable connections at Fitzpatrick indicated no aging effects requiring management. NUREG 1800, Rev. 1 identifies the following aging stressors for electrical cable connections (metallic parts): thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation. Provide a justification for why an AMP is not necessary or provide an AMP with the ten elements for cable connections.

LR Response

Basis for Program Scope
Based on the November 30, 2006 meeting with the NRC, the revised or alternate XI.E6 program will be a one-time inspection of a representative sample of cable connections subject to aging management review.

The LR project identified connections to include in the aging management program by evaluating the JAFNPP non-EQ cable connections that meet the criteria of being a bolted connection. Switchyard connections are not addressed in this program, since these connections operate at a much higher voltage (>35KV); they are addressed separately as part of the switchyard commodity types.

Connections for all voltage levels are considered in scope. As discussed during the November 30, 2006 meeting and during the JAF AMR audit, that bolted connections are the main concern. The stressors thermal cycling, ohmic heating, and electrical transients are potential stressors only for high load connections.

Thermal cycling, ohmic heating, and electrical transients are not potential stressors for low load connections. Low-load connections located in a controlled environment can be screened out, because vibration, chemical contamination, corrosion and oxidation are not a concern. Low-load in-scope field instrumentation connections such as pressure transmitters, RTDs, and flow transmitters are not subject to AMR, because the in-scope instrumentation located in a harsh environment, are typically EQ, and the non-EQ sensitive instrument circuit (high radiation and neutron monitoring) connections which are included in the XI.E2 program. All connections associated with circuits that do not have an intended function, such as general lighting, are not subject to AMR.

Methods To Identify Cable Connections
The methods used to identify cable connections to include in the AMP were based on discussions in the November 30, 2006 NEI meeting with the NRC.

The types of circuits considered for identifying cable connections were electrical and I&C penetrations, DC load centers, inverters, battery chargers, motors, MCCs, switchgear, circuit breakers, transformers, metal-enclosed bus, and field components. All of the electrical and I&C penetrations are EQ; therefore, all of the connections for these penetrations were excluded. The field components considered includes current / potential transformers (CTs/PTs), and power supplies. The assumption made for the non-EQ high load connections was that all of these connections are bolted.

The basis discusses the stressors that are being addressed. Plant information (single line drawings, switchyard drawings) was searched to determine the potential population of bolted connections. The criterion used for determining the high load connections was identifying power circuits for all voltage levels. The types of cable connections that were determined to meet the definition of a high load connection are subject to AMR.

In addition to the one-time inspection program, many of the JAFNPP cable connections are inspected or tested by PMs. The maintenance procedures (PMs) for the following components were searched to determine if the PM evaluated the field cable connections associated with the active components.

- 480 VAC MCCs and Switchgear (MP-056.01 AC Motor Control Center Maintenance)
- 600 VAC MCCs and Switchgear (MP-056.01 AC Motor Control Center Maintenance)
- 4160 VAC Switchgear (MP-054.02 4.16kV Bus and Metal-Clad Switchgear)
- AC Motors (MP-059.83 Motor Power Monitoring (MPM) Testing and Analysis)

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- DC Motors (MP-059.83 Motor Power Monitoring (MPM) Testing and Analysis)
- 125 VDC Distribution and Lighting Panels (MP.200.16 Maintenance and Subcomponent Replacement of GE 7700 Series DC Motor Control Centers)
- Battery Control Boards (MP.200.16 Maintenance and Subcomponent Replacement of GE 7700 Series DC Motor Control Centers)
- 125 VDC MCCs (MP.200.16 Maintenance and Subcomponent Replacement of GE 7700 Series DC Motor Control Centers)
- Battery Chargers
- Reserve Transformers (MP-071.42 Station Service Transformer Maintenance)

The maintenance procedures for these component types have details to detect degradation of bolted connections.

The maintenance rule indicators for the systems that contain these commodities do not show problems or issues that have not been resolved. There is no plant OE that identified degraded connections where the degradation was a result of aging.

Conclusion
JAFNPP will have a one-time inspection program that will inspect or test a representative sample of the connection types. The one-time inspection program will verify that there are no aging effects that require management during the period of extended operation. The program will have the following information.

Scope of Program
Non-EQ connections associated with cables in scope of license renewal are included in this program. This program does not include the higher voltage (>35KV) switchyard connections. The in-scope connections are screened for applicability of this program.

Parameters Monitored/Inspected
This program will focus on the metallic parts of the cable connections. The one-time inspection verifies that the loosening of bolted connections due to thermal cycling, ohmic heating, electrical transients, vibration, chemical contamination, corrosion, and oxidation do not require a periodic aging management program. A representative sample of the electrical cable connection population subject to aging management review will be inspected and tested. The sample will include each type of electrical cable connection. The following factors will be considered for sampling: voltage level (medium and low voltage), circuit loading (high loading), and location (high temperature, high humidity, vibration, etc.). The technical basis for the sample selected will be documented.

This is listed in the JAF Commitment List #24.

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LR Request

AMR - LRA Section 3.6 -2
In LRA, Table 3.6.2-1, under switchyard bus (switchyard bus for SBO) and connections you have stated "no aging effects requiring management and no AMP is required." NUREG 1801, Rev. 1 and NUREG 1800, Rev. 1, Section 3.6.2.2.3 identifies loss of preload is an aging effect for switchyard bus connections. In addition, EPRI document TR-104213, "Bolted Joint Maintenance & Application Guide," recommends inspection of bolted joints for evidence of overheating, signs of burning or discoloration, and indication of loose bolts. Provide a discussion why torque relaxation for bolted connections of switchyard bus is not a concern for Fitzpatrick.

LR Response

As stated in LRA section 3.6.2.2.3, "Connection surface oxidation for aluminum switchyard bus is not applicable since switchyard bus connections requiring AMR are welded connections."

Connection surface oxidation and loosening of bolted connections for aluminum switchyard bus is not applicable since the switchyard bus connections requiring AMR are welded connections. However, the flexible conductors, which are welded to the switchyard bus, are bolted to the other switchyard components. These switchyard component connections are also included in the infrared PM of the 115 kV switchyard, which verifies the effectiveness of the connection design and installation practices. The infared PM is performed at least once every year. The flexible conductors were not considered part of the switchyard bus in the application, but these flexible conductors will be added to the switchyard bus commodity for completeness. These flexible conductor bolted connections are assembled similar to the transmission conductor bolted connections discussed in question 299.
For environmental conditions at JAFNPP, no significant aging has been identified that could cause a loss of intended function for the period of extended operation. Vibration is not applicable since flexible connectors connect switchyard bus to active components.

Although not specifically stated, the switchyard connections requiring AMR are welded and bolted connections. Neither of these connection types require aging management, because the loosening of bolted connections is not a significant aging effect.

This requires an LRA amendment.

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LR Request

AMR - LRA Section 3.6 -3
In LRA, Table 3.6.2-1, under Transmission conductors and connections, you have stated that "no aging effects requiring management and no AMP is required." NUREG 1801, Rev. 1, Section 3.6.2.2.3 identifies loss of conductor strength due to corrosion is the aging effect of high voltage transmission conductors. Explain why loss of conductor strength due to corrosion is not an aging effect requirement management for transmission conductors at Fitzpatrick. Include test data and plant specific acceptance criteria for transmission conductor strength in your response.

LR Response

The most prevalent mechanism contributing to loss of conductor strength of an ACSR (aluminum conductor steel reinforced) transmission conductor is corrosion, which includes corrosion of the steel core and aluminum strand pitting. For ACSR conductors, degradation begins as a loss of zinc from the galvanized steel core wires. Corrosion rates depend largely on air quality, which includes suspended particles chemistry, SO2 concentration in air, precipitation, fog chemistry and meteorological conditions. Tests performed by Ontario Hydroelectric showed a 30% loss of composite conductor strength of an 80 year old ACSR conductor due to corrosion.

RSST 71T-3 is connected to the 115 kV switchyard with overhead transmission lines. The overhead transmission conductors are 336.4 MCM ACSR 18/1 conductors with a 7 AWG alumoweld static wire. This specific conductor type was not included in the Ontario Hydroelectric test, but this type is bounded by the types that are included.
There is a set percentage of composite conductor strength established at which a transmission conductor is replaced. As illustrated below, there is ample strength margin to maintain the transmission conductor intended function through the period of extended operation.

The National Electrical Safety Code (NESC) requires that tension on installed conductors be a maximum of 60% of the ultimate conductor strength. The NESC also sets the maximum tension a conductor must be designed to withstand under heavy load requirements, which includes consideration of ice, wind and temperature. These requirements are reviewed concerning the specific conductors included in the AMR. The conductors with the smallest ultimate strength margin (4/0 ACSR) will be used as an illustration.

The ultimate strength and the NESC heavy load tension requirements of 4/0 (212 MCM) ACSR are 8350 lbs. and 2761 lbs. respectively. The margin between the NESC Heavy Load and the ultimate strength is 5589 lb.; i.e., there is a 67% of ultimate strength margin. The Ontario Hydroelectric study showed a 30% loss of composite conductor strength in an 80 year old conductor. In the case of the 4/0 ACSR transmission conductors, a 30% loss of ultimate strength would mean that there would still be a 37% ultimate strength margin between what is required by the NESC and the actual conductor strength.
The 4/0 ACSR conductors have the lowest initial design margin of transmission conductors included in the AMR. This illustrates with reasonable assurance that transmission conductors will have ample strength through the period of extended operation.

There are no applicable aging effects that could cause loss of the intended function of the transmission conductors for the period of extended operation.

A review of industry OE and NRC generic communications related to the aging of transmission conductors ensured that no additional aging effects exist beyond those previously identified. A review of plant-specific OE did not identify any unique aging effects for transmission conductors.

Numerous previous applicants (Oconee, Turkey Point, North Anna and Surry, Peach Bottom, St. Lucie, Fort Calhoun, McGuire and Catawba, and Virgil C. Summer) reached this conclusion that no aging management program is required for the transmission conductor aging effects of loss of conductor strength and loss of material. The Staff, as documented in these applicants' SERs, accepted this position.

There are no applicable aging effects requiring management for JAFNPP transmission conductors.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMR - LRA Section 3.6 -4
Provide a discussion why torque relaxation and oxidation of bolted connections of transmission conductors are not a concern for Fitzpatrick.

LR Response

The design of the transmission conductor bolted connections precludes torque relaxation, and the plant specific OE supports this statement. The OE report did not identify any failures of switchyard connections due to aging. The typical design of switchyard bolted connections includes Bellville washers and is no-ox coated. The type of bolting plate and the use of Bellville washers is the industry standard to preclude torque relaxation. This combined with the proper sizing of the conductors virtually eliminates the need to consider this aging mechanism, therefore, there will be no significant aging.

The in-scope transmission conductors at JAFNPP are limited to the connections from the 115 kV switchyard to the station service transformer for the SBO recovery path. JAFNPP performs infrared inspection of the 115 kV switchyard connections as part of a PM task that is performed at least once each year.. This PM and the absence of plant OE confirms that no significant aging is occurring for JAFNPP.

Based on this information, torque relaxation of transmission connections does not require aging management for JAFNPP.

Loss of material due to corrosion of connections due to surface oxidation is an applicable aging mechanism, but is not significant enough to cause a loss of intended function. The components in the switchyard are exposed to precipitation, but these components do not experience any appreciable aging effects in this environment, except for minor oxidation, which does not impact the ability of the connections to perform their intended function. At JAFNPS, switchyard connection surfaces are coated with an anti-oxidant compound (i.e., a grease-type sealant) prior to tightening the connection to prevent the formation of oxides on the metal surface and to prevent moisture from entering the connections thus reducing the chances of corrosion. Based on operating experience, the method of installation has been shown to provide a corrosion resistant low electrical resistance connection. In addition, the infrared inspection of the 115KV switchyard verifies that this aging effect is not significant for JAFNPP. Therefore, it is concluded that general corrosion resulting from oxidation of switchyard connection surface metals does not require management at JAFNPP.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMR - LRA Section 3.6 -5

In Section 3.6.2.2.3 of the LRA, you have stated that "loss of material that could be caused by transmission conductor vibration or sway are found not to be applicable aging effects in that they would not cause a loss of intended function if left unmanaged for the extended period of operation." Explain why transmission conductor vibration or sway would not cause a loss of intended function if left unmanaged for the extended period of operation.

LR Response

Transmission conductor vibration, or sway, would be caused by wind loading. Wind loading that can cause a transmission line and insulators to vibrate is considered in the design and installation. Loss of material (wear) and fatigue that could be caused by transmission conductor vibration or sway are found not to be applicable aging effects in that they would not cause a loss of intended function if left unmanaged for the period of extended operation.

A review of industry OE and NRC generic communications related to the aging of transmission conductors ensured that no additional aging effects exist beyond those previously identified. A review of plant-specific OE did not identify any unique aging effects for transmission conductors.

Numerous previous applicants (Oconee, Turkey Point, North Anna and Surry, Peach Bottom, St. Lucie, Fort Calhoun, McGuire and Catawba, and Virgil C. Summer) reached this conclusion that no aging management program is required for the transmission conductor aging effects of loss of conductor strength and loss of material. The Staff, as documented in these applicants' SERs, accepted this position.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMR - LRA Section 3.6 -6
Are all electrical and I&C containment penetrations EQ? If not, provide AMRs and AMPs for non-EQ electrical and I&C containment penetrations. The AMRs should include both organic (XLPE, XLPO, and SR internal conductor/pigtail insulation, etc.,) as well as inorganic material (such as cable fillers, epoxies, potting compounds, connector pins, plugs, and facial grommets).

LR Response

The JAFNPP electrical and I&C penetration assemblies are all included in the EQ program.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

AMR - LRA Section 3.6 -7

In LRA, Table 3.6.2-1, under "Electrical cables and connections not subject to 10 CFR 50.49 EQ requirements and Electrical cables not subject to 10 CFR 50.49 EQ requirements used in instrumentation and circuits," you have identified heat or radiation and air are the environments of these electrical components. NUREG-1801, Rev. 1 (GALL) identified heat, radiation, or moisture in the presence of oxygen are the environments and moisture intrusion is the aging effect/mechanism. Revise Table 3.6.2.-1 to be consistent with GALL or provide a technical justification of why moisture in the presence of oxygen is not an aging effect for cables and connections.

LR Response

Moisture was included in the aging management review for these two items. This was an omission from the two table rows. The statement will be revised to "heat, radiation, or moisture and air."

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

TLAA LRA Section 4.3 -8
Explain why the 60-year CUF value of 0.11 is a valid CUF value for the tie rods, particularly when 60-year projection was based solely on the maximum allowable design basis value of 233 for a single-type shutdown transient (and not on the 60-year cycle projections for all design basis transients analyzed for in the original 40-year CUF calculation). If 0.11 is not a valid 60-year CUF value for the tie rods, provide an updated 60-year CUF value for the tie rods based on the 60-year cycle projections for all design basis transients analyzed for in the original 40-year analysis.

LR Response

The fatigue calculation included in the original stress analysis for the tie rods was based on alternating loads due to an Operating Basis Earthquake and 3 transients: Startup/Shutdown, Loss of Feedwater Pumps (with Isolation Valves Closed) and Turbine Generator Trip (with Isolation Valves Open). The original calculated 40-year CUF for the tie rods was .0575. The allowable number of cycles for 2 of these 3 transients has increased for 60 years of operation and the allowable number of cycles for one of the transients has been decreased since the original stress analysis was performed. The allowable number of Startup/Shutdown cycles has increased by 94% from 120 to 233 cycles. The allowable number of Loss of Feedwater Pumps (with Isolation Valves Closed) has increased 20% from 10 to 12 cycles. The allowable number of Turbine Generator Trip (with Isolation Valves Open) cycles has decreased by 70% from 40 to 12 cycles. Conservatively, the 40-year CUF for the tie rods was increased by 94% to project the 60-year CUF of 0.11 based on the worst case change in allowable cycles for Startups and Shutdowns. This tie rod CUF value was conservatively projected for 60 years of operation.

JAFNPP AMP and AMR Database

Audit Question #

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LR Request

TLAA LRA Section 4.3 -9

Section 4.3.1.2 identifies that the jet pump assembly diffuser adapter is the limiting RV internal for CUF and provides a 40-year CUF value of 0.65 for this component. This appears to conflict with information in LRA Table 4.3-1 which identifies that the "Core Shroud Support" is the limiting Class 1 component (and therefore limiting RV internal) for CUF (with a 40-year CUF value of 0.90). Clarify which Class 1 component analyzed in accordance with ASME Section III CUF methodology is the limiting CUF component for fatigue and state what the 40-year, non-environmentally impacted CUF value for this component (i.e., the 40-year CUF value before any potential Fen modification of the value is made if the component is a NUREG/CR-6260 component). Confirm that the 40-year CUF value provided for the jet pump diffuser adapter in LRA Section 4.3.1.2 appropriately supplements the 40-year CUFs for the commodity groups that are provided in LRA Table 4.3-1.

LR Response

The jet pump assembly diffuser adapter is not a Class 1pressure boundary component. Therefore, its CUF is not listed among the maximum CUFs for Class1 components in Table 4.3-1. The core shroud support is welded into the reactor vessel by the vessel manufacturer, and is analyzed for CUF as part of the reactor vessel stress report. Since the vessel is a Class 1 component, the attached core shroud support CUF is included in the Class 1 component CUFs in Table 4.3-1.

The highest (most limiting) CUF for the reactor vessel, based on the analyzed number of design transients, prior to any environmentally assisted fatigue adjustment, is 0.90 for the shroud support. (LRA Table 4.3-1)

As discussed above, the 40-year CUF value of 0.65 for the jet pump diffuser adapter discussed in LRA Section 4.3.1.2 is in addition to the Class 1 component CUFs in Table 4.3-1.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

TLAA LRA Section 4.3 -10

Identify which components/commodity groups in AMR Tables 3.1.2-1, -2, and -3 were designed to ASME Section III. Clarify which components/commodity groups received an ASME Section III CUF calculation, and identify which commodity group listing in LRA Table 4.3-1 provides the applicable CUF result. If no CUF calculation was performed, justify the basis for exclusion and propose an acceptable AMP to manage the aging effect "cracking fatigue" in accordance with the criterion in 10 CFR 54.21(c)(1)(iii). If an exclusion from performing a CUF calculation is based on an ASME Section III, provide the paragraph in the Code.

LR Response

Table 3.1.2-1 is for the reactor vessel. All of the reactor vessel components were built to ASME Section III, 1965 edition thru winter 1966 addenda.

Table 3.1.2-2 is for the reactor vessel internals. The reactor vessel internals are not code components and while various codes were used for guidance in designing and building the internals, they are not built in compliance with any specific codes.

Table 3.1.2-3 is for the reactor coolant system pressure boundary. In accordance with the guidelines of NUREG-1801, the commodity groups in Table 3.1.2-3 are grouped based on material and environment, not on design code. The codes for table 3.1.2-3 (piping and in-line components, and non-piping components) are discussed in the next 2 questions.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

TLAA LRA Section 4.3 -11
Identify which components in AMR Tables 3.1.2-1, -2, and -3 were designed in accordance with B31.1. Clarify whether the commodity groups were evaluated for an allowable stress reduction assessment based on the 7000 thermal cycles in accordance with B31.1. Identify whether: (1) the allowable stress reduction analysis remains bounded under 10 CFR 54.21(c)(1)(I), (2) the allowable stress range needs to be reduced in accordance with the stress reduction criteria in B31.1 to comply with 10 CFR 54.21(c)(1)(ii), or (3) the aging effect "cracking - fatigue" needs to be managed for the period of extended (EPO) operation in accordance with 10 CFR 54.21(c)(1)(iii) and propose an acceptable AMP to manage the aging effect.

LR Response

Table 3.1.2-1 is for the reactor vessel. None of the reactor vessel components were built to ANSI B31.1.
Table 3.1.2-2 is for the reactor vessel internals. The reactor vessel internals are not code components and while various codes were used for guidance in designing and building the internals, they are not built in compliance with any specific codes.
Table 3.1.2-3 is for the reactor coolant system pressure boundary. In accordance with the guidelines of NUREG-1801, the commodity groups in Table 3.1.2-3 are grouped based on material and environment, not on design code. However, all the piping and in-line components on this table are built to B31.1 and therefore do not require CUF calculations. Non-piping components are discussed in question #314.

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Audit Question

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LR Request

TLAA LRA Section 4.3 -12

For non-piping components/commodity groups in LRA Tables 3.1.2-1, -2, and -3 that were not designed to ASME Section III or B31.1, identify which design code applies to the particular commodity group and clarify whether the design code required a metal fatigue analysis. If a metal fatigue analysis was required, summarize what type of metal fatigue calculation was required to be performed and discuss how: (1) the analysis remains bounding under 10 CFR 54.21(c)(1)(I), (2) has been projected to the expiration of the EPO and remains acceptable pursuant to 10 CFR 54.21(c)(1)(ii), or (3) whether an AMP needs to be proposed to manage the aging effect of "cracking - fatigue" for the EPO and state which AMP will be used to manage the aging effect. If a metal fatigue analysis was not performed and "cracking -fatigue" needs to be manage for the EPO, propose an acceptable AMP for the management of the aging effect in accordance with the criterion in 10 CFR 54.21(c)(1)(iii).

LR Response

Table 3.1.2-1 is for the reactor vessel. All of the reactor vessel components were built to ASME Section III, 1965 edition.

Table 3.1.2-2 is for the reactor vessel internals. The reactor vessel internals are not code components and while various codes were used for guidance in designing and building the internals, they are not built in compliance with any specific codes.

Table 3.1.2-3 is for the reactor coolant system pressure boundary. In accordance with the guidelines of NUREG-1801, the commodity groups in Table 3.1.2-3 are grouped based on material and environment, not on design code. Therefore these entries may represent multiple design codes. To answer this question, the components must be reviewed on a component by component basis, not a commodity group basis.

The RCSPB components in question are:

- Fatigue is not an aging effect requiring management for the stainless steel control rod drive mechanisms (pressure boundary) because they are maintained below the 270 degree F threshold for fatigue of stainless steel.
- The control rod drive accumulators are not subject to fatigue as they never exceed 140 °F.
- The control rod drive scram discharge header has component IDs of 03TK-1A and 03TK-1B; however, these "tanks" actually consist of sections of large diameter piping inserted into the scram discharge piping. All the scram discharge piping, including the scram discharge headers are built to ANSI B31.1. It will not exceed 7000 cycles and therefore remains acceptable for the period of extended operation.
- The reactor recirculation pump (driver mount, casing, cover, and thermal barrier) are not built to ASME Section III and no fatigue analyses for these parts were found. The driver mount is not exposed to hot water and therefore is not susceptible to fatigue. Cracking of the casing and cover (including thermal barrier) is managed by a combination of Water Chemistry Control, Inservice Inspection, and BWR Stress Corrosion Cracking programs.
- The main steam flow restrictors are not pressure boundary parts and thus are not built to the ASME code, and therefore have no TLAA for fatigue. Cracking, due to both SCC and fatigue, of these components is managed by the One-Time Inspection Program.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

TLAA LRA Section 4.3 -13

Section 4.3.2 of the JAFNP LRA provides Entergy's TLAA on Metal Fatigue of Non-Class 1 components. In this section Entergy provides the metal fatigue analysis for the Non-Class 1 components that were designed in accordance with B31.1. For each non-piping components/commodity group in AMR Tables 3.2.2-X, 3.3.2-X and 3.4.2-X that is within the scope of a fatigue-based AMR line item, identify which design code applies to the particular commodity group and clarify whether the design code required a metal fatigue analysis. If a metal fatigue analysis was required, summarize what type of metal fatigue calculation was required to be performed and discuss how: (1) the analysis remains bounding under 10 CFR 54.21(c)(1)(I), (2) has been projected to the expiration of the EPO and remains acceptable pursuant to 10 CFR 54.21(c)(1)(ii), or (3) whether an AMP needs to be proposed to manage the aging effect of "cracking - fatigue" for the EPO and state which AMP will be used to manage the aging effect. If a metal fatigue analysis was not performed and "cracking -fatigue" needs to be manage for the EPO, propose an acceptable AMP *for the management of the aging effect* in accordance with the criterion in 10 CFR 54.21(c)(1)(iii).

LR Response

The piping and in-line components in Tables 3.2.2-X, 3.3.2-X and 3.4.2-X, including cyclone separators, drain pots, expansion joints, flow elements, mufflers, orifices, piping, rupture disks, steam traps, strainers, strainer housings, thermowells, T-quenchers, tubing and valve bodies are identified with a TLAA for fatigue, and are discussed in Section 4.3.2 of the LRA. These components were designed to the applicable ASME Section III, Section VIII or ANSI B31.1 code. Since the TLAA remains valid per 10CFR54.21(c)(1)(i), no aging management program is required to manage cracking due to fatigue.

For those components In Tables 3.2.2-X, 3.3.2-X, and 3.4.2-X, that were not designed to any ASME or ANSI code, cracking-fatigue, as an aging effect, will be managed by the applicable aging management program; One-Time Inspection, Fire Protection, or Periodic Surveillance and Preventive Maintenance (PSPM). These components are on air or exhaust systems and since no design code applies, review for a TLAA is not applicable.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

TLAA LRA Section 4.3 -15
LRA Table 4.3-2 indicates that the environmentally-impacted CUF values for the RV shell, RV feedwater nozzle safe end, RV recirculation inlet nozzle thermal sleeve, and RV recirculation outlet nozzles are all projected to exceed a value of 1.0 prior to the expiration of the current operating period. On pages 4.3-7 and 4.3-8, Entergy provides its corrective action plan to address this issue. The corrective action program for the environmentally impacted CUF factor components (i.e., the Class 1 components at JAFNP that correspond to those analyzed for fatigue in NUREG/CR-6260) needs to be included as a commitment on the JAFNP LRA.

LR Response

LRA Table 4.3-2 is for projected cycles, Table 4.3-3 is for environmentally adjusted CUFs. Note that Table 4.3-3 does not indicate that 40 year CUFs will exceed 1.0 with the EAF adjustment because the EAF adjustment is not applied until the period of extended operation. However, some of the CUFs will exceed 1.0 at the beginning of the period of extended operation when environmentally assisted fatigue is added to the CUF calculation.
The corrective action plan in LRA Section 4.3.3 on Page 4.3-7 and 4.3-8 is revised to read as follows and is included on the JAFNPP license renewal commitment list as Commitment 20.

At least 2 years prior to entering the period of extended operation, for the locations identified in NUREG/CR-6260 for BWRs of the JAFNPP vintage, JAFNPP will implement one or more of the following:
(1) Refine the fatigue analyses to determine valid CUFs less than 1 when accounting for the effects of reactor water environment. This includes applying the appropriate Fen factors to valid CUFs determined in accordance with one of the following.
1. For locations, including NUREG/CR-6260 locations, with existing fatigue analysis valid for the period of extended operation, use the existing CUF to determine the environmentally adjusted CUF.
2. More limiting JAFNPP-specific locations with a valid CUF may be added in addition to the NUREG/CR-6260 locations.
3. Representative CUF values from other plants, adjusted to or enveloping the JAFNPP plant specific external loads may be used if demonstrated applicable to JAFNPP.
4. An analysis using the NRC-approved ASME code 2001 edition up to and including 2003 addendum, may be performed to determine a valid CUF.

The determination of Fen will account for operating time with normal water chemistry and operating time with hydrogen water chemistry.

(2) Manage the effects of aging due to fatigue at the affected locations by an inspection program that has been reviewed and approved by the NRC (e.g., periodic non-destructive examination of the affected locations at inspection intervals to be determined by a method acceptable to the NRC).
(3) Repair or replace the affected locations before exceeding a CUF of 1.0.

Should JAFNPP select the option to manage the aging effects due to environmental-assisted fatigue during the period of extended operation, details of the aging management program such as scope, qualification, method, and frequency will be submitted to the NRC at least 2 years prior to the period of extended operation.

This requires an LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

LRA Section 4.6 -1
The applicant is requested to provide the design codes for the liner plate, torus down comer/vent header and torus-attached piping, and SRV piping for review.

LR Response

Liner plate
The JAFNPP GE Mark I containment includes a steel drywell with no liner plate. The design code for the drywell shell is ASME Code, Section III (1968 Edition including the Summer1968 Addenda) [Ref. UFSAR Section 5.2.3.1]. The design code for the torus is ASME Code, Section III including the Summer 1968 Addenda [Ref. UFSAR Section 5.2.3.1]. The torus was later evaluated to the requirements of ASME Section III, Diviion I, with addenda through Summer 1977 and code case N-197 as part of the Mark 1 Containment Upgrade Program [Ref. TES doc. TR-5321-1].

Torus downcomer/vent Header :
The original design code for the 48 pairs of torus downcomers, eight vent pipes and vent header is ASME Code, Section III (1968 Edition including the Summer1968 Addenda) [Ref. UFSAR Section 5.2.3.1]. The torus downcomers were later evaluated to the requirements of ASME Section III, Division I, with addenda through Summer 1977 and code case N-197 as part of the Mark 1 Containment Upgrade Program [Ref. TES doc. TR-5321-1].

Torus attached piping:
The design code for the torus attached piping is ANSI B 31.1 (1967 Edition thru 1969 Addenda). The torus attached piping was later evaluated to include the additional Mark 1 upgrade loading effects to the requirements of ASME Section III (1977 Edition) as part of the Mark 1 Containment Upgrade Program. Pipe support analysis was performed to Section III Subsection NF [Ref. TES doc. TR-5321-2].

SRV discharge piping:
The design code for the safety relief valve discharge piping was ANSI B 31.1 (1967 Edition thru 1969 Addenda). The safety relief valve discharge piping was later evaluated to include the additional Mark 1 upgrade loading effects to the requirements of ASME Section III (1977 Edition) as part of the Mark 1 Containment Upgrade Program
[Ref. TES doc. TR-5321-2].

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LR Request
LRA Section 4.6 -2
The applicant is requested to provide a statement indicating that the estimate of the total number of 60-year SRV actuations used in the design fatigue analysis remains valid and conservative, based on the actual SRV actuations counted thru 2006.

LR Response
Based on a review of plant operating data from October, 1974 to November 4, 2006, SRVs at JAFNPP have undergone a total of 564 lifts. This represents approximately 32 years of operation. Conservatively assuming each of the 11 valves have lifted on every actuation, the estimated number of lifts for each valve for 60 years is (60/32) times 564 = 1058 lifts in 60 years.

TR-5321-2, Mark 1 Containment Program Plant-Unique Analysis Report of the Torus Attached Piping for James A. Fitzpatrick Nuclear Power Station, Revision 1, November, 1984 (page 13) states that 7500 cycles are allowed for the SRV discharge line penetration into the torus. The estimated total number of SRV actuations for 60 years is less than the number of actuations assumed in the design fatigue analysis. The estimate is based on actual SRV actuations counted thru November 4, 2006. The design fatigue analysis remains valid. Based upon this, the projected CUF for 60 years is calculated as 0.141.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

LRA Section 4.6 -3

The applicant is requested to provide a description or a reference to the "augmented" Class 2/3 fatigue methodology that was developed to account for cycle mechanical loads.

LR Response

The augmented Class 2/3 fatigue methodology is an approach developed to evaluate Mark I Containment Program loadings and acceptance criteria for fatigue effects and to define a course of action for a generic Mark I response to NRC concern regarding cyclic stress due to mechanical loads. The approach was developed along the lines of the Class 2/3 piping design methods. The methodology is described in report MPR 751.

Augmented Class 2/3 methodology described in MPR-751 was applied to JAF via two plant specific calculations performed for JAFNPP by Teledyne Engineering Services (TES).

TR-5321-1 Plant Unique Analysis Report of the Torus Suppression Chamber
TR-5321-2 Plant Unique Analysis Report of the Torus Attached Piping

Teledyne Engineering Services document TR-5321-2 documents stress evaluations for the SRV piping for various load combinations, but does not include a fatigue analysis. The fatigue analysis of the SRV piping along with all the other torus attached piping. (TAP) is bounded by Mark 1 Upgrades generic report MPR-751, prepared by GE. MPR-751 concluded that for all plants and piping systems considered, in all cases the fatigue usage factors for an assumed 40-year plant life was less than 0.5. In a worst-case scenario, extending plant life for an additional 20 years would produce usage factors below 0.75. Since this is less than 1.0, the fatigue criteria are satisfied. The MPR-751 generic fatigue analysis is thus protected for the period of extended operation in accordance with 10 CFR 54.21©(1)(ii)

A JAF plant specific analysis addresses the SRV discharge piping and its supports, as well as the main vent penetration through which the SRV discharge enters the torus. This analysis states that the SRV penetrations are qualified for 7500 cycles of maximum load while the SRVs are expected to see less than 50 cycles at maximum load and less than 4500 cycles at partial load. The TR-5321-2 report concludes "Since the 7500 cycles of maximum load bounds both of these by such a large margin and since no other significant loads are imposed on the line, the penetration was assumed acceptable for fatigue without further evaluation." Increasing the 40 year cycles by 1.5 for the period of extended operation would still be only 75 maximum load cycles and 6750 low load cycles for a total of 6850 mixed load cycles, less than the 7500 maximum load cycles permitted. The fatigue analysis for torus penetrations thus remains valid for the period of extended operation in accordance with 10 CFR 54.21©(1)(i).

The JAF plant-specific analysis (TR-5321-2) references the generic GE Mark 1 Containment program for other torus attached piping. The results of the generic GE Mark 1 containment program (based on 40 years of operation) were that 92% of the TAP would have cumulative usage factors of less than 0.3, and that 100% would have usage factors less than 0.5. Conservatively multiplying the CUFs by 1.5 shows that for 60 years of operation, 92% of the TAP would have CUFs below 0.45, and 100% would have CUFs below 0.75. These calculations have thus been projected through the period of extended operation in accordance with 10 CFR 50.21©(ii).

Hard copies of the two Teledyne reports were available onsite for review.

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.13.2-9
LRA Table 3.3.2-5, "Fire Protection—Water System Summary of Aging Management Evaluation," does not list yard fire hydrants for the Fire Protection—Water system. Fire hydrants are considered passive and long-lived components in accordance with 10 CFR 54.21. If they are excluded from an AMR, provide justification for the exclusion or describe how the aging of those hydrants will be managed and the aging management program for the period of extended operation.

LR Response

Hydrants are subject to aging management review and are included in the component type "valve body" in Table 3.3.2-5. A hydrant is a valve body in Table 3.3.2-5. The corresponding line items in Table 3.3.2-5 are listed as valve body with material of gray cast iron, and environment of raw water (int.). The corresponding NUREG-1801 Volume 2 line items are VII.G-14 and VII.G-24. Hydrants are shown on drawing LRA-FB-49A.

JAFNPP AMP and AMR Database

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LR Request

AMP B.1.13.2-10
The LRA Table 3.3.2-5, "Fire Protection—Water System Summary of Aging Management Evaluation," does not list sprinkler heads for the Fire Protection—Water system. Provide justification for the exclusion or address how the aging of those hydrants will be managed and the aging management program for the period of extended operation.

LR Response

Sprinkler heads are subject to aging management review. In Table 3.3.2-5, sprinkler heads are listed as component type "nozzle". Materials are carbon steel and copper alloy > 15% Zn. Sprinkler heads are shown on drawing LRA-FB-49A.

JAFNPP AMP and AMR Database

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LR Request
Section 3.1 -1a Reactor Vessel, Internals and Reactor Coolant System
LRA Section 4.3.1.3 states that all reactor coolant pressure boundary (RCPB) piping is designed and analyzed in accordance with ANSI B31.1. In the ANSI B31.1 code, fatigue is addressed by using stress range reduction factors to reduce the stress allowable (SA). The LRA states that since the RCPB components will not exceed 7000 full temperature cycles in 60 years of operation, the existing stress analyses remain valid for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(I). However, LRA Section 3.1.2.2.1 states exceptions for the steam line flow restrictors and reactor water circulating pumps, which also require no fatigue analysis. The One-Time Inspection Program is credited to manage cracking due to fatigue for the main steam line flow restrictors, and the ISI Program is credited for the reactor water circulating pumps. In LRA Table 3.1.1, items 3.1.1-55 and 3.1.1-57, the same AMPs are also credited to manage loss of fracture toughness due to thermal aging embrittlement for these two RCPB components. Please provide the following information:

a) Clarify why exceptions are taken for the steam line flow restrictors and the reactor water circulating pumps.

LR Response
There was no Code exception taken for the main steam flow restrictors or for the reactor water recirculation pumps. The exception for the main steam flow restrictors and the reactor water recirculation pumps indicates that the JAFNPP design codes (code of record) for these components did not require a fatigue analysis. Consequently, cracking due to fatigue has no TLAA for JAFNPP. There is only one line entry for cracking for these components; a line entry that includes cracking due to any applicable mechanism.
Cracking due to fatigue will be managed by the same programs that manage cracking due to other mechanisms.
Cracking and loss of fracture toughness of the main steam flow restrictors will be managed by the One-time Inspection Program.
The flow restrictors are not pressure boundary parts and as such are not covered by the ISI Program.
One-time inspection is considered adequate for the main steam flow restrictors as they are not pressure boundary parts.
Cracking and loss of fracture toughness of the recirculation water pump casings are managed by the Inservice Inspection Program.
The pump casing welds are examined per IWB-2500-1 Category B-L-1 while the pump casing itself is examined per IWB-2500-1 Category B-L-2.

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LR Request

Section 3.1 -1b Reactor Vessel, Internals and Reactor Coolant System
LRA Section 4.3.1.3 states that all reactor coolant pressure boundary (RCPB) piping is designed and analyzed in accordance with ANSI B31.1. In the ANSI B31.1 code, fatigue is addressed by using stress range reduction factors to reduce the stress allowable (SA). The LRA states that since the RCPB components will not exceed 7000 full temperature cycles in 60 years of operation, the existing stress analyses remain valid for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(I). However, LRA Section 3.1.2.2.1 states exceptions for the steam line flow restrictors and reactor water circulating pumps, which also require no fatigue analysis. The One-Time Inspection Program is credited to manage cracking due to fatigue for the main steam line flow restrictors, and the ISI Program is credited for the reactor water circulating pumps. In LRA Table 3.1.1, items 3.1.1-55 and 3.1.1-57, the same AMPs are also credited to manage loss of fracture toughness due to thermal aging embrittlement for these two RCPB components. Please provide the following information:

b) Discuss the specific activities in the One-Time Inspection AMP that will manage both cracking due to fatigue and loss of fracture toughness due to thermal aging embrittlement for the main steam line flow restrictors.

LR Response

The One-Time Inspection Program does not manage cracking due to fatigue for the main steam line flow restrictors, as indicated in response to part a) above. The scope of the One-Time Inspection Program is described in LRA Appendix B, Section B.1.21. Activities of the One-Time Inspection Program are used to confirm that loss of material, cracking, and reduction of fracture toughness (as evidenced by cracking), as applicable, are not occurring or are so insignificant that an aging management program is not warranted. The One-Time Inspection Program comprises combinations of nondestructive examinations (including visual, ultrasonic, and surface techniques) that will be performed by qualified personnel following procedures that are consistent with Section XI of ASME B&PV Code and 10CFR50, Appendix B, looking for the presence of, and evaluating the extent of, cracking. Cracking is considered to be symptomatic of a reduction in fracture toughness (and reduced toughness allows existing cracks to propagate at higher rates). Therefore, by managing cracking, the One-Time Inspection Program is credited with managing reduction in fracture toughness for the main steam flow restrictors.

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Audit Question

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LR Request

Section 3.1 -1c Reactor Vessel, Internals and Reactor Coolant System
LRA Section 4.3.1.3 states that all reactor coolant pressure boundary (RCPB) piping is designed and analyzed in accordance with ANSI B31.1. In the ANSI B31.1 code, fatigue is addressed by using stress range reduction factors to reduce the stress allowable (SA). The LRA states that since the RCPB components will not exceed 7000 full temperature cycles in 60 years of operation, the existing stress analyses remain valid for the period of extended operation, in accordance with 10 CFR 54.21(c)(1)(I). However, LRA Section 3.1.2.2.1 states exceptions for the steam line flow restrictors and reactor water circulating pumps, which also require no fatigue analysis. The One-Time Inspection Program is credited to manage cracking due to fatigue for the main steam line flow restrictors, and the ISI Program is credited for the reactor water circulating pumps. In LRA Table 3.1.1, items 3.1.1-55 and 3.1.1-57, the same AMPs are also credited to manage loss of fracture toughness due to thermal aging embrittlement for these two RCPB components. Please provide the following information:

c) Discuss the specific activities in the ISI Program that will manage both cracking due to fatigue and loss of fracture toughness due to thermal aging embrittlement for the reactor water circulating pumps.

LR Response

The ISI Program does not manage cracking due to fatigue for the reactor water recirculating pumps, as indicated in response to part a) above. The scope of the ISI Program is described in LRA Appendix B, Section B.1.16.2. The ISI Program manages cracking, loss of material, and reduction of fracture toughness (as evidenced by cracking), as applicable, of reactor coolant system components, including the reactor water recirculating pumps, using NDE techniques specified in ASME Section XI, Subsections IWB, IWC and IWD examination categories. Cracking is considered to be symptomatic of a reduction in fracture toughness (and reduced toughness allows existing cracks to propagate at higher rates). Therefore, by managing cracking, the ISI Program is credited with managing reduction in fracture toughness for the reactor water recirculating pumps.

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LR Request

Section 3.1 -2a Reactor Vessel, Internals and Reactor Coolant System

The further evaluation in LRA Section 3.1.2.2.2, item 2, and the discussion column in Table 3.1.1, item 3.1.1-13, states that, although JAFNPP does not have an isolation condenser, loss of material due to general, pitting, and crevice corrosion for other steel components exposed to reactor coolant will be managed by the Water Chemistry Control – BWR Program and the One-Time Inspection Program. SRP Section 3.1.2.2.2, item 2, recommends the water chemistry program and an augmented inspection program for the management of loss of material due to general, pitting, and crevice corrosion for both steel and stainless steel isolation condenser components. Please provide the following information:

a) Confirm that this further evaluation in LRA Section 3.1.2.2.2 and discussion in Table 3.1.1 are applicable only to steel components exposed to reactor coolant.

LR Response

Yes. The further evaluation in LRA Section 3.1.2.2.2 and the discussion in Table 3.1.1, item 3.1.1-13, are applicable only to steel components exposed to reactor coolant. NUREG-1801 has no other line item for BWR reactor pressure boundary steel components with the aging effect loss of material due to corrosion. Applicable line items are those in Table 3.1.2-3 referencing Item 3.1.1-13. As shown in Table 3.1.2-3, those line items are Piping and fittings < 4" NPS, Piping and fittings >or = 4" NPS, tank (CRD accumulator and CRD scram discharge volume), valve bodies < 4" NPS, and valve bodies > or = 4" NPS.

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Audit Question

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LR Request

Section 3.1 -2b Reactor Vessel, Internals and Reactor Coolant System
The further evaluation in LRA Section 3.1.2.2.2, item 2, and the discussion column in Table 3.1.1, item 3.1.1-13, states that, although JAFNPP does not have an isolation condenser, loss of material due to general, pitting, and crevice corrosion for other steel components exposed to reactor coolant will be managed by the Water Chemistry Control – BWR Program and the One-Time Inspection Program. SRP Section 3.1.2.2.2, item 2, recommends the water chemistry program and an augmented inspection program for the management of loss of material due to general, pitting, and crevice corrosion for both steel and stainless steel isolation condenser components. Please provide the following information:

b) Discuss the evaluation performed to conclude that the activities in the one-time inspection AMP are consistent with the augmented inspections recommended in the SRP, including the activities performed to manage aging, the sample population inspected, and the inspection locations.

LR Response

SRP Section 3.1.2.2.2, Item 2 states, "A one-time inspection of select components at susceptible locations is an acceptable method to determine whether an aging effect is not occurring or an aging effect is progressing very slowly such that the component's intended function will be maintained during the period of extended operation. Activities of the One-Time Inspection Program include combinations of nondestructive examinations (including visual, ultrasonic, and surface techniques) that will be performed by qualified personnel following procedures that are consistent with Section XI of ASME B&PV Code and 10CFR50, Appendix B. As described in LRA Appendix B, the elements of the One-Time Inspection Program include (a) determination of the sample size based on an assessment of materials of fabrication, environment, plausible aging effects, and operating experience; (b) identification of the inspection locations in the system or component based on the aging effect; (c) determination of the examination technique, including acceptance criteria that would be effective in managing the aging effect for which the component is examined; and (d) evaluation of the need for follow-up examinations to monitor the progression of any aging degradation.

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LR Request

Section 3.1 -3a Reactor Vessel, Internals and Reactor Coolant System
The further evaluation in LRA Section 3.1.2.2.11 addresses cracking due to flow-induced vibration in the stainless steel steam dryers. The BWR Vessel Internals Program is credited to manage this aging effect. The further evaluation also states that JAFNPP will evaluate BWRVIP-139 for the steam dryer, when it is approved by the staff, and include appropriate recommendations in the BWR vessels internals program. SRP Section 3.1.2.2.11 states that cracking due to flow-induced vibration could occur for the BWR stainless steel steam dryers and recommends further evaluation of a plant-specific aging management program to ensure that this aging effect is adequately managed. Please provide the following information:

a) Discuss the current aging management activities that are being performed to address steam dryer cracking, and indicate which, if any, GE recommendations given in SIL 644, Revision 1 are used.

LR Response

As part of the BWR Vessel Internals Program, visual inspections of the steam dryer are conducted on a periodic basis to assess component condition, and ultrasonic (UT) or enhanced visual (EVT-1) inspections are performed as necessary to characterize cracking. These visual and volumetric inspections are based on the guidance in NRC IN 2002-26 and its supplements, GE SIL 644 and its supplements and the latest operating experience (Ref. JAF-RPT-NBS-04394, JAF-RPT-NBS-01848). The inspections are compliant with GE SIL 644, Revision 1. Any indications during the inspections are evaluated and either justified for a subsequent cycle or repaired.

JAFNPP will incorporate the recommendations of BWRVIP-139 once it is approved by the NRC staff.

License Renewal Commitment #22.

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LR Request

Section 3.1 -3b Reactor Vessel, Internals and Reactor Coolant System
The further evaluation in LRA Section 3.1.2.2.11 addresses cracking due to flow-induced vibration in the stainless steel steam dryers. The BWR Vessel Internals Program is credited to manage this aging effect. The further evaluation also states that JAFNPP will evaluate BWRVIP-139 for the steam dryer, when it is approved by the staff, and include appropriate recommendations in the BWR vessels internals program. SRP Section 3.1.2.2.11 states that cracking due to flow-induced vibration could occur for the BWR stainless steel steam dryers and recommends further evaluation of a plant-specific aging management program to ensure that this aging effect is adequately managed. Please provide the following information:

b) Discuss how steam dryer cracking was addressed as part of the evaluation performed for the extended power uprate (EPU) at JAFNPP, and whether any concerns were raised and how they were addressed.

LR Response

No concerns were raised with respect to steam dryer cracking as a result of the power uprate (4% uprate in 1996) performed several years ago at JAFNPP. The baseline inspection of the recommended steam dryer locations was completed in R17. None of the identified indications have been attributed to flow-induced vibration. Relevant industry operating experience has been considered in the program, and FIV/uprate related cracking is considered a non-issue for the JAFNPP steam dryer.

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LR Request
Section 3.1 -3c Reactor Vessel, Internals and Reactor Coolant System
The further evaluation in LRA Section 3.1.2.2.11 addresses cracking due to flow-induced vibration in the stainless steel steam dryers. The BWR Vessel Internals Program is credited to manage this aging effect. The further evaluation also states that JAFNPP will evaluate BWRVIP-139 for the steam dryer, when it is approved by the staff, and include appropriate recommendations in the BWR vessels internals program. SRP Section 3.1.2.2.11 states that cracking due to flow-induced vibration could occur for the BWR stainless steel steam dryers and recommends further evaluation of a plant-specific aging management program to ensure that this aging effect is adequately managed. Please provide the following information:

c) The staff reviewed SIL 644, Rev. 1, and comments were sent to the BWROG in a letter dated January 12, 2005. Most of these comments were related to EPU. Please discuss the resolutions to these NRC comments as they apply to JAFNPP.

LR Response
As described in response to question 3.b) above, power uprate is considered a non-issue for the JAFNPP steam dryers, based on a lack of indications attributable to FIV. Therefore, the resolutions of the NRC EPU related comments to the SIL 644 revision are not applicable to JAFNPP.
JAF completed a 4% uprate in 1996.

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LR Request

Section 3.1 -4 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.1, item 3.1.1-40, addresses cracking due to SCC, IGSCC, and cyclic loading for stainless steel and nickel alloy penetrations for CRD stub tube instrumentation, jet pump instrumentation, SLC, flux monitor and drain lines exposed to reactor water. The AMR credits the Water Chemistry Control – BWR program and either the BWR Penetrations, BWR Vessel Internals or Inservice Inspection Program. NUREG-1801 recommends the BWR Penetration and Water Chemistry programs. Please discuss the evaluation performed to conclude that the activities in the BWR Vessel Internals and Inservice Inspection AMP are consistent with the activities in the BWR Penetration AMP recommended by NUREG-1801 for the components addressed by this AMR, including the activities performed to manage aging, the sample population inspected, and the inspection locations.

LR Response

The only variances from NUREG-1801 in LRA tables 3.1.2-1, 3.1.2-2 and 3.1.2-3 items referencing 3.1.1-40 are for the CRD stub tubes and the incore housings.

Although NUREG-1801 Section IV calls for the BWR Penetrations Program to manage cracking of the CRD stub tubes and the incore housings, the BWR Penetration Program described in NUREG-1801, XI.M8 does not address either of these components. Therefore, JAFNPP did not credit the BWR Penetrations Program for managing this cracking.

Cracking of the CRD stub tubes is managed by the BWR Vessel Internals Program, which incorporates the guidelines of NRC approved BWRVIP-47A for the CRD stub tubes. The BWR Vessel Internals Program has been reviewed for consistency with GALL and the applicable BWRVIPs and there are no exceptions to BWRVIP-47A.

Cracking for the incore housings is managed by the Inservice Inspection Program. We will modify the LRA to show this cracking is also managed by the BWR Vessel Internals Program. Similar to the CRD stub tubes, the BWR Vessel Internals Program includes the BWRVIP-47A recommendations for the incore housings without exception.

ISI performs volumetric or surface examination of 10% of the peripheral CRD housing welds. In addition, periodic leak testing of the reactor vessel lower head including both the CRD stub tubes and the incore housing.

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LR Request

Section 3.1 -5 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.1, item 3.1.1-41, addresses cracking in stainless steel, nickel alloy and steel clad with stainless steel components exposed to reactor coolant, which is managed by several programs. For some components of the reactor vessel and reactor coolant pressure boundary, the LRA credits the BWR Stress Corrosion Cracking and Water Chemistry Control – BWR AMPs to manage cracking, further supplemented by the Inservice Inspection Program, which is Consistent with NUREG-1801. For other components, to which the BWR Stress Corrosion Cracking Program is not applicable, cracking is managed by the Water Chemistry Control – BWR Program, and either the Inservice Inspection, One-Time Inspection, BWR Feedwater Nozzle or BWR Vessel Internals Program. Please identify the components to which the BWR Stress Corrosion Cracking Program is not applicable and discuss the evaluation performed to conclude that the activities in the Inservice Inspection, One-Time Inspection, BWR Feedwater Nozzle or BWR Vessel Internals AMPs are consistent with the activities in the BWR Stress Corrosion Cracking AMP recommended by NUREG-1801 for the components addressed by this AMR, including the activities performed to manage aging, the sample population inspected, and the inspection locations.

LR Response

The BWR Stress Corrosion Cracking Program is applicable to stainless steel reactor vessel nozzle safe ends greater than 4" NPS (core spray, jet pump instrument, and recirc inlet/outlet nozzles); RWR flow elements, pump casings and covers; and piping, fittings and valve bodies of the RCPB that are greater than 4" NPS. The BWR Stress Corrosion Cracking Program is not applicable to any other components.

The feedwater, core spray, and RWR nozzle thermal sleeves are not part of the BWRSCC program because they are not part of the Code-required pressure boundary. The thermal sleeves employ press-fit or threaded connections.

The ISI Program was evaluated as a plant-specific program; the One-Time Inspection Program was evaluated for consistency with the NUREG-1801 One-Time Inspection and Small-bore Piping AMPs; the BWR Feedwater Nozzle Program was evaluated for consistency with the NUREG-1801 BWR Feedwater Nozzle AMP; and the BWR Vessel Internals Program was evaluated for consistency with the NUREG-1801 BWR Vessel Internals AMP. Each of these programs was determined effective at managing the aging effects noted for the associated material and enviroment combinations. Note E was used in Tables 3.1.2-1 and 3.1.2-3 in all of these cases because a different program than the one identified in item 3.1.1-41 is credited for aging management.

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LR Request

Section 3.1 -6 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.1, item 3.1.1-47, addresses loss of material due to pitting and crevice corrosion in stainless steel and nickel-alloy reactor vessel internals. The LRA credits the Water Chemistry Control – BWR and One-Time Inspection Programs to manage this aging effect. NUREG-1801 recommends the water chemistry and Inservice Inspection (IWB, IWC, and IWD) programs. The LRA states that the One-Time Inspection Program will verify the effectiveness of the Water Chemistry Control Program to manage loss of material. The LRA also states that the Inservice Inspection Program is not applicable to most reactor vessel internal components since they are not part of the pressure boundary. Please identify the reactor vessel internals that are part of the pressure boundary and, therefore, are subject to Inservice Inspection. For those components, please clarify why Inservice Inpsection is not credited for this AMR. Also, please discuss the evaluation performed to conclude that the activities in the One-Time Inspection AMP are consistent with the activities in the Inservice Inspection AMP recommended by NUREG-1801 for the components addressed by this AMR, including the activities performed to manage aging, the sample population inspected, and the inspection locations.

LR Response

As listed in LRA Tables 3.2.1-2 and 3.1.2-3, the reactor vessel internals components with a pressure boundary function are the incore flux monitor dry tubes, local power range monitors and guide tubes. As described in LRA Section 2.3.1 (pages 2.3.1&2), the incore flux monitor guide tubes extend from the top of the incore flux monitor housings, in the lower plenum, to the top guide. The power range detectors for the power range monitoring units and the dry tubes for the source range monitoring and intermediate range monitoring (SRM/IRM) detectors are inserted through the guide tubes. These components inside the reactor vessel are, via the housings in the lower plenum, connected to penetrations in the reactor vessel and, therefore, are a part of the reactor coolant pressure boundary. Even though JAFNPP is performing all the inservice inspections required by Section XI of the ASME code, JAFNPP is not crediting the Inservice Inspection Program for the management of aging for these components due to their location inside the reactor vessel.
The One-Time Inspection Program, which is credited for these components inside the vessel, has not been evaluated for consistency with the NUREG-1801 Inservice Inspection (ISI) AMP, but instead was evaluated for consistency with the NUREG-1801 One-Time Inspection and Small-bore Piping AMPs. A Note E was used in Table 3.1.2-2 because a different program than the one identified in item 3.1.1-47 is credited for aging management.
JAFNPP performs all the inspections required by the ASME Section XI Inservice Inspection Program, but this program is not credited for managing loss of material because it does not specifically inspect many of the reactor vessel internal components.
JAFNPP credits the BWR Vessel Internals Program which incorporates the requirements of ASME Section XI, the approved BWRVIP documents, and other approved industry documents such as vendor letters and NUREGs.
Changes will be made to the License Renewal Application as indicated below.

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LR Request

Section 3.1 -7 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.1, item 3.1.1-49, addresses cracking due to SCC, IGSCC, IASCC in nickel-alloy core shroud and core plate welded access hole cover with no crevice. The LRA credits the Water Chemistry Control – BWR and BWR Vessel Internals Program to manage this aging effect. NUREG-1801 recommends the Inservice Inspection and Water Chemistry programs. Please discuss the evaluation performed to conclude that the activities in the BWR Vessel Internals AMP are consistent with the activities in the Inservice Inspection AMP recommended by NUREG-1801 for the components addressed by this AMR, including the activities performed to manage aging, the sample population inspected, and the inspection locations.

LR Response

The BWR Vessel Internals Program has been evaluated for consistency with the NUREG-1801 BWR Vessel Internals AMP. A Note E was used in Table 3.1.2-2 because a different program than the one identified in item 3.1.1-49 is credited for aging management.

The Inservice Inspection Program requires only a visual inspection of the shroud support plate access hole covers (as acknowledged in GALL item IV.B1-5). The JAFNPP BWR Vessel Internals program includes the visual examinations required by ASME Section XI as well as any other requirements found in approved BWRVIP documents, and other industry documents. JAFNPP has credited the BWR vessel internals program rather than ISI because BWR vessel internals is the governing program for management of the vessel internals.

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LR Request
Section 3.1 -8a Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.1, item 3.1.1-52, addresses cracking due to SCC, loss of material due to wear, loss of preload due to thermal effects, gasket creep and self-loosening for RCPB bolting in high-pressure and high temperature systems. The LRA credits the Bolting Integrity AMP to manage these aging effects, which is consistent with NUREG-1801 recommendations. Please provide the following information:

a) The LRA only addresses stainless steel bolting. Please confirm that JAFNPP does not have any steel or low alloy carbon steel RCPB bolting.

LR Response
JAFNPP has stainless steel and low alloy steel, carbon steel RCPB bolting. Stainless steel and low alloy steel, carbon steel RCPB bolting items are included in LRA Table 3.1.2-3 (page 3.1-57). The first sentence of the discussion for LRA Table 3.1.1, item 3.1.1-52, is specific to stainless steel bolting. The remaining discussion addresses both stainless steel and low alloy steel (or similar material).
Also, due to more applicable aging mechanisms for loss of material (e.g., general, crevice and pitting corrosion) and SCC not being applicable to alloy steel bolting that is not high-strength, the low alloy steel, carbon steel RCPB bolting was compared to a NUREG-1801 item (V.E-4), which corresponds to NUREG-1800 item 3.2.1-23, and a Note C is used in Table 3.1.2-3.

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LR Request

Section 3.1 -8b Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.1, item 3.1.1-52, addresses cracking due to SCC, loss of material due to wear, loss of preload due to thermal effects, gasket creep and self-loosening for RCPB bolting in high-pressure and high temperature systems. The LRA credits the Bolting Integrity AMP to manage these aging effects, which is consistent with NUREG-1801 recommendations. Please provide the following information:

b) The LRA states that industry operating experience indicates that loss of material due to wear is not a significant aging effect for bolting. Please provide the technical justification and the operating experience data to support this conclusion.

LR Response

Loss of material due to wear is not a significant aging effect for RCPB bolting because wear is the result of relative motion between two surfaces and any relative displacements or movements during normal plant operations are small and the resulting loss of material minimal. The relative motion between bolting and the connected surface that can occur during periodic assembly/disassembly for inspection maintenance are not related to normal aging. As described in LRA Table 3.1.1, item 3.1.1-52, occasional thread failures, such as galling (or improper fit-up/assembly), are event driven conditions that are resolved as required. Therefore, loss of material due to wear of RCPB bolting, both stainless steel and low alloy steel, carbon steel, is not a significant aging effect.
Industry operating experience documented in various sources, such as the Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 3, EPRI, Palo Alto, CA: 2001. 1003056 (Mechanical Tools), supports that the most common failures of pressure retaining bolting in safety-related applications were attributed to boric acid wastage and a few instances of stress corrosion cracking. No instances of bolting wear have been identified in site or industry documentation that were attributable to normal aging, whereas event driven bolting failures are known to occur, and are corrected in the short-term. Furthermore, the operating experience discussion for the Bolting Integrity Program in NUREG-1801, Revision 1, Section XI.M18 does not address bolting wear as an aging mechanism for bolting.

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LR Request

Section 3.1 -8c Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.1, item 3.1.1-52, addresses cracking due to SCC, loss of material due to wear, loss of preload due to thermal effects, gasket creep and self-loosening for RCPB bolting in high-pressure and high temperature systems. The LRA credits the Bolting Integrity AMP to manage these aging effects, which is consistent with NUREG-1801 recommendations. Please provide the following information:

c) The LRA states that loss of preload is a design driven effect and not an aging effect requiring management. Please provide the technical justification for concluding that thermal cycles, gasket creep and self-loosening are not aging mechanisms that could lead to this aging effect.

LR Response

As described in LRA Table 3.1.1, item 3.1.1-52, loss of preload would only be a concern in very high temperature applications (> 700ºF), per ASME Code Section II, Part D, Table 4. No JAFNPP systems operate at > 700ºF so no JAFNPP bolting is exposed to the high temperatures that could result in a loss of preload.
At elevated temperatures (thermal effects), a fastener will produce less and less clamping force with time, referred to as relaxation. A bolted joint at 1200ºF can lose as much as 50% of preload. Furthermore, elevated temperature behavior, e.g., where relaxation might occur, begins at 700ºF for low alloy steels, and higher for austenitic stainless steels (Ref. Volume 11 of the Metals Handbook, 9th Edition, "Failure Analysis and Prevention). Gasket creep and self-loosening, that are not a product of thermal effects, typically occur shortly after initial loading and early in the service life with actions taken to prevent recurrence.

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LR Request

Section 3.1 -8d Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.1, item 3.1.1-52, addresses cracking due to SCC, loss of material due to wear, loss of preload due to thermal effects, gasket creep and self-loosening for RCPB bolting in high-pressure and high temperature systems. The LRA credits the Bolting Integrity AMP to manage these aging effects, which is consistent with NUREG-1801 recommendations. Please provide the following information:

d) The LRA states that proper joint preparation and make-up in accordance with industry standards is expected to preclude loss of preload and this is confirmed by operating experience at JAFNPP. Please discuss and provide the plant operating experience justifying this conclusion.

LR Response

Good bolting practices in accordance with EPRI NP-5067, "Good Bolting Practices, A Reference Manual for Nuclear Power Plant Maintenance Personnel," volume 1: "Large Bolt Manual," 1987 and volume 2: "Small Bolts and Threaded Fasteners," 1990, have been implemented for the Bolting Integrity Program of JAFNPP with further enhancement to include guidance from EPRI NP-5769, Degradation and Failure of Bolting in Nuclear Power Plants, Volumes 1 and 2, April 1988 and EPRI TR-104213, Bolted Joint Maintenance & Application Guide, Electric, December 1995 planned for license renewal, as described in LRA Appendix B, Section B.1.30. No instances of a loss of bolt preload that occurred as a result of aging have been identified for JAFNPP, which provides confirmation that the bolting practices, along with the RCS temperatures below 700ºF, have precluded a loss of preload (ref. JAF-RPT-05-LRD05, Attachment 5). Nevertheless, the JAFNPP Bolting Integrity Program includes the aging management activities specified in NUREG-1801, Section XI.M18.

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LR Request
Section 3.1 -9 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.1, item 3.1.1-55, addresses loss of fracture toughness due to thermal aging embrittlement in CASS Class 1 pump casing and valve bodies and bonnets exposed to reactor coolant. The LRA credits the ISI for pumps and One-Time Inspection for valves to manage this aging effect. Please clarify whether JAFNPP will use ASME Code Case N-481 as an alternative for pump casing. Also, please clarify why One-Time Inspection is credited for valves.

LR Response
ASME Code Case N-481 is not applicable to the JAF ISI Program for reactor recirculation Pump Casings.
JAF has no welds in the recirculation pump casing.

The ISI program is applicable for Valve bodies > 4" for visual examination of internal surfaces, pressure testing and leak testing. This is credited for managing aging effects.

Valves ≤ 4" have no required NDE inspections under the ASME Section XI Code or the ISI program, but are required to be visually inspected (VT-2) in accordance with the pressure testing program conducted every refuel outage. This visual inspection requirement also applies to Pump Casings because they are included in the pressure testing program.

The One-Time Inspection Program will be addressed by utilizing industry initiatives for program and inspection development.

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LR Request

Section 3.1 -10 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.1, item 3.1.1-57, addresses loss of fracture toughness due to thermal aging embrittlement in CASS Class 1 piping component, and piping elements and CRD pressure housings exposed to reactor coolant. The LRA credits the One-Time Inspection AMP to manage this aging effect for the main steam flow restrictors, which are the only CASS component in the scope of this AMR. NUREG-1801 *recommends the Thermal Aging Embrittlement of CASS program*. Please discuss the evaluation performed to conclude that the activities in the One-Time Inspection AMP are consistent with the activities in the Thermal Aging Embrittlement of CASS AMP recommended by NUREG-1801 for the components addressed by this AMR, including the activities performed to manage aging, the sample population inspected, and the inspection locations.

LR Response

The One-Time Inspection Program has not been evaluated for consistency with the NUREG-1801 Thermal Aging Embrittlement of CASS AMP, but was instead evaluated for consistency with the NUREG-1801 One-Time Inspection and Small-bore Piping AMPs. A Note E was used in Table 3.1.2-3 because a different program than the one identified in item 3.1.1-57 is credited for aging management. The One-Time Inspection Program will detect cracking that is symptomatic of reduction of fracture toughness using established visual nondestructive examination (NDE) techniques. Reduction of fracture toughness does not cause cracking, but the reduced toughness allows existing cracks to propagate at higher rates. The sample population includes all of the main steam flow restrictors. NUREG-1801 XI.M12 program is applicable to primary pressure boundary and reactor vessel internal components. The main steam flow restrictors are neither.

JAFNPP AMP and AMR Database

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LR Request

Section 3.1 -11 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-1 includes a line item on reactor vessel external attachments that addresses the loss of material of structural low alloy and carbon steel exposed to an air-indoor (external) environment. The LRA credits the ISI AMP for managing this aging effect. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss the specific ISI AMP activities that will be performed to manage this aging effect.

LR Response

The ISI Program manages loss of material for reactor vessel external attachments by surface examination using NDE techniques specified in ASME Section XI, Subsection IWB; specifically IWB-2500 category B-K. The current inspection frequency is once an interval (10yrs) on the recommended sample size of 100% of the total population.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -12 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-1 includes a line item on reactor vessel closure flanges that addresses the loss of material of high-strength low-alloy steel exposed to an air-indoor (external) environment. The LRA credits the Reactor Head Closure Studs AMP for managing aging of this component. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss the specific activities in the Reactor Head Closure Studs AMP that will be performed to manage this aging effect.

LR Response

As stated in LRA Section B.1.23, the Reactor Head Closure Studs Program is consistent with the program described in NUREG-1801, Section XI.M3, Reactor Head Closure Studs. (There is one exception but it is not related to wear detection.) As stated in NUREG-1801, Section XI.M3, under Detection of Aging Effects, inspection can reveal cracking, loss of material due to corrosion or wear, and leakage of coolant. Specifically, visual inspections specified in ASME Section XI, Table IWB-2500-1 detect loss of material.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -13 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-1 includes two line items to address the reactor vessel closure flange leakoff nozzle; one line item addresses stainless steel and the other carbon steel. Please clarify with sketches how the reactor flange leakoff nozzle at JAFNPP has components made out of these two different materials.

LR Response

The reactor vessel flange leak detection system consists of lines attached to two separate drilled penetrations in the vessel flange, one between the reactor vessel O-rings and one outside of the outer O-ring. Therefore, materials for the reactor vessel closure flange leakoff nozzles were based on the connecting piping material specifications. The connecting piping for nozzle N13 was identified as stainless steel (A376 Type 304), and for nozzle N14, carbon steel (A106 Grade B).

JAFNPP AMP and AMR Database

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LR Request

Section 3.1 -14 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-3 includes line items to address cracking for various components (including condensing chambers, CRD, CRD filter housing, instrumentation orifices, etc.) constructed of stainless steel and exposed to reactor coolant. In some cases, the LRA credits the Water Chemistry Control – BWR and One-Time Inspection AMPs, while for other cases, the LRA credits the Water Chemistry Control – BWR and Inservice Inspection AMPs to manage cracking. However, all line items refer to Table 1 item 3.1.1-48, which credits the Water Chemistry Control – BWR, Inservice Inspection and One-Time Inspection AMPs for managing cracking in stainless steel RCPB components. Please clarify these discrepancies where only two out of three AMPs are credited for RCPB components.

LR Response

There are nine line entries in JAFNPP LRA Table 3.1.2-3 that reference Table 3.1.1-1 Item 3.1.1-48. Five of these entries reference Water Chemistry Control – BWR, the OTI-Small Bore Piping program, and the ISI program, consistent with GALL item IV.C1-1. JAFNPP will modify the license renewal application to add ISI to the three line items (Condensing chambers, CRD filter housings, and Orifices) that do not currently have this program. This will make 8 of the 9 entries list all 3 programs and be consistent with GALL entry IV.C1-1. Note that these entries will retain a note E because the JAFNPP ISI program is considered a plant specific program.

There was no GALL line that made a good comparison for the Control Rod Drives. JAFNPP decided that IV.C1-1 was the closest GALL line item and therefore used it for comparison. However, because the drives are not small bore piping, the One-Time Inspection for ASME Code Class 1 Small Bore Piping does not apply to the drives. The CRDs are inspected by ISI in accordance with ASME Section XI, and therefore the ISI program is credited. The note for this entry is E, both because the OTI Small Bore program is not listed and because the ISI program is plant specific.

Note 107: The program credited in NUREG-1801, IV.C1-1 is the One-Time Inspection of ASME Code Class 1 Small Bore Piping, not the One-Time Inspection to verify the effectiveness of Water Chemistry Control. GALL item IV.C1-1 does not call out the One-time inspection to verify water chemistry control, consequently JAFNPP did not add Note 107 as the nine entries calling out IV.C1-1 are consistent with that GALL item without OTI for WCC verification.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -15a Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the reactor top guide assembly. The LRA credits the Water Chemistry Control-BWR, BWR Vessel Internals, and One-Time Inspection AMPs to manage this aging effect. The description of the BWR Vessel Internals program in Section B.1.7 of the LRA includes an exception stating that the inspection of the hold-down assemblies of the top guide at 0degree and 180degree are deferred from RO16 to RO17. NUREG-1801 recommends augmented inspections for top guides with neutron fluence exceeding the IASCC threshold (5E20. E>1MEV) before or after entering the period of extended operation. Please provide the following information:

a) Discuss the current condition of the top guide, including any degradation or cracking that has been observed and any corrective actions performed.

LR Response

a) [Refer to response to Item 256.] At JAF, hold-down assemblies are inspected with a conservative decision making philosophy. In that, JAF has been inspecting the hold down assemblies despite BWRVIP-26-A (A version approved by the NRC), Figure A-1 showing that the FitzPatrick plant faulted vertical loads at hold-down assemblies are on the demarcation line between "lift off" and "will not lift". Therefore, the hold down assemblies will not lift-off during a postulated seismic event.

Accessible areas of top guide hold-down assemblies at 0° and 180° were inspected in R17 (Fall 2006) by VT-1 visual method with no recordable indications noted. R17 inspections also included top guide grid beam and beam-to-beam crevice slot at three locations by VT-3/VT-1 with no recordable indications noted.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -15b Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the reactor top guide assembly. The LRA credits the Water Chemistry Control-BWR, BWR Vessel Internals, and One-Time Inspection AMPs to manage this aging effect. The description of the BWR Vessel Internals program in Section B.1.7 of the LRA includes an exception stating that the inspection of the hold-down assemblies of the top guide at 0degree and 180degree are deferred from RO16 to RO17. NUREG-1801 recommends augmented inspections for top guides with neutron fluence exceeding the IASCC threshold (5E20. E>1MEV) before or after entering the period of extended operation. Please provide the following information:

b) Based on past operating experience, provide the technical basis for concluding that the BWR vessel internals, water chemistry, and one-time inspection AMPs are adequate for maintaining the structural integrity of the top guide, specifically the hold-down assemblies, during the period of extended operation.

LR Response

b) FitzPatrick plans to continue implementing the inspection requirement per BWRVIP-26-A, including NRC SER dated December 7, 2000.

JAFNPP AMP and AMR Database

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LR Request

Section 3.1 -15c Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the reactor top guide assembly. The LRA credits the Water Chemistry Control-BWR, BWR Vessel Internals, and One-Time Inspection AMPs to manage this aging effect. The description of the BWR Vessel Internals program in Section B.1.7 of the LRA includes an exception stating that the inspection of the hold-down assemblies of the top guide at 0□ and 180□ are deferred from RO16 to RO17. NUREG-1801 recommends augmented inspections for top guides with neutron fluence exceeding the IASCC threshold (5E20. E>1MEV) before or after entering the period of extended operation. Please provide the following information:

c) Discuss any augmented inspections that are being performed now, or will be performed during the period of extended operation to monitor the condition of the top guide.

LR Response

c) See the responses to questions 251 and 252 for additional information on the top guide inspections.

The fluence threshold for IASCC of 5E20 was exceeded after approximately the first 5 years of operation. Ten (10) percent of the top guide cross hatch area locations will be inspected using enhanced visual inspection technique, EVT-1, within the first 12 years of the period of extended operation, with at least one-half of the inspections to be completed within the first 6 years of the period of extended operation. Locations selected for examination will be areas that have exceeded the neutron fluence threshold.

Inspections of 10 percent of the top guide cross hatch area locations within the first 12 years of the period of extended operation provides assurance that the program will be sufficient to manage IASCC in the top guide for the PEO.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -16a Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the reactor vessel core shroud. The LRA credits the Water Chemistry Control-BWR and BWR Vessel Internals AMPs to manage this aging effect. The description of the BWR Vessel Internals AMP in Section B.1.7 of the LRA includes a discussion of operating experience, which states that crack-like indications were identified at four core shroud vertical welds in RO14. Also, a line item on shroud stabilizers in LRA Table 3.1.2-2 indicates that the shroud has cracks, which were repaired in the past and are being managed by plant programs. Please provide the following information:

a) Discuss the current condition of the core shroud, including any degradation or cracking detected and corrective actions taken.

LR Response

The flawed vertical welds at JAF have been determined to be acceptable for further service until R18 (CR-JAF-2006-04238 & 04287). An EOI (end of interval) calculation for belt-line welds SV5A and SV5B will be prepared in 2007 (CR-JAF-2006-04238 CA 00003) in accordance with BWRVIP-76 guidelines. BWRVIP-76 was recently approved by the NRC in a letter dated 7/27/2006. There are no corrective actions (repairs) anticipated at the present time since significant margin remains for structural evaluations.

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LR Request

Section 3.1 -16b Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the reactor vessel core shroud. The LRA credits the Water Chemistry Control-BWR and BWR Vessel Internals AMPs to manage this aging effect. The description of the BWR Vessel Internals AMP in Section B.1.7 of the LRA includes a discussion of operating experience, which states that crack-like indications were identified at four core shroud vertical welds in RO14. Also, a line item on shroud stabilizers in LRA Table 3.1.2-2 indicates that the shroud has cracks, which were repaired in the past and are being managed by plant programs. Please provide the following information:

b) Based on past operating experience, provide the technical basis for concluding that the BWR vessel internals and water chemistry AMPs are adequate for maintaining the structural integrity of the core shroud during the period of extended operation.

LR Response

FitzPatrick plans to continue core shroud inspections per BWRVIP-76 requirements, including a future "A" version when issued. BWRVIP-76 was recently approved by the NRC in a letter dated 7/27/2006.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -16c Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the reactor vessel core shroud. The LRA credits the Water Chemistry Control-BWR and BWR Vessel Internals AMPs to manage this aging effect. The description of the BWR Vessel Internals AMP in Section B.1.7 of the LRA includes a discussion of operating experience, which states that crack-like indications were identified at four core shroud vertical welds in RO14. Also, a line item on shroud stabilizers in LRA Table 3.1.2-2 indicates that the shroud has cracks, which were repaired in the past and are being managed by plant programs. Please provide the following information:

c) Discuss any augmented inspections that are being performed now, or will be performed during the period of extended operation to monitor the condition of the core shroud.

LR Response

See response to Item 246. The JAFNPP BWR Reactor Vessel Internals Program includes actions specified in approved and applicable BWRVIP reports including BWRVIP-76, which addresses core shroud inspections. BWRVIP-76 was approved in July 2006.

JAFNPP AMP and AMR Database

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LR Request

Section 3.1 -17a Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the core support rim bolts. The LRA credits the Water Chemistry Control-BWR and BWR Vessel Internals AMPs to manage this aging effect. The description of the BWR Vessel Internals AMP in Section B.1.7 of the LRA includes an exception, which states that JAFNPP provides an alternate inspection for the core plate rim hold-down bolts that is technically justified according to BWRVIP- 94. Please provide the following information:

a) Discuss the current condition of the core support rim bolts, including any degradation or cracking detected and corrective actions taken.

LR Response

JAF verified the structural integrity of the top locking engagement of all 72 installed bolts per drawing configuration. This included a 100% baseline of all bolts by VT-3 inspection in 1998 (R13). JAF also verified the structural integrity of the top locking engagement of 20 bolts by the VT-1 method in December 1994 (R11). There were no recordable indications noted on these exams.

BWRVIP-94 provides guidance on implementation of the BWRVIP reports. BWRVIP-94 provides administrative guidelines on how justifications of alternate inspections should be prepared but does not provide technical bases. BWRVIP-94 is endorsed by procedure Entergy ENN-DC-135.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -17b Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the core support rim bolts. The LRA credits the Water Chemistry Control-BWR and BWR Vessel Internals AMPs to manage this aging effect. The description of the BWR Vessel Internals AMP in Section B.1.7 of the LRA includes an exception, which states that JAFNPP provides an alternate inspection for the core plate rim hold-down bolts that is technically justified according to BWRVIP- 94. Please provide the following information:

b) Based on past operating experience, provide the technical basis for concluding that the BWR vessel internals and water chemistry AMPs are adequate for maintaining the structural integrity of the core support rim bolts during the period of extended operation.

LR Response

FitzPatrick plans to inspect the core support rim bolts during the PEO either by ASME Code Section XI or by BWRVIP-25 provided there is a viable inspection method and BWRVIP-25 received approval by NRC.

Refer to response to AMP audit question 252.

JAFNPP developed technical justifications for deviation from the guidelines of BWRVIP-25 in accordance with the guidance given in Appendix A to BWRVIP-94. This appendix does not provide technical justification in and of itself, rather it provides administrative guidelines for processing a technical justification.

Entergy is deviating from the guidelines of BWRVIP-25 because the method proposed for core plate rim hold down bolts is not feasible. JAFNPP plans to perform the inspections required by ASME Section XI as an alternate method for inspection of the core plate rim hold down bolts.

The examination method, inspection frequency, and inspection sample size for the alternative inspection method will be in accordance with the requirements of ASME Section XI, Table IWB-2500-1, Examination Category B-N-2.

LRA Section A.2.1.7 and Section B.1.7 will be revised to include the following enhancement.

JAFNPP will perform inspections of the core plate rim hold down bolts in accordance with ASME Section XI Table IWB-2500-1, Examination Category B-N-2 or in accordance with a future NRC-approved revision of BWRVIP-25 that provides a feasible method of inspection.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -17c Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the core support rim bolts. The LRA credits the Water Chemistry Control-BWR and BWR Vessel Internals AMPs to manage this aging effect. The description of the BWR Vessel Internals AMP in Section B.1.7 of the LRA includes an exception, which states that JAFNPP provides an alternate inspection for the core plate rim hold-down bolts that is technically justified according to BWRVIP- 94. Please provide the following information:

c) Discuss any augmented inspections that are being performed now, or will be performed during the period of extended operation to monitor the condition of the core support rim bolts.

LR Response

FitzPatrick plans to inspect the core support rim bolts during the PEO either by ASME Code Section XI or by BWRVIP-25 provided there is a viable inspection method and BWRVIP-25 is approved by NRC. The NRC has accepted the reference of BWRVIP-25 in License Renewal Applications. Refer to EPRI letter 2001-006 and NRC letter dated 12/7/2000.

Refer to response to AMP audit question 252.

JAFNPP developed technical justifications for deviation from the guidelines of BWRVIP-25 in accordance with the guidance given in Appendix A to BWRVIP-94. This appendix does not provide technical justification in and of itself, rather it provides administrative guidelines for processing a technical justification.

Entergy is deviating from the guidelines of BWRVIP-25 because the method proposed for core plate rim hold down bolts is not feasible. JAFNPP plans to perform the inspections required by ASME Section XI as an alternate method for inspection of the core plate rim hold down bolts.

The examination method, inspection frequency, and inspection sample size for the alternative inspection method will be in accordance with the requirements of ASME Section XI, Table IWB-2500-1, Examination Category B-N-2.

LRA Section A.2.1.7 and Section B.1.7 will be revised to include the following enhancement.

JAFNPP will perform inspections of the core plate rim hold down bolts in accordance with ASME Section XI Table IWB-2500-1, Examination Category B-N-2 or in accordance with a future NRC-approved revision of BWRVIP-25 that provides a feasible method of inspection. The NRC has accepted the reference of BWRVIP-25 in License Renewal Applications, however, it provides no viable inspection method for the core plate rim hold down bolts. Refer to EPRI letter 2001-006 and NRC letter dated 12/7/2000.

JAFNPP AMP and AMR Database

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LR Request

Section 3.1 -18a Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the jet pump assemblies. The LRA credits the Water Chemistry Control-BWR and BWR Vessel Internals AMPs to manage this aging effect. The description of the BWR Vessel Internals AMP in Section B.1.7 of the LRA includes an exception, which states that inspections for inaccessible welds, beam (UT), and scheduled inspections of high ranked welds for the jet pump assemblies have been deferred, but the deferrals are technically justified. Please provide the following information:

a) Discuss the current condition of the jet pump assemblies including any degradation or cracking detected and corrective actions taken.

LR Response

a) FitzPatrick inspected all twenty jet pump beams by UT in R17 with no recordable indications noted.

Also in R17, FitzPatrick inspected by UT (ID 360° tooling) high priority welds at jet pump diffuse and adapter/lower ring assembly of all 20 jet pumps. Indications were recorded at welds DF-2 (JP# 1 & 3) and AD3b/DF-3 (JP# 12 & 17). All indications were determined acceptable (CR-JAF2006-04531).

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -18b Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the jet pump assemblies. The LRA credits the Water Chemistry Control-BWR and BWR Vessel Internals AMPs to manage this aging effect. The description of the BWR Vessel Internals AMP in Section B.1.7 of the LRA includes an exception, which states that inspections for inaccessible welds, beam (UT), and scheduled inspections of high ranked welds for the jet pump assemblies have been deferred, but the deferrals are technically justified. Please provide the following information:

b) Based on past operating experience, provide the technical basis for concluding that the BWR vessel internals and water chemistry AMPs are adequate for maintaining the structural integrity of the jet pump assemblies, including the inaccessible welds, during the period of extended operation.

LR Response

b) Refer to response to AMP audit question 257. FitzPatrick plans to continue inspecting jet pump assembly welds by BWRVIP-41, Revision 1 guidelines and by a future NRC approved "A" version, when available. The BWRVIP NDE Center has an action item to develop techniques and tooling for access to inaccessible welds. The JAFNPP BWR Reactor Vessel Internals Program requires implementation of the inspections specified by applicable and approved BWRVIP reports, including BWRVIP-41 for the jet pump assemblies. The BWRVIP is based on past operating experience throughout the BWR fleet.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
Section 3.1 -18c Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-2 includes a line item to address cracking of the jet pump assemblies. The LRA credits the Water Chemistry Control-BWR and BWR Vessel Internals AMPs to manage this aging effect. The description of the BWR Vessel Internals AMP in Section B.1.7 of the LRA includes an exception, which states that inspections for inaccessible welds, beam (UT), and scheduled inspections of high ranked welds for the jet pump assemblies have been deferred, but the deferrals are technically justified. Please provide the following information:

c) Discuss any augmented inspections that are being performed now, or will be performed during the period of extended operation to monitor the condition of the jet pump assemblies.

LR Response
c) Fitzpatrick will continue inspections in accordance with BWRVIP-41, Revision 1 guidelines and by a future NRC approved "A" version, when available. No inspections beyond BWRVIP-41 are planned. The JAFNPP BWR Reactor Vessel Internals Program requires implementation of the inspections specified by applicable and approved BWRVIP reports, including BWRVIP-41 for the jet pump assemblies.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -19a   Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-1 and Table 3.1.2-2 include line items to address cracking of core spray lines and feedwater lines, including spargers and thermal sleeves. The LRA credits the Water Chemistry Control-BWR, BWR Vessel Internals, BWR Feedwater Nozzle and One-Time Inspection AMPs to manage this aging effect. Please provide the following information:

a) Discuss the current condition of the core spray lines and feedwater lines, including spargers and thermal sleeves, in terms of any degradation or cracking detected and corrective actions taken.

LR Response

(a) FitzPatrick performs inspections of the Feedwater, Corespray per BWRVIP-48A, 18A and per response to NUREG 0619 as applicable. The current condition of Corespray and Feedwater piping and spargers are satisfactory with no degradation / cracking noted based on current inspection results.
Previously identified indication in Loop (B) Core Spray piping was weld repaired utilizing a Clamp repair in 1988 per modification F1-88-199.

JAFNPP AMP and AMR Database

Audit Question #

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LR Request

Section 3.1 -19b Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-1 and Table 3.1.2-2 include line items to address cracking of core spray lines and feedwater lines, including spargers and thermal sleeves. The LRA credits the Water Chemistry Control-BWR, BWR Vessel Internals, BWR Feedwater Nozzle and One-Time Inspection AMPs to manage this aging effect. Please provide the following information:

b) Based on past operating experience, provide the technical basis for concluding that the BWR vessel internals, BWR feedwater nozzle (for feedwater lines only) and water chemistry AMPs are adequate for maintaining the structural integrity of the core spray and feedwater lines, specifically the sparger assemblies and thermal sleeves, during the period of extended operation.

LR Response

(b)The BWR FW nozzles have been modified based on the recommendations of NUREG 0619. This includes cladding removal in the radius and bore regions, change out of the thermal sleeve to a triple sleeve double piston ring, and implementation of the alternative enhanced UT examinations based on GE-NE-523-A71-0594, "Alternative BWR Feedwater Nozzle Inspection Requirements" . This report has been approved by the NRC. These enhancements and inspections of the feedwater nozzles, thermal sleeves and spargers are part of the industry's and JAF's aging management to maintain the structural integrity of the feedwater nozzles and lines.

The BWR Vessel Internals Program manages the core spray lines (including the spargers and thermal sleeves) in accordance with the guidelines of NRC-approved BWRVIP-18A. As explained in Appendix B to the LRA, JAFNPP takes no exceptions to the recommendations of this approved BWRVIP.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -19c Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-1 and Table 3.1.2-2 include line items to address cracking of core spray lines and feedwater lines, including spargers and thermal sleeves. The LRA credits the Water Chemistry Control-BWR, BWR Vessel Internals, BWR Feedwater Nozzle and One-Time Inspection AMPs to manage this aging effect. Please provide the following information:

c) Discuss any augmented inspections that are being performed now, or will be performed during the period of extended operation to monitor the condition of these components.

LR Response

The Feedwater nozzles, spargers and thermal sleeves at JAF are inspected through implementation of the, "Alternative BWR Feedwater Nozzle Inspection Requirements", General Electric Report GE-NE-523-A71594 Rev.1. Reference BWROG – Safety Evaluation of Proposed Alternative to BWR Feedwater Nozzle Inspections (TAC M94090) dated June 5, 1998. This is scheduled once every 10 years as required by the GE topical report and ASME XI Code Category B-D. These inspections will be continued into the period of extended operation.

The core spray lines (including the spargers and thermal sleeves) will continue to be inspected in accordance with NRC-approved BWRVIP-18A through the period of extended operation. These inspections will adequately manage cracking of these lines for the period of extended operation.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.1 -20 Reactor Vessel, Internals and Reactor Coolant System
LRA Table 3.1.2-3 includes a line item to address cracking of FW thermal sleeves. The LRA credits the Water Chemistry Control-BWR program alone to manage this aging effect. Please provide the technical justification for concluding that the water chemistry control-BWR AMP alone is adequate to manage cracking of these components with no associated inspection.

LR Response

The feedwater thermal sleeves are entered both in Table 3.1.2-1 (the reactor vessel) and in Table 3.1.2-3 (the reactor coolant system pressure boundary). The thermal sleeves are handled more completely in Table 3.1.2-1 and will be deleted from Table 3.1.2-3. The feedwater thermal sleeve entry in table 3.1.2-1 credits the BWR Feedwater Nozzle Program in addition to Water Chemistry Control for managing cracking. See also the response to questions 357, 358 and 359.

This requires a change to the LRA.

JAFNPP AMP and AMR Database

Audit Question
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LR Request
Section 3.2 -1 Engineered Safety Features Systems

The further evaluation presented in Section 3.2.2.2.3, Item 2, of the LRA addresses loss of material from pitting and crevice corrosion for stainless steel piping and piping components exposed to a soil environment. The further evaluation states that an inspection of buried components will be performed within ten years of entering the period of extended operation. Please confirm that an inspection will also be performed during the ten-year period immediately prior to entering the period of extended operation.

LR Response
An inspection will be performed during the 10 year period immediately prior to the period of extended operation.

This point will be clarified by inserting the following after the third sentence of Section 3.1.B.4.b of JAF-RPT-05-LRD02.

"If an inspection did not occur, a focused inspection will be performed prior to the period of extended operation."

The FSAR supplement for AMP B.1.1 will also be clarified to reflect this inspection.

This requires an LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.2 -2 Engineered Safety Features Systems
The further evaluation presented in Section 3.2.2.2.8, Item 1 of the LRA addresses loss of material due to general, pitting and crevice corrosion for BWR steel piping and components in ESF systems exposed to treated water. The further evaluation states that the Periodic Surveillance and Preventive Maintenance Program supplements the Water Chemistry Control-BWR program for components at the waterline in the suppression chamber and for components subject to erosion. Please clarify whether the PSPM program is in addition to the one-time inspection program, or whether it replaces the one-time inspection program for the components addressed by this AMR.

LR Response

The PSPM program replaces the One-time Inspection Program for this line item. The PSPM program is described in Section 3.2.2.2.8 for management of components at the waterline in the suppression chamber that are not completely wetted. A periodic inspection is specified since the Water Chemistry Control-BWR Program alone is not adequate to manage the effects of aging on steel piping and components at the water line in the suppression chamber.

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LR Request

Section 3.2 -3 Engineered Safety Features Systems
The further evaluation presented in Section 3.2.2.2.9 of the LRA addresses loss of material due to general, pitting, crevice, and MIC for steel (with or without coating or wrapping) piping buried in soil in ESF systems. The further evaluation states that an inspection of buried components will be performed within ten years of entering the period of extended operation. Please confirm that an inspection will also be performed during the ten-year period immediately prior to entering the period of extended operation.

LR Response

An inspection will be performed during the 10 year period immediately prior to the period of extended operation.
This point will be clarified by inserting the following after the third sentence of Section 3.1.B.4.b of JAF-RPT-05-LRD02.

"If an inspection did not occur, a focused inspection will be performed prior to the period of extended operation."

The FSAR supplement for AMP B.1.1 will also be clarified to reflect this inspection.

This requires an amendment to the LRA.

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LR Request

Section 3.2 -4 Engineered Safety Features Systems
AMR line-item 3.2.1-19 addresses wall thinning due to flow-accelerated corrosion for steel piping, piping components, and piping elements exposed to steam or treated water. The AMR states that the Periodic Surveillance and Preventive Maintenance program provides augmented inspections for flow wall thinning. Please discuss the augmented inspections performed and why they are not included in the Flow-Accelerated Corrosion AMP.

LR Response

The core spray, HPCI and RCIC piping included in this line item are administratively controlled in the Flow Accelerated Corrosion program, but are inspected using NDE techniques such as UT in the Periodic Surveillance and Preventive Maintenance program. This is being done because the aging effect for these components is loss of material due to erosion and not loss of material due to flow accelerated corrosion. It would therefore not be appropriate to manage using the Flow Accelerated Corrosion program. Therefore these components are managed by the Periodic Surveillance and Preventive Maintenance program.

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LR Request

Section 3.2 -5 Engineered Safety Features Systems
AMR line-item 3.2.1-24 addresses loss of preload due to thermal effects, gasket creep, and self-loosening. The AMR states that this is not applicable since loss of preload is a design-driven effect and not an aging effect requiring management. A discussion of thermal effects is provided. Please provide the following information with regard to this AMR, a) discuss why gasket creep and self-loosening are not aging mechanisms that could lead to loss of preload for steel closure bolting in the ESF systems at JAFNPP, and b) discuss JAFNPP's operating experience with steel closure bolting in the ESF systems.

LR Response

a) Gasket creep and self-loosening are mechanisms that could lead to loss of preload for steel closure bolting, but are not considered aging mechanisms. Operating experience indicates that these mechanisms occur in relatively short order in applications with improper bolted joint design or installation. This is consistent with the EPRI Mechanical Tools (EPRI 1010639) that do not consider loss of preload an aging effect for bolted closures. Gasket creep will normally occur shortly after initial loading, which allows for addressing this effect by installation practices and subsequent maintenance of the joint and is therefore not related to aging. Self-loosening is also not an aging effect but is an event-driven effect that occurs due to improper joint design or installation that doesn't properly consider the potential for this effect. This would also be detected early in component service life and actions would be taken to prevent recurrence.

b) A review of JAFNPP site operating experience over five years was performed. Search results were screened to determine whether the identified condition was related to pressure boundary bolting that may have experienced cracking or loss of preload. The majority of the search results involved event-driven conditions that required no further review. The review found instances of loss of material due to corrosion, loose bolting due to improper maintenance practices, and cracking of Class 1 bolting, but no evidence of cracking or loss of preload for non-Class 1 pressure boundary bolting.

AMR line item 3.2.1-24 state "not applicable" in the discussion section that descirbes loss of preload due to thermal effects, gasket creep, and self-loosening. The term "not applicable" will be removed from the discussion section of these line items.

This requires an amendment to the LRA.

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LR Request

Section 3.2 -6 Engineered Safety Features Systems
AMR line-item 3.2.1-35 addresses loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion, and fouling for steel containment isolation piping and component internal surfaces exposed to raw water. The AMR credits the Periodic Surveillance and Preventive Maintenance Program instead of the Open-Cycle Cooling Water System AMP, which is recommended by NUREG-1801. Please discuss the evaluation performed to conclude that the activities in the Periodic Surveillance and Preventive Maintenance AMP are consistent with the activities in the Open-Cycle Cooling Water AMP recommended by NUREG-1801 for the components addressed by this AMR, including the activities performed to manage aging, the sample population inspected, and the inspection locations.

LR Response

AMR line-item 3.2.1-35 addresses components included in containment isolation penetrations for drains from the drywell floor and equipment sumps. The internal raw water environment for these components is drainage from containment, which is not the raw lakewater in the Open-Cycle Cooling Water System AMP XI.M20. Therefore, the actions from Generic Letter 89-13 that are described in NUREG-1801 XI.M20 are not appropriate for these items (See Table 3.0-1, page 3.0-9 of the LRA). For this environment the Periodic Surveillance and Preventive Maintenance Program manages the aging effects in these components. Visual or NDE techniques will be used to detect aging effects on internal surfaces at a specified interval of 5 years. These techniques will be applied on a representative sample basis to detect degradation prior to loss of intended function. This inspection will be done in the internal piping and valve bodies of containment penetration X-18 and X-19.

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LR Request
Section 3.2 -7 Engineered Safety Features Systems
AMR line-item 3.2.1-36 addresses loss of material due to general, pitting, crevice, galvanic, and microbiologically-influenced corrosion, and fouling for steel heat exchanger components exposed to raw water. For piping components of the standby gas treatment system, the AMR credits the Periodic Surveillance and Preventive Maintenance Program instead of the Open-Cycle Cooling Water System AMP, which is recommended by NUREG-1801. Please discuss the evaluation performed to conclude that the activities in the Periodic Surveillance and Preventive Maintenance AMP are consistent with the activities in the Open-Cycle Cooling Water AMP recommended by NUREG-1801 for the components in the standby gas treatment system addressed by this AMR, including the activities performed to manage aging, the sample population inspected, and the inspection locations.

LR Response
AMR line-item 3.2.1-36 addresses components included in the standby gas treatment system that are drains for water accumulation or condensation from the various components in the system (filter demisters, fans, steam packing exhausters, condenser air removers and stack analyzer sample chambers). The internal raw water environment for these components is condensation and drainage not lake water. The components are not in the Open-Cycle Cooling Water System. Therefore, the actions from Generic Letter 89-13 that are described in NUREG-1801 XI.M20 are not appropriate for these items (See Table 3.0-1, page 3.0-9 of the LRA). For this environment, the Periodic Surveillance and Preventive Maintenance Program manages the aging effects in these components. Visual or NDE techniques will be used to detect aging effects on internal surfaces at a specified interval of 5 years. This inspection will be done in the internal piping and valve bodies of these drains in the standby gas treatment system.

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LR Request

Section 3.2 -8 Engineered Safety Features Systems
AMR line-item 3.2.1-52 addresses glass piping elements exposed to air-indoor uncontrolled (external), lubricating oil, raw water, treated water, or treated borated water. The AMR states that there are no aging mechanisms or effects for these material/environment combinations, which is consistent with NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components containing these material/environment combinations.

LR Response

A review of five years of JAFNPP operating experience did not identify aging effects for components with these material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which is available for onsite review.

JAFNPP operating experience with these material and environment combinations is consistent with the industry experience of no aging effects reflected in NUREG-1801 and the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

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LR Request

Section 3.2 -9 Engineered Safety Features Systems
AMR line-item 3.2.1-53 addresses stainless steel and copper alloy piping, piping components, and piping elements exposed to air-indoor uncontrolled (external). The AMR states that there are no aging mechanisms or effects for these material/environment combinations, which is consistent with NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components containing these material/environment combinations.

LR Response

A review of five years of JAFNPP operating experience did not identify aging effects for components with these material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which is available for onsite review.

JAFNPP operating experience with these material and environment combinations is consistent with the industry experience of no aging effects reflected in NUREG-1801 and the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

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LR Request

Section 3.2 -10 Engineered Safety Features Systems
AMR line-item 3.2.1-56 addresses steel and stainless steel piping, piping components, and piping elements exposed to gas. The AMR states that there are no aging mechanisms or effects for these material/environment combinations, which is consistent with NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components containing these material/environment combinations.

LR Response

A review of five years of JAFNPP operating experience did not identify aging effects for components with these material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which is available for onsite review.

JAFNPP operating experience with these material and environment combinations is consistent with the industry experience of no aging effects reflected in NUREG-1801 and the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

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LR Request

Section 3.2 -11 Engineered Safety Features Systems
Table 3.2.2-1 in the LRA includes a line-item for Heat Exchanger (tubes) in the Residual Heat Removal Systems constructed of stainless steel and exposed to treated water >140F. The aging effect identified is loss of material-wear and the AMP credited is Service Water Integrity (AMP B.1.26). Please clarify why AMP B.1.26, which addresses components exposed to service water, is credited for this AMR instead of a water chemistry AMP.

LR Response

Wear is a mechanism caused by relative motion between adjacent components. Water chemistry cannot prevent the conditions that cause wear. These heat exchangers are included in the Service Water Integrity Program since they are cooled by the service water system. Although loss of material due to wear occurs on the external surface of the tubing (which is exposed to treated water) this aging effect will be managed by eddy current testing of the tubes in the Service Water Integrity Program.

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LR Request

Section 3.2 -12 Engineered Safety Features Systems
The further evaluation presented in Section 3.2.2.2.7 of the LRA addresses loss of material due to general corrosion and fouling for steel drywell and suppression chamber spray system nozzle and flow orifice internal surfaces exposed to air-indoor uncontrolled (internal). The further evaluation states that at JAFNPP the spray nozzles are copper alloy and are not subject to loss of material due to general corrosion in an indoor air environment. Industry operating experience has shown that corrosion products from piping upstream of these nozzles can detach and cause blockage of the nozzles. Please provide the following information related to this further evaluation: a) discuss the testing performed to ensure the drywell and suppression chamber spray nozzles are unobstructed, including the nature and frequency of this testing; b) discuss the results of previous tests performed, including whether any blockage of nozzles was observed, the cause of the blockage, and the corrective actions taken; and c) discuss how nozzle blockage due to corrosion products from upstream piping will be managed at JAFNPP.

LR Response

Surveillance testing to ensure the drywell and suppression chamber spray nozzles are unobstructed is completed at JAFNPP by aligning service air to each of the spray headers in the drywell and suppression chamber spray system and verifying air flow from each spray nozzle. This surveillance test is performed once every 10 years in accordance with the JAFNPP Inservice Inspection Program. The testing detected some cases of nozzle blockage. The amount of blockage was below the acceptance criteria for the surveillance. The blockage was removed after testing. Continued surveillance testing will ensure that the active function of flow control is assured.

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LR Request
Section 3.2 -13 Engineered Safety Features Systems
AMR line-item 3.2.1-50 addresses aluminum piping, piping components, and piping elements exposed to air-indoor uncontrolled (external). The AMR states that there are no aging mechanisms or effects for these material/environment combinations, which is consistent with NUREG-1801. The LRA also states that the only components to which this NUREG-1801 line-item applies are in the auxiliary systems. Please discuss the JAFNPP plant-specific operating experience with components in the auxiliary systems containing these material/environment combinations.

LR Response
JAFNPP operating experience with components in the auxiliary systems containing this material and environment combination is consistent with the industry experience of no aging effects reflected in NUREG-1801 and the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].
The review of JAFNPP operating experience did not identify aging effects for auxiliary systems components with this material and environment combination. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Report, which was available onsite for review.

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LR Request
Section 3.3 -1 Auxiliary Systems
The further evaluation presented in Section 3.3.2.2.3, Item 3, of the LRA addresses cracking due to SCC in stainless steel diesel engine exhaust piping exposed to diesel exhaust. The further evaluation states that at JAFNPP, the stainless steel exhaust components are oriented vertically, which precludes pooling of water. Therefore, cracking due to SCC is not an aging effect requiring management for the stainless steel diesel engine exhaust piping. Please discuss the JAFNPP plant-specific operating experience with stainless steel diesel engine exhaust piping, and the results of the most recent inspection performed on these components. As part of the response, please address the reason for not performing a one-time inspection of these components to confirm that cracking is not occurring.

LR Response
Inspection of the exhaust system components is included in the Periodic Surveillance and Preventive Maintenance program as discussed in JAF-RPT-05-LRD-02 Attachment 3. Conservatively, these components will be inspected for loss of material once every five years during the period of extended operation. Because there is no potential for the accumulation of water, there is no moisture available for the concentration of contaminants such as chlorides which would provide an environment conducive for the initiation of cracking. This evaluation is in accordance with the EPRI Mechanical Tools for the determination of aging effects.
Further evaluation section 3.3.2.2.3 will be revised to state that the PSPM program will verify the absence of cracking in the stainless steel exhaust components.

This requires an amendment to the LRA.

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LR Request
Section 3.3 -2 Auxiliary Systems
The further evaluation presented in Section 3.3.2.2.6 of the LRA addresses reduction of neutron-absorbing capacity for Boral spent fuel storage racks. The further evaluation states that plant operating experience with Boral coupons inspected in 2005 is consistent with the staff's conclusion that the reduction of neutron-absorbing capacity is insignificant, and an aging management program is not required for this effect. Please provide additional details on the JAFNPP plant-specific operating experience with Boral coupons, and the results of the coupon tests performed in 2005 that support the conclusion that an aging management program is not required.

LR Response
In 2005, nine Boral coupons from JAFNPP spent fuel racks were subjected to nondestructive testing. The condition of the coupons was as expected, with the exception of some localized pitting and some blistering of the aluminum skin of those coupons exposed to pool water.
These conditions were attributed to the following:
* the pitting was attributed to residual carbon steel chips left on the surface of the Boral during assembly of the capsules.
* the blisters were attributed to hydrogen formed by reaction between the pool water and internal surfaces of the aluminum.

These conditions of appearance did not affect the intended function of the boral material. The areal densities determined by neutron attenuation measurements and verified by wet chemical analysis were, in every case, in excess of the minimum as-fabricated values which confirms that reduction in neutron absorption capacity is not an aging effect requiring management. Loss of material and cracking are managed by the Water Chemistry Control program. This testing is documented in CR-JAF-2005-00631, which was available for review on site.

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LR Request

Section 3.3 -3 Auxiliary Systems

The further evaluation presented in Section 3.3.2.2.8 of the LRA addresses loss of material due to general, pitting, crevice and MIC for carbon steel (with or without coating or wrapping) piping and components buried in soil in the auxiliary systems at JAFNPP. The further evaluation states that an inspection of buried components will be performed within ten years of entering the period of extended operation. Please confirm that an inspection will also be performed during the ten-year period immediately prior to entering the period of extended operation.

LR Response

See response to AMP Audit question 52.

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LR Request
Section 3.3 -4 Auxiliary Systems
AMR line-item 3.3.1-45 addresses loss of preload due to thermal effects, gasket creep, and self-loosening. The AMR states that this is not applicable since loss of preload is a design-driven effect and not an aging effect requiring management. A discussion of thermal effects is provided. Please provide the following information with regard to this AMR, a) please provide a discussion of why gasket creep and self-loosening are not aging mechanisms that could lead to loss of preload for steel closure bolting in the auxiliary systems at JAFNPP, and b) please provide a discussion of JAFNPP's operating experience with steel closure bolting in the auxiliary systems.

LR Response
a) This is consistent with the EPRI Mechanical Tools (EPRI 1010639) that do not consider loss of preload to be an aging effect for bolted closures. Gasket creep will normally occur in 10 to 20 minutes after initial loading, which allows this effect to be addressed by installation practices and subsequent maintenance of the joint and is therefore not related to aging but is event driven. Self-loosening is also not an aging effect but is an event driven effect that occurs due to improper joint design or installation that doesn't properly consider the potential for this effect. This would also be detected early in component service life and actions would be taken to prevent recurrence.

b) A review of JAFNPP site operating experience over five years was performed. Search results were screened to determine whether the identified condition was related to pressure boundary bolting that may have experienced cracking or loss of preload. The majority of the search results involved event-driven conditions that required no further review. The review found instances of loss of material due to corrosion, loose bolting due to improper maintenance practices, and cracking of Class 1 bolting, but no evidence of cracking or loss of preload for non-Class 1 pressure boundary bolting.

AMR line item 3.3.1-45 states "not applicable" in the discussion section that descirbes loss of preload due to thermal effects, gasket creep, and self-loosening. The term "not applicable" will be removed from the discussion section of these line items, since these components are inspected under the Bolting Integrity Program.

This requires an amendment to the LRA.

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LR Request

Section 3.3 -5 Auxiliary Systems
AMR line-item 3.3.1-62 addresses loss of material due to pitting and crevice corrosion for aluminum piping, piping components, and piping elements exposed to raw water. The LRA credits the one-time inspection program to manage this aging effect; however, NUREG-1801 recommends the Fire Protection program. Please discuss the justification for using the one-time inspection program instead of the Fire Protection program to manage this aging effect.

LR Response

As identified in line item 3.3.1-62, the only components to which this NUREG-1801 line item applies are included in scope under criterion 10 CFR 54.4(a)(2) and are listed in the series 3.3.2-14-xx tables. AS indicated in the tables, the aluminum component addressed by line item 3.3.1-62 is in the radwaste system. As such, the fire protection program is not appropriate to manage the effects of aging. Aluminum is a corrosion resistant material that is not expected to experience significant loss of material in this environment. As described in LRA Appendix B, the One Time Inspection Program will confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted. Therefore the one-time inspection program is appropriate for managing this aging effect.

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LR Request

Section 3.3 -6 Auxiliary Systems
AMR line-item 3.3.1-71 addresses loss of material due to general, pitting, and crevice corrosion for steel piping, piping components, and piping elements exposed to moist air or condensation (internal). The LRA states that the Periodic Surveillance and Preventive Maintenance and One-Time Inspection programs are used to manage this aging effect. NUREG-1801 recommends the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program. While this Table 1 line-item indicates that both AMPs are used together to manage this aging effect, a review of the Table 2 AMR line-items shows that only the OTI program or the PSPM program is credited; not both. Please clarify this apparent discrepancy between Table 1 line item 3.3.1-71 and the corresponding Table 2 line items in terms of which AMPs are credited. Also, if the OTI or PSPM program will be used alone to manage this aging effect, please discuss the evaluation that was performed to determine that the activities in each of these programs are consistent with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program recommended in NUREG-1801.

LR Response

As described in LRA Section 3.0, the "Discussion" column in Table 1 provides a discussion of how the line item compares to the corresponding line item in NUREG-1801, Volume 1. In the case of line item 3.3.1-71, either of two programs which are different than the one listed in the corresponding GALL line item may be used to manage the specified aging effects wherever this material-environment combination appears in the Table 2 entries. The use of "and" is not meant to imply that both programs are required to manage the aging effects. Selection of either the One-Time Inspection or Periodic Surveillance and Preventive Maintenance (PSPM) program is based on the environment, and the type and configuration of components described in the Table 2 entries. The One-Time Inspection program is used in situations where the goal is to confirm that loss of material is not occurring or is so insignificant that an aging management program is not warranted. The PSPM program is used in situations where the aging effect is likely and therefore requires aging management. The line items that compare to GALL line item 3.3.1-71 in Table 3.3.2-14-41 and credit the One-Time Inspection program are in error. These line items should have credited the Periodic Surveillance and Preventive Maintenance program. This change requires an amendment to the LRA.
NUREG-1801 states that XI.M38 "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components" is used for components that are not covered by other aging management programs. This GALL program uses visual inspections to manage aging effects. The Periodic Surveillance and Preventive Maintenance (PSPM) Program described in Appendix B also uses visual inspections to manage loss of material and is consistent with the attributes described for the program in NUREG-1801 XI.M38.

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LR Request
Section 3.3 -7 Auxiliary Systems
AMR line items 3.3.1-73 and 3.3.1-74 address loss of material due to general corrosion and wear, respectively, for steel crane components exposed to air-indoor uncontrolled (external). The LRA states that these components are evaluated as structural components in Section 3.5, and that the Periodic Surveillance and Preventive Maintenance and Structures Monitoring programs are credited to manage these aging effects. However, NUREG-1801 recommends the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program. Please discuss the evaluation that was performed to determine that the activities in the Periodic Surveillance and Preventive Maintenance and Structures Monitoring programs are consistent with the Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems program.

LR Response
No evaluation was performed to determine whether the PSPM and SMP are consistent with the Inspection of Overhead Heavy Load and Light Load (related to refueling) Handling Systems Program. The AMR identified appropriate AMPs to manage aging effects. In this case, reactor building steel crane structural girders used in load handling are inspected under the Periodic Surveillance and Preventive Maintenance Program (PSPM) identified in Section B.1.22 of the application. Turbine building complex and yard structures crane rails and girders are inspected under the Structures Monitoring Program as identified in Section B.1.27. The Structures Monitoring Program will be enhanced, as identified in Section B.1.27, to address crane rails and girders. These programs when enhanced will include visual inspections of the crane rails and girders which is consistent with XI.M23 for managing loss of material.

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LR Request
Section 3.3 -8 Auxiliary Systems
AMR line item 3.3.1-76 addresses loss of material for steel piping, piping components, and piping elements exposed to raw water. The LRA states that for some of these components, the Periodic Surveillance and Preventive Maintenance program is credited to manage this aging effect. However, NUREG-1801 recommends the Open Cycle Cooling Water System program. Please discuss the evaluation that was performed to determine that the activities in the PSPM are consistent with the Open Cycle Cooling Water System program.

LR Response
Line Item 3.3.1-76 specifies the Periodic Surveillance and Preventive Maintenance (PSPM) Program instead of XI.M20, Open-Cycle Cooling Water System Program, in line items where the environment of raw water is used to identify untreated water that is not part of the service water system. The affected components are not part of the open cycle cooling water system, therefore, the actions from the Open Cycle Cooling Water System Program described in NUREG-1801 XI.M20 are not appropriate for these items.

The five year PSPM frequency is acceptable because (1) Aging effects for carbon steel, even in raw water, are not fast acting; (2) PSPM inspection activities are preformed on (a)(2) systems that have been in service for the life of the plant without required inspections per the JAFNPP corrective action program; and (3)The consequences of failure due to loss of material are low.
SRP Appendix A, Section A.1.2.2 states that risk significance may be considered in developing the details of an aging management program (see excerpt below).
"The risk significance of a structure or component could be considered in evaluating the robustness of an aging management program. Probabilistic arguments may be used to assist in developing an approach for aging management adequacy. However, use of probabilistic arguments alone is not an acceptable basis for concluding that, for those structures and components subject to an AMR, the effects of aging will be adequately managed in the period of extended operation. Thus, risk significance may be considered in developing the details of an aging management program for the structure or component for license renewal, but may not be used to conclude that no aging management program is necessary for license renewal."

Therefore, periodic inspections of non-safety related systems conducted on a five year frequency or less is acceptable.

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LR Request

Section 3.3 -9 Auxiliary Systems
AMR line item 3.3.1-77 addresses loss of material for steel heat exchanger components exposed to raw water. The LRA states that Service Water Integrity and Periodic Surveillance and Preventive Maintenance Programs manage this aging effect. NUREG-1801 recommends the *Open Cycle Cooling Water System program*. *While this Table 1 line item indicates that both* AMPs are used together to manage this aging effect, a review of the Table 2 AMR line-items shows that only the Service Water Integrity program is credited to manage loss of material for heat exchanger bonnets, and only the PSPM program is credited to manage heat exchanger shells. Please clarify this apparent discrepancy between Table 1 line item 3.3.1-77 and the corresponding Table 2 line items in terms of which AMPs are credited. Also, if the PSPM program will be used alone to manage this aging effect, please explain why the PSPM Program is credited.

LR Response

The Table 1 line item says that both programs are used, not that both are used together in every instance. The use of the word "and" was intended to identify that these two programs are credited individually in specific line items to manage aging effects. The PSPM program is specified in line items where the environment of raw water is used to identify untreated water (drain water, HVAC drain water) that is not part of the service water system. The Service Water Integrity Program is specified for those line items where the attributes of NUREG-1801 XI.M20, Open-Cycle Cooling Water System Program, apply.

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LR Request
Section 3.3 -10 Auxiliary Systems
AMR line-items 3.3.1-79 and 3.3.1-81 address loss of material for stainless steel and copper alloy, respectively, piping, piping components, and piping elements exposed to raw water. The LRA states that for some components, the Periodic Surveillance and Preventive Maintenance and One-Time Inspection programs are used to manage this aging effect. NUREG-1801 recommends the *Open-Cycle Cooling Water System program. While these Table 1 line items indicate that both AMPs are used together to manage this aging effect, a review of the Table 2* AMR line items shows that only the OTI program or the PSPM program is credited; not both. Please clarify this apparent discrepancy between Table 1 line items 3.3.1-79 and 3.3.1-81 and their corresponding Table 2 line items in terms of which AMPs are credited. Also, if the OTI or PSPM program will be used alone to manage this aging effect, please explain why the PSPM or OTI programs are credited.

LR Response
The Periodic Surveillance and Preventive Maintenance (PSPM) Program and the One-Time Inspection (OTI) Program are not intended to be combined for the management of aging effects. The use of the word "and" was intended to identify that these two programs are credited individually in specific line items to manage aging effects.

The PSPM or OTI programs are specified in line items where the environment of raw water is used to identify untreated water further defined as drain water, radwaste water, ventilation system drain water, potable water, and chemical treatment water. Since Service Water Integrity is not applicable for these raw water environments, PSPM or OTI appropriately manage aging effects for these environments.

The PSPM program is specified where the component is primarily wetted and the material-environment combination is more susceptible to aging effects. The OTI program is specified for stainless steel or copper alloy components that are not susceptible to significant aging effects.

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LR Request

Section 3.3 -11 Auxiliary Systems
AMR line item 3.3.1-83 addresses reduction of heat transfer due to fouling for copper alloy heat exchanger tubes exposed to raw water. The LRA states that the Service Water Integrity, Periodic Surveillance and Preventive Maintenance and Fire Protection programs are used to manage this aging effect. NUREG-1801 recommends the Open-Cycle Cooling Water System program. While these Table 1 line items indicate that all three AMPs are used together to manage this aging effect, a review of the Table 2 AMR line items shows that only one of the programs is credited for each line item. Please clarify this apparent discrepancy between Table 1 line item 3.3.1-83 and the corresponding Table 2 line items in terms of which AMPs are credited. Also, if the PSPM or Fire Protection Programs will be used alone to manage this aging effect, please discuss the evaluation that was performed to determine that the activities in each of these programs are consistent with *the Open-Cycle Cooling* Water System *program*.

LR Response

The Service Water Integrity, Periodic Surveillance and Preventive Maintenance (PSPM), and Fire Protection Programs are not intended to be combined for the management of aging effects. The use of the word "and" was intended to identify that these programs are credited individually in specific line items to manage aging effects. The PSPM program attributes are described in LRA Section B.1.22 and the Fire Protection Program attributes are described in LRA Section B.1.13.1.

The PSPM program is specified for management of fouling in copper alloy heat exchanger tubes (control room chiller condenser) exposed to raw water (service water) in LRA Table 3.3.2-7, Heating Ventilation and Air Conditioning Systems. The aging effect loss of material is managed by the Service Water Integrity Program for this component, however, fouling is not managed under this program. Therefore, PSPM is specified for management of fouling since determination of heat transfer capability is not performed by the Service Water Integrity Program for this component.

The Fire Protection Program is specified for management of fouling in copper alloy heat exchanger tubes exposed to raw water (system fire water used for engine cooling) per LRA Table 3.3.2-5, Fire Protection – Water Systems. Diesel fire pump cooling uses fire water from Lake Ontario as a cooling source. Testing of the cooling capacity of the heat exchanger is observed during pump testing under the Fire Protection Program and manages the aging effect of fouling of copper alloy heat exchangers cooled by fire water (listed as raw water). The Service Water Integrity program is not applicable to fire water used as a heat sink.

JAFNPP AMP and AMR Database

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LR Request

Section 3.3 -12 Auxiliary Systems
AMR line item 3.3.1-93 addresses glass piping elements exposed to air, air-indoor uncontrolled (external), fuel oil, lubricating oil, raw water, treated water, or treated borated water. The AMR states that there are no aging mechanisms or effects for these material/environment combinations, which is consistent with NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components in the auxiliary systems containing these material/environment combinations.

LR Response

A review of five years of JAFNPP operating experience did not identify aging effects for components in the auxiliary systems with these material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which was available for onsite review.

JAFNPP operating experience with these material and environment combinations is consistent with the industry experience of no aging effects reflected in NUREG-1801 and the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

JAFNPP AMP and AMR Database

Audit Question
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LR Request
Section 3.3 -13 Auxiliary Systems
AMR line item 3.3.1-94 addresses stainless steel and nickel alloy piping, piping components, and piping elements exposed to air-indoor uncontrolled (external). The AMR states that there are no aging mechanisms or effects for these material/environment combinations, which is consistent with NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components in the auxiliary systems containing these material/environment combinations.

LR Response
A review of five years of JAFNPP operating experience did not identify aging effects for components in the auxiliary systems with these material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which was available for onsite review.

JAFNPP operating experience with these material and environment combinations is consistent with the industry experience of no aging effects reflected in NUREG-1801 and the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -14 Auxiliary Systems
AMR line item 3.3.1-96 addresses steel and stainless steel piping, piping components, and piping elements in concrete. The AMR states that there are no aging mechanisms or effects for these material/environment combinations, which is consistent with NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components in the auxiliary systems containing these *material/environment combinations*.

LR Response

A review of five years of JAFNPP operating experience did not identify aging effects for components in the auxiliary systems with these material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which was available for onsite review.

JAFNPP operating experience with these material and environment combinations is consistent with the industry experience of no aging effects reflected in NUREG-1801 and the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

JAFNPP AMP and AMR Database

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LR Request

Section 3.3 -15 Auxiliary Systems
AMR line item 3.3.1-97 addresses steel, stainless steel, aluminum, and copper alloy piping, piping components, and piping elements exposed to gas. The AMR states that there are no aging mechanisms or effects for these material/environment combinations, which is consistent with NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components in the auxiliary systems containing these material/environment combinations.

LR Response

A review of five years of JAFNPP operating experience did not identify aging effects for components in the auxiliary systems with these material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which was available for onsite review.

JAFNPP operating experience with these material and environment combinations is consistent with the industry experience of no aging effects reflected in NUREG-1801 and the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -16 Auxiliary Systems
AMR line item 3.3.1-98 addresses steel, stainless steel, and copper alloy piping, piping components, and piping elements exposed to dried air. The AMR states that there are no aging mechanisms or effects for these material/environment combinations, which is consistent with NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components in the auxiliary systems containing these material/environment combinations.

LR Response

A review of five years of JAFNPP operating experience did not identify aging effects for components in the auxiliary systems with these material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which was available for onsite review.

JAFNPP operating experience with these material and environment combinations is consistent with the industry experience of no aging effects reflected in NUREG-1801 and the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -17 Auxiliary Systems
The further evaluation presented in Section 3.3.2.2.5, Item 1, of the LRA addresses cracking and change in material properties due to elastomer degradation in elastomer flexible connections of auxiliary systems and other systems exposed to air-indoor. The further evaluation states that these aging effects are managed by the Periodic Surveillance and Preventive Maintenance Program. Please provide the technical justification for concluding that the PSPM program will provide reasonable assurance that the effects of aging will not compromise any intended function during the period of extended operation for these components. The response should address a) how an appropriate sample size will be assured, b) how the selection of inspection locations that include the most susceptible components will be assured, c) the criteria that will be used to determine if corrective actions are required based on inspection results, and d) the administrative controls that will be implemented to assure that follow-up inspections, or an expansion of the inspection population is performed should aging be detected.

LR Response

The PSPM program as described in LRA Section B.1.22 is a program that requires periodic inspection of a sample of elastomers in each system crediting this program. Because the program requires periodic inspections, the detection of aging effects will be ensured. The inspection frequencies and acceptance criteria for these components are described in Attachment 3 to JAF-RPT-05-LRD02. Because these components are elastomer materials exposed to the same environment of indoor air there are no locations that provide an environment that would be significantly more susceptible to aging effects. These inspections are new such that the details on the sample size are not available. However, the sample size will be selected from all elastomer components that credit this program, it will consider operating experience in the selection of the sample size and it will be a statistically appropriate sample size. The site corrective action program will control the assignment of corrective actions including follow-up inspections and expansion of inspection sites should aging effects be detected.

Refer to response for question 475 regarding sample plan.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -18 Auxiliary Systems

Table 3.3.2.3 includes an AMR line item for elastomer duct flexible connections exposed to air-indoor (internal) in the emergency diesel generator system. The AMR states that there are no aging mechanisms or effects for these material/environment combinations. NUREG-1801 Volume 2 item VII.F1-7 is cited, which recommends a plant-specific aging management program. A plant specific note (309) in the LRA states that changes of material properties and cracking in elastomers are results of exposure to ultra-violet light or elevated temperatures (>95oF). The note further states that the interior surfaces of these components are not exposed to ultra-violet light and are part of the air intake that is not exposed to elevated temperatures. However, the staff notes that there are other elastomer duct flexible connections exposed to similar environments in other systems that have been identified as being susceptible to aging and requiring aging management, for example in the HVAC systems (Table 3.3.2-7). Please clarify why the elastomer duct flexible connections addressed in this AMR are not susceptible to aging while other elastomer duct flexible connections in other systems are identified as requiring aging management.

LR Response

This particular line item is in reference to a specific component (the diesel intake air flexible connection) and is only applicable to the interior surface of the component. The reason why there are no aging effects for the interior surface is explained by note 309. In accordance with the EPRI Structural Tools for the evaluation of aging effects for elastomer materials, if an elastomer is not exposed to temperatures above 95°F or ultraviolet light the material will not experience aging effects. The exterior surface of this same component (duct flexible connection exposed to indoor air (ext)) is identified in Table 3.3.2.3 and includes the aging effects of cracking and change in material properties since it is exposed to ultraviolet light. It will be managed by the PSPM program visual inspections. This line item is only meant to identify that there will be no aging on the inside of the expansion joint. However, the outside is susceptible to aging and will be inspected.

JAFNPP AMP and AMR Database

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LR Request
Section 3.3 -19 Auxiliary Systems
The further evaluation presented in Section 3.3.2.2.7, Item 3, of the LRA addresses loss of material due to general (steel only) pitting and crevice corrosion for carbon steel and stainless steel diesel exhaust piping and components exposed to diesel exhaust in the emergency diesel generator and security generator systems. The further evaluation states that these aging effects are managed by the Periodic Surveillance and Preventive Maintenance Program. Please provide the technical justification for concluding that the PSPM program will provide reasonable assurance that the effects of aging will not compromise any intended function during the period of extended operation for these components. The response should address a) how an appropriate sample size will be assured, b) how the selection of inspection locations that include the most susceptible components will be assured, c) the criteria that will be used to determine if corrective actions are required based on inspection results, and d) the administrative controls that will be implemented to assure that follow-up inspections, or an expansion of the inspection population is performed should aging be detected.

LR Response
The Periodic Surveillance and Preventive Maintenance (PSPM) Program is described in LRA Appendix B, Section B.1.22. The PSPM Program will be effective for managing aging effects since it consists of proven monitoring techniques, acceptance criteria, corrective actions, and administrative controls. Prior to the period of extended operation, program activity guidance documents will be enhanced as necessary to assure that the effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation. The inspection frequencies and acceptance criteria for these components are described in Attachment 3 to JAF-RPT-05-LRD02. The inspections required by the PSPM program include separate periodic inspections for both the EDG and Security Generator exhaust subsystems. These inspections will be adjusted as required based on the inspection results. This will ensure the intended function of the components is maintained for the period of extended operation. The sample size will be selected from all components that credit this program. It will consider operating experience in the selection of the sample size and be a statistically appropriate sample size. The site corrective action program will control the assignment of corrective actions including follow-up inspections.

Refer to response for question 475 regarding sample plan.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -20 Auxiliary Systems

The further evaluation presented in Section 3.3.2.2.10, Item 6, of the LRA addresses loss of material due to pitting and crevice corrosion for copper alloy piping and components exposed to internal condensation. The further evaluation states that these aging effects are managed by the Periodic Surveillance and Preventive Maintenance and the One-Time Inspection programs. *However, the Table 2 AMR line items associated with this further evaluation only credit the PSPM program. Please clarify this apparent discrepancy between the further evaluation and the Table 2* AMRs. Also, please provide the technical justification for concluding that the PSPM program alone will provide reasonable assurance that the effects of aging will not compromise any intended function during the period of extended operation for these components. The response should address a) how an appropriate sample size will be assured, b) how the selection of inspection locations that include the most susceptible components will be assured, c) the criteria that will be used to determine if corrective actions are required based on inspection results, and d) the administrative controls that will be implemented to assure that follow-up inspections, or an expansion of the inspection population is performed should aging be detected.

LR Response

The Periodic Surveillance and Preventive Maintenance (PSPM) Program and the One-Time Inspection Program are not intended to be combined for the management of aging effects. The use of the word "and" was intended to identify that these two programs are credited individually in specific line items to manage aging effects. The PSPM program is specified for materials requiring periodic inspections to manage aging effects. The One-Time Inspection Program is specified for materials where insignificant aging effects are expected. The One-Time Inspection Program will verify the absence of significant aging effects.

The One-Time Inspection Program, as described in LRA Appendix B, Section B.1.21, will be consistent with the program described in NUREG-1801, Section XI.M32, One-Time Inspection.

The PSPM Program is described in LRA Appendix B, Section B.1.22 and will be effective for managing aging effects since it consists of proven monitoring techniques, acceptance criteria, corrective actions, and administrative controls. Prior to the period of extended operation, program activity guidance documents will be enhanced as necessary to assure that the effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation. The inspection frequencies and acceptance criteria for these components are described in Attachment 3 to JAF-RPT-05-LRD02. These inspections are new such that the details on the sample size are not available. However, the sample size will be selected from all components that credit this program, it will consider operating experience in the selection of the sample size and be a statistically appropriate sample size. Components that are in susceptible locations such as low points will be included in the sample. The site corrective action program will control the assignment of *corrective actions including follow-up inspections and expansion of inspection sites should aging be detected.*

Refer to response for question 475 regarding sample plan.

JAFNPP AMP and AMR Database

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LR Request

Section 3.3 -21 Auxiliary Systems
The further evaluation presented in Section 3.3.2.2.10, Item 3, of the LRA addresses loss of material due to pitting and crevice corrosion for copper alloy components exposed to condensation (external) in the HVAC and other systems. The further evaluation states that these aging effects are managed by the External Surfaces Monitoring, Periodic Surveillance and Preventive Maintenance, and Service Water Integrity programs. The Table 2 AMR line items credit only one of the three programs. Please clarify this apparent discrepancy between the Table 1 line item and the Table 2 line items in regard to which AMPs are credited. Also, for AMRs that credit the PSPM program alone to manage this aging effect, please provide the technical justification for concluding that the PSPM program will provide reasonable assurance that the effects of aging will not compromise any intended function during the period of extended operation for these components. The response should address a) how an appropriate sample size will be assured, b) how the selection of inspection locations that include the most susceptible components will be assured, c) the criteria that will be used to determine if corrective actions are required based on inspection results, and d) the administrative controls that will be implemented to assure that follow-up inspections, or an expansion of the inspection population is performed should aging be detected.

LR Response

The External Surfaces Monitoring, Periodic Surveillance and Preventive Maintenance (PSPM) Program, and the Service Water Integrity Program are not intended to be combined for the management of aging effects. The use of the word "and" was intended to identify that these programs are credited individually in specific line items to manage aging effects. Also, in contexts where copper alloy zinc content is not required to be defined, as in the further evaluation discussion of Section 3.3.2.2, the phrase "copper alloy" may be used broadly to identify all three commonly defined variations [i.e., copper alloy, copper alloy >15% zinc, and copper alloy >15% zinc (inhibited)]. In Table 3.3.2-7, Heating Ventilation and Air Conditioning Systems, for the " condensation (external)" environment, External Surfaces Monitoring is specified for "copper alloy" tubing, while the Service Water Integrity or PSPM program is specified for management of aging effects for "copper alloy >15% zinc" heat exchanger tubes.

As described in LRA Appendix B, Section B.1.22, program activity guidance documents will be enhanced as necessary to assure that the effects of aging will be managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation. The PSPM Program will be effective for managing aging effects since it consists of proven monitoring techniques, acceptance criteria, corrective actions, and administrative controls. The inspection frequencies and acceptance criteria for these components that credit PSPM are described in Attachment 3 to JAF-RPT-05-LRD02. These inspections are new such that the details on the sample size are not available. However, the sample size will be selected from all components that credit the PSPM program, it will consider operating experience in the selection of the sample size and be a statistically appropriate sample size. Components that are in susceptible locations such as low points will be included in the sample. The site corrective action program will control the assignment of corrective actions including follow-up inspections and expansion of inspection sites should aging be detected.

JAFNPP AMP and AMR Database

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LR Request
Section 3.3 -22 Auxiliary Systems
AMR line items 3.3.1-5, 3.3.1-37 and 3.3.1-38 address cracking for stainless steel piping, piping components, and piping elements exposed to treated water. The LRA credits the Water Chemistry Control-BWR program. The LRA also states that the one-time inspection program will be used to verify the effectiveness of the water chemistry program. However, the Table 2 AMR line items associated with these Table 1 entries do not credit the one-time inspection program. Please clarify this discrepancy between the Table 1 and Table 2 AMR line items.

LR Response
There is no discrepancy between the Table 1 and Table 2 AMR line items. The Table 1 discussion in the LRA provides explanations applicable generically to all items that reference the specific line item. As stated in the discussion sections of AMR line items 3.3.1-5, 3.3.1-37 and 3.3.1-38, the One-Time Inspection program will be used to verify the effectiveness of the Water Chemistry Control-BWR program. Therefore, by this reference, all Table 2 line items that reference these Table 1 line items also credit the One-Time Inspection Program. In addition, as stated in section B.1.21 of the LRA the One-Time Inspection Program includes an activity to verify the effectiveness of the water chemistry control aging management programs. Therefore, in addition to the explicit statements in the Table 1 items, it is implied that everywhere the Water Chemistry Control-BWR program is called out as an aging management program in the Table 2 line items it also includes a One-Time Inspection to verify the effectiveness of the program.
Plant specific notes in Table 2 line items are included where GALL identified Water Chemistry Control - BWR augmented by One-time Inspection as the applicable aging management program. Therefore, the plant specific note is used to clarify specific applicability to the GALL line items. Where water chemistry control is the only aging management program specified in GALL line items, no plant specific note applies.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -23 Auxiliary Systems
Table 3.3.2-7 includes an AMR line item to address fouling of aluminum heat exchanger fins exposed to condensation (external) in the HVAC systems. Generic note G is cited, indicating that this environment is not addressed in NUREG-1801. The LRA credits the Service Water Program to manage this aging effect. Please describe the specific activities in the Service Water Program that will be used to manage fouling of the external surface of heat exchanger fins. Also, please discuss why the Service Water Program was selected as the most appropriate AMP for this MEA combination.

LR Response

The Service Water Integrity Program includes activities to visually inspect components (fins) or verify the heat transfer capability of safety-related heat exchangers cooled by service water. The heat exchangers referred to in this line item are room coolers that are cooled by service water so they are included in the Service Water Integrity Program. These heat exchangers are either visually inspected for fouling or are performance tested to detect fouling.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -24 Auxiliary Systems
Table 3.3.2-3 includes an AMR line item to address loss of material of aluminum valve bodies exposed to lube oil (internal) in the EDG systems. Generic note G is cited, indicating that this environment is not addressed in NUREG-1801. The LRA credits the Oil Analysis Program to manage this aging effect. Please clarify why a one-time inspection is not credited also to verify the effectiveness of the lube oil program.

LR Response

As discussed in the response to Audit question 279, Activities to confirm the effectiveness of the Oil Analysis Program will be added to the One-Time Inspection Program.
This requires an amendment to the LRA.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -25 Auxiliary Systems
Table 3.3.2-3 includes AMR line items to address aluminum lubricator housings and motor housings exposed to air-untreated (internal) in the EDG systems. The LRA states that there are no aging effects requiring management. Generic note G is cited, indicating that this environment is not addressed in NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components containing this material/environment combination.

LR Response

A review of five years of JAFNPP operating experience did not identify aging effects for components with this material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which was available for onsite review.

JAFNPP operating experience with this material and environment combinations is consistent with the industry experience of no aging effects reflected in the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -26 Auxiliary Systems
Table 3.3.2-4 includes AMR line items to address aluminum flame arrestors exposed to air-outdoor (internal and external) in the fuel oil systems. The LRA states that there are no aging effects requiring management. Generic note G is cited, indicating that this environment is not addressed in NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components containing this material/environment combination.

LR Response

A review of five years of JAFNPP operating experience did not identify aging effects for components with this material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which was available for onsite review.

JAFNPP operating experience with this material and environment combinations is consistent with the industry experience of no aging effects reflected in the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -27 Auxiliary Systems
Table 3.3.2-8 includes AMR line items to address aluminum heat exchanger coils and stainless steel tanks exposed to liquid nitrogen (internal) in the containment systems. The LRA states that there are no aging effects requiring management. Generic note G is cited, indicating that this environment is not addressed in NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components containing these material/environment combinations.

LR Response

A review of five years of JAFNPP operating experience did not identify aging effects for components with these material and environment combinations. The operating experience review is documented in JAF-RPT-05-LRD05, JAFNPP License Renewal Operating Experience Review Report, which was available for onsite review.

JAFNPP operating experience with these material and environment combinations is consistent with the industry experience of no aging effects reflected in the Mechanical Tools [Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools, Revision 4, EPRI, Palo Alto, CA: 1010639].

JAFNPP AMP and AMR Database

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LR Request
Section 3.3 -28 Auxiliary Systems
Table 3.3.2-9 includes an AMR line items to address cracking of aluminum/boron carbide neutron absorber exposed to treated water (external) in the fuel pool cooling and cleanup system. The LRA credits the water chemistry-BWR program to manage this aging effect. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss how the effectiveness of the water chemistry-BWR program for managing this aging effect will be verified for this component.

LR Response
The One-Time Inspection Program will verify the effectiveness of the Water Chemistry Program to manage cracking of the aluminum/boron carbide neutron absorbers. As described in section B.1.21 of the LRA: One-time inspection activities will verify the effectiveness of the water chemistry control aging management program by confirming that unacceptable cracking is not occurring.

JAFNPP AMP and AMR Database

Audit Question #

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LR Request

Section 3.3 -29 Auxiliary Systems
Table 3.3.2-14-41 includes AMR line items to address cracking due to fatigue of carbon steel compressor housings, piping, and valve bodies exposed to air-untreated (internal) in the EDG systems. The LRA credits the one-time inspection program to manage this aging effect. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss how the one-time inspection program will manage cracking due to fatigue for these components throughout the period of extended operation.

LR Response

The components in this line item are included in scope only for structural support of the safety-related components in the EDG air start subsystem. This aging effect was conservatively identified due to the potential for high temperature thermal cycling of the discharge piping. The one-time inspection activity will confirm thru visual or other NDE techniques that cracking is not occurring or is so insignificant that an ongoing aging management program is not warranted. If significant cracking is detected corrective actions will be taken in accordance with the site corrective action program.

JAFNPP AMP and AMR Database

Audit Question #

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LR Request

Section 3.3 -30 Auxiliary Systems

Table 3.3.2-5 includes AMR line items to address cracking due to fatigue of carbon steel mufflers, piping, and valve bodies exposed to exhaust gas (internal) in the fire protection-water system. The LRA credits the Fire Protection program to manage this aging effect. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss how the Fire Protection program will manage cracking due to fatigue for these components throughout the period of extended operation.

LR Response

The Fire Protection Program includes periodic inspections and testing of the diesel-driven fire pump including exhaust system components to ensure that diesel engine components can perform their intended functions. These inspections and testing will identify cracking through the use of visual observations.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -31 Auxiliary Systems
Table 3.3.2-13 includes AMR line items to address cracking due to fatigue of carbon piping and silencers and stainless steel expansion joints exposed to exhaust gas (internal) in the security generator. The LRA credits the Periodic Surveillance and Preventive Maintenance program to manage this aging effect. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss how the PSPM program will manage cracking due to fatigue for these components throughout the period of extended operation.

LR Response

As identified in Appendix B of the LRA and section 4.17 of JAF-RPT-05-LRD-02, the PSPM Program will periodically use visual or other NDE techniques to inspect a representative sample of security generator exhaust components to manage cracking. These inspections will be adequate to verify no unacceptable cracking on the security generator exhaust components.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -32 Auxiliary Systems

Table 3.3.2-7 includes an AMR line item to address loss of material due to wear of copper alloy heat exchanger tubes exposed to gas (external) in the HVAC systems. The LRA credits the Service Water Integrity program to manage this aging effect. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss the rational for crediting the Service Water Integrity program to manage this aging effect for components exposed to gas throughout the period of extended operation instead of the Heat Exchanger Monitoring program.

LR Response

The heat exchangers crediting the Service Water Integrity Program for the management of aging effects in Table 3.3.2-7 represent the condensers of the control room chillers. Each condenser utilizes emergency service water as a heat sink and is inspected per the requirements of GL 89-13 by the Service Water Integrity Program which includes eddy current testing. These inspections will be used to detect loss of material due to wear on the copper alloy tubes.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -33 Auxiliary Systems
Table 3.3.2-7 includes an AMR line item to address loss of material due to wear of copper alloy heat exchanger tubes exposed to treated water (external) in the HVAC systems. The LRA credits the Periodic Surveillance and Preventive Maintenance program to manage this aging effect. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss the rational for crediting the PSPM program to manage this aging effect for components exposed to treated water throughout the period of extended operation instead of the Heat Exchanger Monitoring or Water Chemistry program.

LR Response

The heat exchanger described by this line item is an evaporator. A water chemistry program by itself would not be adequate to manage loss of material due to wear on the external tube surface. The PSPM program was incorrectly credited for managing loss of material due to wear. Instead the Heat Exchanger Monitoring program should have been credited for management of this aging effect. This requires an amendment to the LRA.

JAFNPP AMP and AMR Database

Audit Question

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LR Request

Section 3.3 -34 Auxiliary Systems
Table 3.3.2-3 includes an AMR line item to address loss of material due to wear of copper alloy heat exchanger tubes exposed to treated water (external) in the EDG systems. The LRA credits the Service Water Integrity program to manage this aging effect. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss the rational for crediting the Service Water Integrity program to manage this aging effect for components exposed to treated water throughout the period of extended operation instead of the Heat Exchanger Monitoring or Water Chemistry program.

LR Response

This line item addresses wear on the external surface of tubes in the EDG jacket water heat exchanger. A water chemistry program cannot manage loss of material due to wear. These heat exchangers are included in the Service Water Integrity Program since they are cooled by the service water system and are part of GL 89-13 commitments. Although loss of material due to wear occurs on the external surface of the tubing (which is exposed to treated water) this aging effect will be managed by eddy current testing of the tubes in the Service Water Integrity Program.

JAFNPP AMP and AMR Database

Audit Question

408

LR Request

Section 3.3 -35 Auxiliary Systems
Table 3.3.2-12 includes AMR line items to address fiberglass piping and tanks exposed to air-indoor, raw water, and soil in the Radwaste and Plant Drains systems. The LRA states that there are no aging effects requiring management for these material/environment combinations. Generic note F is cited, indicating that this material is not addressed in NUREG-1801. Please discuss the JAFNPP plant-specific operating experience with components containing this material/environment combination, including inspections performed, degradation detected, and any failures that have occurred.

LR Response

The review of recent site experience documented in JAF-RPT-05-LRD05 "Operating Experience Review Report" did not identify degraded conditions or failures that would indicate the presence of aging effects for fiberglass components. This is consistent with the EPRI Mechanical Tools which state that fiberglass is a highly corrosion resistant material. The components are monitored by system engineering walkdowns with no aging effects identified. For additional information, see Section 3.0 of JAF-RPT-05-LRD05 for review of aging effects at JAFNPP.

JAFNPP AMP and AMR Database

Audit Question

409

LR Request

Section 3.3 -36 Auxiliary Systems
Table 3.3.2-5 includes AMR line items to address cracking due to fatigue of gray cast iron turbocharger housings and stainless steel expansion joints exposed to exhaust gas (internal) in the fire protection-water system. The LRA credits the Fire Protection program to manage this aging effect. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss how the Fire Protection program will manage cracking due to fatigue for these components throughout the period of extended operation.

LR Response

The Fire Protection Program includes periodic inspections and testing of the diesel-driven fire pump including exhaust system components to ensure that diesel engine components can perform their intended functions. These inspections and testing will identify cracking through the use of visual observations.

JAFNPP AMP and AMR Database

Audit Question

410

LR Request

Section 3.3 -37 Auxiliary Systems

Table 3.3.2-3 includes AMR line items to address cracking of stainless steel strainers exposed to lube oil (internal and external) in the EDG system. The LRA credits the Oil Analysis program to manage this aging effect. Generic note H is cited, indicating that this aging effect is not addressed in NUREG-1801. Please discuss how the Oil Analysis program will manage cracking for these components throughout the period of extended operation.

LR Response

As stated in LRA Section B.1.20, The Oil Analysis Program maintains oil systems free of contaminants (primarily water and particulates) thereby preserving an environment that is not conducive to loss of material, cracking, or fouling. Sampling frequencies are based on vendor recommendations, accessibility during plant operation, equipment importance to plant operation, and previous test results. Therefore, the Oil Analysis Program will manage cracking of these components through the period of extended operation.

JAFNPP AMP and AMR Database

Audit Question

411

LR Request

Section 3.3 -38 Auxiliary Systems
The LRA does not list the following components: east diesel fire pump and Screenwell Building fire suppression system and associated components; the jockey pump and its associated components; manual water spray systems provided in HPCI and RCIC pump rooms, reactor feed-pump turbine areas, hydrogen seal oil unit, and turbine generator bearing boxes and oil piping area; and preaction sprinkler systems and its associated components provided in the recirculation pumps motor generator set room, and in the emergency diesel generator rooms. Confirm whether the are in the scope of license renewal. If they are excluded from the scope of license renewal and not subject to an AMR, provide justification for the exclusion. If not, describe your aging management reviews and the aging management programs.

LR Response

The east diesel fire pump (76-P-4) serves as a backup to the main diesel fire pump and the electric fire pump and is not required to comply with the requirements of 10 CFR 50.48 as described in Technical Requirements Manual (TRM) Section B 3.7.H. The screenwell building fire suppression system, including suppression in the east diesel fire pump room, is subject to aging management review with its components included in LRA Table 3.3.2-5.

The motor driven jockey fire pump (76-P-3) maintains fire system pressure during standby operations. As shown at coordinates C-3 of drawing LRA-FB-48A, this component is outside the quality class "M" (augmented quality) boundary.

Automatic water spray systems in the HPCI pump rooms, RCIC pump rooms, reactor feed pump turbine areas, hydrogen seal oil unit, and turbine generator bearing boxes and oil piping area are subject to aging management review and their components are included in LRA Table 3.3.2-5.

Pre-action sprinkler systems and associated components in the recirculation pumps MG set room and EDG rooms are subject to aging management review and their components are included in LRA Table 3.3.2-5.

JAFNPP AMP and AMR Database

Audit Question

412

LR Request

Section 3.3 -39 Auxiliary Systems
JAFNNP is required to meet Appendix A to Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSP) 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," May 1, 1976," August 23, 1976. According to JAFNPP commitments to satisfy Appendix A to BTP APCSP 9.5-1, JAFNPP letter dated January 11, 1977, states that the transformer is protected by an automatic water spray deluge system in accordance with NFPA 13. If automatic water deluge system is excluded from the scope of license renewal and not subject to an AMR, provide justification for the exclusion. If not, describe your aging management reviews and the aging management programs.

LR Response

As shown on LRA-FB-49A at location E-3, the automatic water deluge system protecting station reserve transformer (T-3) is subject to aging management review and is included in LRA Table 3.3.2-5.

JAFNPP AMP and AMR Database

Audit Question

413

LR Request

Section 3.4 -1 AMR - Condensate Storage System
LRA Section 3.4.2.2.4 (Reduction of Heat Transfer due to Fouling) - states that the steam and power conversion systems at JAFNPP have no heat exchanger tubes with an intended function of heat transfer and associated aging effect of fouling. Drawing LRA-FM-33D depicts Thermosiphon heat exchanger A/B associated with each condensate storage tank respectively.
Should this heat exchanger be included in the aging management program, if not why?

LR Response

As described in the UFSAR section 10.9.3, two thermosiphon heat exchangers (one per tank) were originally provided, but now have been retired in place. The tank nozzles for the thermosiphon heater are located in the upper half of the tank (above the required reserve supply) such that their failure would not affect the ability of the tank to perform its functions. Therefore the piping to and from these components is not subject to aging management review.

JAFNPP AMP and AMR Database

Audit Question

414

LR Request

Section 3.5 -13

Table 3.5.2-4, "Bulk Commodities Summary of Aging Management Evaluation," that the structural fire barriers (walls, ceilings, floors, and slabs) are within in 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). If these structural fire barriers are excluded from the scope of license renewal and not subject to an AMR, provide justification for the exclusion. If not, describe your aging management reviews and the aging management programs.

LR Response

Structural fire barriers (walls, ceilings, floors and slabs) are identified as in-scope of license renewal and are listed within the tables of the associated structures with an intended function "FB". The aging management program for these commodities is the Fire Protection Program.

JAFNPP AMP and AMR Database

Audit Question

415

LR Request

TLAA LRA Section 4.3 -1a
In LRA, Table 4.3-2 listed current Design Basis Cycles for Design Transients.

Part A: Are these transients/cycles extracted from Design Specification, or other basis documents? Provide basis for these transients/cycles.

LR Response

As explained in Section 2.3 of LRD04, these transients/cycles are obtained from JAFNPP technical specifications, UFSAR, and plant drawings. The original design basis cycles have been updated based on actual plant transient history from start-up to June 30, 2001.

JAFNPP AMP and AMR Database

Audit Question

416

LR Request

TLAA LRA Section 4.3 -1b
In LRA, Table 4.3-2 listed current Design Basis Cycles for Design Transients.

Part B: What is the CUFs in Table 4.3-1? Is these CUFs for 60 years or just for current design cycles as indicated in Table 4.3-2?

LR Response

The CUFs in Table 4.3-1 are calculated based on the analyzed number of design cycles. The CUFs are valid for the analyzed number of design cycles independent of how many years it takes to accrue those cycles. Projections indicate that actual design cycles for 60 years of operation will not exceed the analyzed number of cycles. Since these design cycles will not be exceeded in either 40 years or 60 years, these CUFs are good for both 40 years and 60 years.

JAFNPP AMP and AMR Database

Audit Question
417

LR Request
TLAA LRA Section 4.3 -1c
In LRA, Table 4.3-2 listed current Design Basis Cycles for Design Transients.

Part C: Does the feedwater nozzle area subject to leakage bypass transient which was described in NUREG-0619? If the answer is yes, the CUF evaluation does count this actual leakage bypass transient, or not?

LR Response
Yes, the feedwater nozzle area is subject to the leakage bypass transients described in NUREG-0619. The calculated CUF for the feedwater nozzle inner blend radius includes rapid cycle fatigue due to the leakage past the thermal sleeve.

As shown in LRA Table 3.1.2-1, cracking of the feedwater nozzles is managed by the BWR Feedwater Nozzle Program. As discussed in LRA Appendix B, this program incorporates the recommendations of GE-NE-523-A71-0594 as approved by the NRC SER of June 5, 1998. These inspections will detect cracking due to various mechanisms, including fatigue.

JAFNPP AMP and AMR Database

Audit Question

418

LR Request

TLAA LRA Section 4.3 -2
LRA Table 4.3-2 defines the design basis transients for JAFNPP and provides the updated
60-year design basis value for these transients. The table also provides the projected number of cycles based on the recorded transients. The staff requests the following additional information:

Part A: For each transient in LRA Table 4.3-2, clarify how many operational cycles have been recorded up to the time that the 60-year transient projections were calculated, as given in the " Updated 60 Year Cycle Projection" column of LRA Table 4.3-2. Provide a technical discussion to clarify how the 60-year projections were performed based on recorded transient data. In particular, if a particular transient category in LRA Table 4.3-2 is made up of more than one specific transient, clarify which specific transient is used to define the transient and clarify how the total number of cycles were used to derive the 60 year cycle projections. In addition, clarify how the cycles were recorded prior to 1988 when JAFNPP did not implement a plant computer to track transient events.

Part B: Page 19 of General Electric (GE) Design Calculation EAS-149-1286 / DRF B13-01391 discusses GE's evaluation of 12 transients (i.e., nine reactor SCRAMS, one turbine trip, two feedwater pump trips) that had been grouped into the "Shutdown" transient for the plant. The report stated that the change in reactor coolant temperature (ΔT) for six of these events had exceeded the ΔT value for this transient. The staff noted that the bases provided on page 19 for justifying why these events can be categorized as plant heatups or cooldowns are based on qualitative analysis without using any temperature gradient data. Justify why these six transients can be grouped into"Shutdown" transient for the plant when the ΔT values for these six events were determined to excessive and the temperature gradients for the transients are not defined.

In particular, for the scram event that occurred on November 4, 1984, a ΔT of -297□F and a ΔT of +437□F occurred on the same day. Please define when did ΔT events occur and what were the actual temperature gradients associated with these events.

Clarify how your response to this part (Part B) factors into your response to Part A, particularly with respect to the number of recorded occurrences for the transient Categories in LRA Table 4.3-2.

Part C: In the GE stress report, GE characterized 12 unidentified operational transients as reactor SCRAMS. GE identified that 63 occurrences of these transients had occurred prior to 1987. Confirm whether or not this is true. In addition, Entergy projects that the number of SCRAM events occurring through 60 years of operation for the "All Other SCRAM" eventswill be 62. Justify how the number of cycles projected through 60 years of operation can be 62 when 63 occurrences had been recorded through 1987.

In the GE stress report, GE also mentioned that the change in reactor coolant temperature (ΔT) associated with these 12 unidentified transients was approximately 330□F. Please define these unidentified transients and list the pressure-temperature data for these transients. Also please define the pressure-temperature (P-T) data that were used for the limiting SCRAM event used in Structural Integrity Associates's (SIA's) updated 60-year cumulative usage factor calculations. Justify how these 12 transients are characterized based on the analyzed P-T limit data used in SIA's updated CUF calculations.

Clarify how your response to this part (Part C) factors into your response to Part A, particularly with respect to the recording the number of cycles for the transients defined in LRA Table 4.3-2 and using this data to project the 60-year cycles for the transients.

LR Response

This response will be provided in a submittal letter for RAI 4.3.1-1.

JAFNPP AMP and AMR Database

Audit Question

442

LR Request

B.1.17-3

Fitzpatrick FSAR Section 8.2.1 states that an alternate source of AC power, from the 345kV system, is available to provide power to plant auxiliaries during plant shutdown. The power is supplied to plant 4.16kV emergency buses by back feeding from the 345kV system via main transformer, isolated phase bus duct, and the normal station transformer. Back feeding is identified as a qualified alternate source of AC power to 4.16kV safety buses and therefore, should be included in the scope of license renewal. Provide a technical justification why the alternate AC source to 4.16kV safety buses from the 345kV system does not need an AMP/

LR Response

The three sources of normal AC power for JAF are the normal, reserve, and emergency sources. The normal source is the Normal Service Station Transformer (NSST) 71T-4. The reserve source is the Reserve Service Station Transformers (RSST) 71T-2 and 71T-3. The emergency source is the Emergency Diesel Generators.

In Section 8.3 of the JAF UFSAR, the 115KV system has the safety objective to provide a supply of offsite power for the engineered safeguard loads. The 115KV system has the power generation objective to provide two sources of offsite AC power to the Plant Service AC Power Distribution System for plant startup, operating and shutdown power including adequate power to the emergency service buses for the safe shutdown of the reactor. The 115KV bus at JAF is energized from two 115KV transmission lines as shown in SAR Figure 8.3-2. This provides the GDC-17 criteria for the Reserve Service Station Transformers.

Section 8.11 of the JAF UFSAR, addresses Station Blackout (SBO). Station Blackout (SBO) is defined in 10 CFR 50.2 as a complete loss of alternating current (AC) electric power to essential and non-essential switchgear buses. Offsite power is assumed to be lost concurrently with a main turbine trip and unavailability of the on-site emergency AC power system. Station Blackout does not include loss of AC power to buses fed by the station batteries through inverters and does not assume a concurrent single failure or design basis accident.

Section 8.2.1 of the JAF UFSAR, states that "An alternate source of AC power, from the 345KV system, is available to provide power to plant auxiliaries during plant shutdown. The power is supplied to plant 4.16KV buses by back feeding from the 345KV system via main transformers, isolated phase bus duct, and the normal station service transformer. The main generator is isolated by removing the isolated phase bus duct disconnect links". This alternate source is only used during outages for maintenance on the Reserve Service Station Transformer. This source of offsite AC power is not credited for recovery from Station Blackout.

The two sources of offsite AC power is the two independent 115KV lines that feed the RSST transformers. There is a cross feed circuit that can be closed to provide power to both of the 4.16KV safety buses in the plant in the case of loss of one 115KV line. This cross-tie can be closed in less than ten minutes when needed. This source will be much faster than installing the feedback source which takes at least 12 hours. No other source is needed or required.

JAFNPP AMP and AMR Database

Audit Question

443

LR Request

B.1.25 - 1 Selective Leaching

When is the one time inspection and hardness measurement mentionend in the "scope" of the program performed? Was this done before?

LR Response

This is a new program that will be implemented prior to entering the period of extended operation as described in commitment 15. No inspections or hardness testing to identify the presence of selective leaching for components included in the scope of license renewal have been performed at the current time. Hardness testing of the components will be performed on the surface exposed to the environment with potential for causing selective leaching.

JAFNPP AMP and AMR Database

Audit Question
444

LR Request
B.1.25 - 2 Selective Leaching

What preventive actions does the applicant plan to take in reducing selective leaching to address GALL element?

LR Response
In accordance with NUREG-1801 XI.M33 and AMP B.1.25 section B.2 there are no preventive actions associated with this program. This program is only an inspection and verification program. If selective leaching is detected during the inspections the corrective action program at JAF will initiate corrective actions. However, monitoring of water chemistry to control pH and concentration of corrosive contaminants and minimizing dissolved oxygen in water as part of the JAF Water Chemistry programs described in Appendix B Section B.1.29 of the JAF license renewal application are effective in reducing selective leaching.

JAFNPP AMP and AMR Database

Audit Question
445

LR Request
B.1.25 - 3 Selective Leaching

What acceptance criteria does the applicant plan to use for hardness testing?

LR Response
The implementation of this program including acceptance criteria is license renewal commitment 15 that will be implemented prior to the period of extended operation.

JAFNPP AMP and AMR Database

Audit Question

446

LR Request

B.1.25 - 4 Selective Leaching

Provide industry operating experience considered for selective leaching program and plant specific operating experience for components in the program

LR Response

Since this is a new program there is no plant specific operating experience for the program. A review of condition reports at JAF did not locate any examples of selective leaching occurring at the site. Within the industry Information Notice 84-71 documented the occurrence of graphitization of cast iron occuring in the salt water system at Calvert Cliffs Nuclear Plant. JAF does not have any salt water systems but will consider industry operating experience during the development of the program.

JAFNPP AMP and AMR Database

Audit Question
447

LR Request
AMP B.1.23-1 "Reactor Head Closure Studs."

NRC audit team requests clarification to exception listed for this program.

LR Response
Add to wording of Note 1 for exception listed in B.1.23:

This is applicable to the current (third) ISI interval which is based on the ASME Section XI Code 1989 version. The code of record for the fourth interval (2001 Edition / 2003 Addenda) has deleted the requirements for surface exams.

This requires a revision to JAF-RPT-05-LRD02 and an amendment to the LRA.

JAFNPP AMP and AMR Database

Audit Question

448

LR Request

Provide verification that the Medium Voltage Cables that go to the RHR and Core Spray Pump Motors are Environmentally Qualified.

LR Response

A search was performed of the Electrical Cable and Raceway Information System Controlled Database (ECRIS) for cables going to the RHR and Core Spray Pump Motors to identify the Cable Marks for the Medium Voltage Cables (NFF-44, NFF-46, NFY-07 and NFY-08)
The applicable environmental qualification files for these cable marks are identified. (QDR 06.10 for NFF-44 and NFF-46 and QDR 06.19 for NFY-07 and NFY-08).
QDRs 06.10 and 06.19 identify the corresponding commodity IDs for the cables. (Cable Marks NFF-44 and NFF-46 are identified as CABLE-12 on the Environmental Qualification Component List (EQCL. Cable Marks NFY-07 and NFY-08 are identified as CABLE-25 on the EQCL.)
CABLE-12 and CABLE-25 were verified listed on the EQCL.

JAFNPP AMP and AMR Database

Audit Question #
449

LR Request
B.1.16.2-16

LRA Section A.2.1.18 provides the following UFSAR Supplement summary description for the ISI Program:

The ISI Program is based on ASME Inspectin Program B (Section xi, IWA-2432), which has 10-year inspection intervals. Every 10 years the program is updated to the latest ASME Section XI code edition and addendum approved in 10CFR50.55a. On September 28, 1997, JAFNPP entered the third ISI interval. The code edition and addenda used for the third interval is the 1989 Edition with no Addenda.

The program consists of periodic volumetic, surface, and visual examination of components and their supports for assessment, signs of degradation, flaw evaluation, and corrective actions.

The JAFNPP is scheduled to enter the 4th 10-year ISI Interval in January 2007. The version of the ASME Code, Section XI frequired for the 4th 10-year ISI interval is the 2001 Edition of the ASME Code, Section XI, inclusive of the 2003 Addenda. The staff requests that the LRA Section A.2.1.18 be amended to delete the relevant information for the 3rd Ten-Year ISI interval for JAFNPP and to incorporate the relevant information for the 4th Ten-Year ISI Interval for JAFNPP.

LR Response
LRA Section A.2.1.18 will be revised in a later update to delete the relevant information for the 3rd Ten-Year ISI interval for JAFNPP and to incorporate the relevant information for the 4th Ten-Year ISI Interval for JAFNPP.

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

450

LR Request

AMP B.1.14 -2   Flow-Accelerated Corrosion

Has any inspection ever been performed on systems that have been excluded based on low operating time of <2% of plant operating time to make sure that there is no wear on these lines.

LR Response

Yes. The FAC program is guided by industry and plant experiences. Portions not explicitly recommended but recognized, via industry and plant experiences, as having potential for FAC or Erosion have been included in the augmented portion of the JAF FAC Inspection program.

In addition, regardless of system run time, if a component is analyzed using our predictive code (CHECWORKS SFA 2.1) and is found to have a low time to T-critical, it is included into our outage scope.

JAFNPP AMP and AMR Database

Audit Question
451

LR Request
AMP B.1.14 -3 Flow-Accelerated Corrosion

Specify the number of inspection locations for piping.

LR Response
There are 1729 modeled components in the JAF predictive code. To date, 456 individual components have been inspected.

The selections are based on the shortest time to T-critical for those components with no inspection history and re-inspections for those components driven by a calculated remaining service life.

The R-17 JAF outage scope included 85 large bore components for inspection. Of these 85, over 40% were first time inspections. This number of first time inspections was greatly influenced by Industry OE associated with the Mihama accident.

JAFNPP AMP and AMR Database

Audit Question
452

LR Request
AMP B.1.14 -4 Flow-Accelerated Corrosion

Provide the following:

a. Percentage increase of inspection when unexpected thinning is detected.

b. Basis for replacement of piping when wall thinning is at 30% of nominal wall thickness is detected (Class 1); and 20% of nominal wall thickness is detected (Class 2 and Class 3)

c. *Basis for replacement of piping when the wall thickness is at the threshold of the minimum thickness required by the code.*

LR Response
1. There is no specific percentage that is used for scope expansion when unexpected wear is detected. The locations are assessed individually. Scope expansion unexpected thinning is detected.provided by ENN-DC-315 R.1 Section 5.12 "Sample Expansion"

2. The Basis for replacement of piping when wall thinning is at 30% of nominal wall for Class 1 and 20% of nominal wall for Class 2 and Class 3 is given in Engineering Specification ENN-CS-S-008 'Pipe Wall Thinning Structural Evaluation.'
The Methodology employed in writing ENN-CS-S-008 Has been conditionally accepted in Reg. Guide 1.147, Rev. 14. Entergy will adhere to all 5 conditions specified in the Reg. Guide.

3. Replacement is performed if the remaining service life does not support continued service based on Code minimums through the next operating cycle.

JAFNPP AMP and AMR Database

Audit Question
454

LR Request
AMP B.1.14 -6 Flow-Accelerated Corrosion

Identify all JAF operating experience with regard to FAC requiring replacement Confirm that the FAC program is subject to appropriate quality assurance review or their equivalents Summarize the latest quality review determination.

LR Response
1. There are a few recent examples of JAF operating experience (i.e. unusual system line-up, valve leaking by, etc) with regard to FAC requiring pipe replacement. They are as follows:
- The piping downstream of 31LCV-122A "MSR DRAIN TANK 4A BYPASS DRAIN TO MAIN CNDSR LEVEL CNTRL VALVE" due to valve leaking by.
- The piping downstream of 31MOV-CA2 "MSR A CROSS AROUND PIPING DRAIN VALVE"

* It should be noted that in both instances, large bore and small, the pipe was replaced with non-susceptible materials. (SA335 p22) (2.25% Cr)

2. QA Audit QA-8-2005-JAF-1 dated March 9, 2005 conlcuded the following: Based on the sample reviewed, the auditors concluded that the scope element FAC Program is Satisfactory.

3. The two most recent FAC program assessments are as follows:
- LO-JAFLO-2005-00069 / Focused Self Assessment / Sept. 26 thru Sept. 30, 2005
- LO-WPOLO-2003-00050 / Self-Assessment / Feb. 9 thru Feb. 13, 2004

In general, the following conclusions were drawn:

- The FAC program is consistent with other FAC programs among the Entergy Nuclear South plants and throughout the industry. Any guidance provided by the NRC has been and is being followed appropriately.

- Several strengths were identified in the level of documentation and ownership of data, details and content of the CHECWORKS models, and use of advanced structural methods as a standard practice to qualify thinned piping and components.

- No weaknesses or deficiencies were identified that would indicate that the JAF FAC program could impact long-term monitoring of FAC or result in a challenge to nuclear or personnel safety, equipment reliability, or station performance.

- There are no gaps between the JAF FAC program attributes and those of the applicable INPO Engineering Program Excellence Guide

JAFNPP AMP and AMR Database

Audit Question

455

LR Request

Generic Question

Entergy is scheduled to enter the 4th 10-year ISI Interval for JAFNPP in January 2007. For the 4th 10-year ISI Interval Entergy is required under 10 CFR50.55a to update the ASME Section XI Code of record to the 2001 Edition of ASME Section XI, inclusive of the 2003 addenda. This is the Edition of Section XI endorsed in GALL. Clarify whether the 2001 edition of ASME Seciont XI, inclusive of the 2003 Addenda, will be the new ASME Section XI code of record for those JAFNPP AMPs reerenceing or crediting Section XI requirements. If an older edition of ASME Section XI will still be used for a particular AMP referencing or using ASME Section Section XI criteria, identify what the AMP is and justify its use for aging management as an exception to the Edition of Section XI endorsed in GALL.

The version of the ASME Code, Section XI frequired for the 4th 10-year ISI interval is the 2001 Edition of the ASME Code, Section XI, inclusive of the 2003 Addenda. The staff requests that the LRA Section A.2.1.18 be amended to delete the relevant information for the 3rd Ten-Year ISI interval for JAFNPP and to incorporate the relevant information for the 4th Ten-Year ISI Interval for JAFNPP.

LR Response

The 2001 edition of ASME Section XI, inclusive of the 2003 Addenda, will be the new ASME Section XI code of record for those JAFNPP AMPs referencing or crediting Section XI requirements.

LRA Section A.2.1.18 will be amended with an update to delete the relevant information for the 3rd Ten-Year ISI interval for JAFNPP and to incorporate the relevant information for the 4th Ten-Year ISI Interval for JAFNPP. LRIS Open Item #267 tracks this issue.

This will be revised during the annual update of the LRA.

JAFNPP AMP and AMR Database

Audit Question

456

LR Request

AMP - General Comment

The staff requests that each commitment docketed on the JAFNPP LRA be referenced in the appropriate LRA Appendix A UFSAR Supplement summary description section.

LR Response

The JAF Commitment List has been revised to add the Appendix A reference to each commitment that involves Appendix A.

The JAF Commitment List will be submitted with the first amendment.

JAFNPP AMP and AMR Database

Audit Question
457

LR Request
AMP B.1.13.1 Fire Protection

GALL preventive action of the AMP states that normal fire protection programs include measures for mitigating or preventing fire events at the plant. Clarify whether the JAFNPP fire protection includes such measures, and if so, state what they entail. If such measures do not exist, justify why not identified as an exception to the preventive action element of the AMP with a technical basis.

LR Response
The JAFNPP Fire Protection Program contains measures for the prevention and mitigation of fire events. Preventive programs such as ignition and combustible control are in place. Additionally, fixed and portable systems are present to assure early fire detection and suppression in areas based upon fire hazards present and safety significance. Safe shutdown strategies are present to ensure plant shutdown in the event of a single fire. Reference JAF Fire Hazards Analysis and the JAF Fire Protection Plan for a description of specific systems and/or administrative elements.

JAFNPP AMP and AMR Database

Audit Question
458

LR Request
B.1.6 - 2 BWR Vessel ID Attachment Weld
Identify the BWRVIPs used for "acceptance criteria" element of AMP B.1.6

LR Response
The bases for the "Acceptance Criteria" element of AMP B.1.6 is BWRVIP-48-A, Section 3.3, "Inspection Acceptance Criteria".

BWRVIP-14, BWRVIP-59 and BWRVIP-60 are used as applicable to evaluate crack growth

JAFNPP AMP and AMR Database

Audit Question #
459

LR Request
B.1.6 -3 BWR Vessel ID Attachment Weld

CR-WPO-LO-2005-069 states that JAFNPP BWRVIP Program is not in compliance with the BWRVIP requirements. Clarify if all recommendations have been incorporated.

LR Response
FitzPatrick has satisfactorily incorporated all recommendations identified in CR-WPO-LO-2005-069. This CR was generated as a result of a Self – Assessment performed on the JAF-BWRVIP Inspection program.

Inspections were performed during Refuel Outage 17, as required by the associated corrective actions and per the established BWRVIP guidelines.

Enhanced visual techniques and ultrasonic's were incorporated to address inspection coverage issues.

The BWRVIP program is in compliance with the BWRVIP program requirements and applicable guidelines.

JAFNPP AMP and AMR Database

Audit Question

460

LR Request

AMP B.1.13.2 - Fire Water System

Enhancements for the parameter monitored/ inspected and acceptance criteria uses the phrase "verify no significant corrosion". What is meant by this phrase?

LR Response

Significant corrosion was intended to mean unacceptable signs of degradation. The first two enhancements listed for AMP B.1.13.2 will be revised to read as follows.

Procedures will be enhanced to include inspection of hose reels for corrosion.
Acceptance criteria will be enhanced to verify no unacceptable signs of degradation.

Procedures for sprinkler systems will be enhanced to include visual inspection of spray and sprinkler system internals for evidence of corrosion. Acceptance criteria will be enhanced to verify no unacceptable signs of degradation.

This requires an LRA amendment.

JAFNPP AMP and AMR Database

Audit Question
462

LR Request
B.1.4-1 BWR Penetrations

Is there a plant specific fatigue evaluation for the Standby Liquid Control Delta P sensing line as discussed in BWRVIP-27A.

LR Response
The site has confirmed that there is no plant specific fatigue evaluation.

JAFNPP AMP and AMR Database

Audit Question #

463

LR Request

Provide a listing of the Medium Voltage cables installed and how they were screened for GALL XI.E3.

LR Response

The list of Medium Voltage cables installed for JAF were provided to NRC.
A summary of cable screening is listed below.
The 4KV cables for RHR Service Water are located within a building and run in conduit that is surrounded by concrete. This conduit run is not underground and not susceptible to moisture.
The Core Spray Cables and RHR Cables are EQ and managed by the EQ Program.
There are some installed spare 4KV cables that are not connected and not energized.
The EDG cables are in conduit in a building and are not in duct bank underground. The EDG cables are not energized >25% of the time.
The 4KV Neutral Grounding Resistor Cabling is installed on the RSST transformers and is tied to plant ground. These cables are low voltage and not suseptable to moisture and water treeing.
Therefore, JAF does not have any 4KV cables that would require a GALL XI.E3 program.
The 4KV cables that are in scope of license renewal are managed by the GALL XI.E1 program.

JAFNPP AMP and AMR Database

Audit Question

464

LR Request

Provide a testing method for the insulating oil in the Oil Filled Cable System.

LR Response

JAF will address the aging management of the oil-filled cable system in response to RAI 3.6.2-1.

This requires an LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

465

LR Request

B.1.17-1 Metal-Enclosed Bus Inspection
JAF-RPT-05-LRD02 Page 23 of 279 under "Parameters Monitored/Inspected" states that "where applicable, enclosure assembly elastomers will be visually inspected and manually flexed to manage cracking and change in material properties." GALL referred structural monitoring program for inspecting the elastomers. Do you intend to inspect the enclosure assembly elastomer? If you do, remove the phrase "as applicable". If you do not, provide justification why elastomer is not subject to aging.

LR Response

Enclosure assembly elastomers will be visually inspected. JAF-RPT-05-LRD02 and Appendix B.1.17 will be revised to omit the wording "where applicable".

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

466

LR Request

B.1.17-2 Metal-Enclosed Bus Inspection
GALL XI.E4 under "Operating Experience" states that "industrial experience has shown that failures have occurred on MEBs caused by cracked insulation and moisture or debris buildup internal to the MEB. Experience also has shown that bus connections in the MEBs exposed to appreciable ohmic heating during operation may experience loosening due to repeated cycling of connected loads." JAF-RPT-05-LRD02 under the same attribute states that MEB Inspection Program at JAFNPP is a new program for which there is no operating experience. Address industrial and plant specific operating experience in the basis document

LR Response

Appendix B.1.17 gives the correct "Operating Experience" discussion. JAF-RPT-05-LRD02 will be revised to agree with the "Operating Experience" discussion in Appendix B.

JAFNPP AMP and AMR Database

Audit Question
467

LR Request
B.1.18-1 Non-EQ Instrumentation Circuits Test Review.
GALL XI.E2 under "Detection of Aging Effects" states that "in cases where a calibration or surveillance program does not include the cabling system in the testing circuit, or as an alternative to the review of calibration results, that the test frequency of these cables shall be determined by the applicant based on engineering evaluation, but the test frequency shall be at least once every ten years." The basis document page 30 of 279 under the same attribute states that the first test shall be completed before the period of extended operation and subsequent tests will occur at least every 10 years. Explain how engineering evaluation will be considered in evaluating the test frequency to be consistent with the GALL?

LR Response
JAF-RPT-05-LRD02 will be revised to be consistent with Appendix B.1.18 as follows.
"In accordance with the corrective action program, an engineering evaluation will be performed when test acceptance criteria are not met and corrective actions, including modified inspection frequency, will be implemented to ensure that the intended functions of the cables can be maintained consistent with the current licensing basis for the period of extended operation".

JAFNPP AMP and AMR Database

Audit Question #

468

LR Request

B.1.18-2 Non-EQ Instrumentation Circuits Test Review
GALL XI.E2 under “Operating Experience” states that “the vast majority of site specific and industry wide operating experience regarding neutron flux instrumentation circuits is related to cable/connector issues inside of containment near the reactor vessel.” JAF-RPT-05-LRD02 Page 32 of 279 under the same attribute states that the Non-EQ Instrumentation Circuits Review Program at JAFNPP is a new program for which there is no operating experience. Address industrial and plant specific operating experience in the basis document.

LR Response

Appendix B.1.18 provides the correct "Operating Experience" discussion for this program. JAF-RPT-05-LRD02 will be revised to agree with Appendix B.1.18.

JAFNPP AMP and AMR Database

Audit Question
469

LR Request
B.1.19-1 Non-EQ Insulated Cables and Connections
GALL XI.E1 under "Operating Experience" states that "operating experience has shown that adverse localized environment caused by heat or radiation for electrical cables and connections may exist next to or above (within three feet of) steam generators, pressurized or hot process pipes, such as feedwater lines." JAF-RPT-LRS02 Page 38 of 279 states that the Non-EQ Insulated Cables and Connections Program at JAFNPP is a new program for which there is not operating experience. Address industrial and plant specific operating experience in the basis document.

LR Response
Appendix B.1.19 provides the correct "Operating Experience" discussion for this program. JAF-RPT-05-LRD02 will be revised to agree with Apendix B.1.19.

JAFNPP AMP and AMR Database

Audit Question

470

LR Request

B.1.18-3 Non-EQ Instrumentation Circuits Test Review Program
Clarify whether the tests include both cables and connections.

LR Response

The testing for instrumentation circuits will include both cables and connections.

JAFNPP AMP and AMR Database

Audit Question
471

LR Request
AMP - General Comment
Appendix B - All programs in Appendix B state that the program "is comparable to" a GALL program.
This is not acceptable. Appendix B needs to state that the program is new or existing and that it meets one of the following criteria:
(1) Consistent with GALL
(2) Consistent with GALL with enhancements, or
(3) Consistent with GALL with exceptions
The plant specific programs will not need this criteria.

LR Response
JAF will revise Appendix B to clarify the "is comparable to " statements and to state if the program is new or existing.

This requires a LRA amendment.

JAFNPP AMP and AMR Database

Audit Question

472

LR Request

AMP B.1.1 Buried Piping and Tanks Inspection
For AMP B.1.1, Buried Piping and Tanks Inspection, please describe plant-specific operating experience information on any inspections of buried components performed at JAFNPP, including the date of the inspection, and any degradation found.

LR Response

A search of the condition report (CR) database from the early 1990s to present identified only one CR (CR-JAF-1993-00502) that provided historical operating experience for buried piping and tanks for JAFNPP. CR-JAF-1993-00502 was written to evaluate a leak in the H2 supply buried piping between the storage facility and the turbine building. The root cause for this CR recommended replacement of this section of piping, because of poor application of protective coatings. Therefore, this pipe leak was the result of a manufacturing issue not aging.

During a period from the mid-1990s to present, several fire protection system buried valves were excavated through the work order process. None of the excavated valves showed evidence of corrosion; therefore, no CRs were written.

JAFNPP AMP and AMR Database

Audit Question

473

LR Request

AMP B.1.21 One-Time Inspection
For AMP B.1.21, One-Time Inspection, please explain the inspection sample size for each inspection and state how it will be expanded if degradation is detected.

LR Response

The sample size is based on Chapter 4 of EPRI document 107514, Age Related Degradation Inspection Method and Demonstration, which outlines a method to determine the number of inspections required for 90% confidence that 90% of the population does not experience degradation (90/90). Components with the same material-environment combinations at other facilities may be included in the sample.

The program provides for increasing inspection sample size and locations in the event that aging effects are detected. Unacceptable inspection findings are evaluated in accordance with the JAFNPP corrective action process to determine the need for subsequent (including periodic) inspections and for monitoring and trending the results.

JAFNPP AMP and AMR Database

Audit Question

474

LR Request

For AMP B.1.21, One-Time Inspection, please explain how the specific inspection technique and location will be determined.

LR Response

Inspection techniques will be selected from 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 Part 50, Appendix B.
The inspection and test techniques will have a demonstrated history of effectiveness in detecting the aging effect of concern. Determination of inspection locations will be based on identification of low flow/stagnant areas, drains, and low points for system components managed by the program. These components are considered the most susceptible to aging effects.

JAFNPP AMP and AMR Database

Audit Question

475

LR Request

AMP B.1.22 Periodic Inspection and Preventive Maintenance
For AMP B.1.22, PSPM, please explain the inspection sample size for each inspection and how it will be expanded if degradation is detected.

LR Response

The sample size will be based on Chapter 4 of EPRI document 107514, Age Related Degradation Inspection Method and Demonstration, which outlines a method to determine the number of inspections required for 90% confidence that 90% of the population does not experience degradation (90/90). Components with the same material-environment combinations at other facilities may be included in the sample.
The program provides for increasing inspection sample size and locations in the event that aging effects are detected. Unacceptable inspection findings are evaluated in accordance with the JAFNPP corrective action process to determine the need for subsequent (including periodic) inspections and for monitoring and trending the results.

JAFNPP AMP and AMR Database

Audit Question
476

LR Request
For AMP B.1.22, PSPM, please explain how monitoring and trending of results are performed.

LR Response
Systems within the scope of the PSPM program are monitored through system engineering activities per site procedures. Results from monitoring activities are evaluated against acceptance criteria and trends are developed by comparing current results to previous results to predict degradation rates. These predictions are used to confirm that loss of component intended function will not occur prior to the next scheduled inspection. Use of trend data from these activities are used to revise inspection frequencies per the site preventive manintenance processes.

All degrading trends will be documented as a Condition Report per the JAF Corrective Action Program in accordance with 10CFR50 Appendix B.

JAFNPP AMP and AMR Database

Audit Question #

478

LR Request

The Main Condenser that is a component of the Steam and Power Conversion System is not identified in Section 3.4 of the LRA. How is aging management addressed for this component?

LR Response

The main condenser has no license renewal intended function and is not subject to aging management review.

JAFNPP AMP and AMR Database

Audit Question

479

LR Request

Why was note E identified in table 2, where the aging management program was the same in table 1 for the following line item:

3.5.1-5; 3.5.1-11; 3.5.1-12; 3.5.1-18; and 3.5.1-53. Please explain or make a correction to the table 2.

LR Response

Note "E" is used rather than Note "A" because the NRC and NEI agreed to use Note "E" rather than Note "A" when GALL specifies a plant-specific program. This indicates the need for the staff to review the acceptability of the program, while Note "A" would indicate that the use of the program had already been accepted as documented in the GALL report.

JAFNPP AMP and AMR Database

Audit Question

481

LR Request

Table 3.2.2-5 includes an AMR line item for carbon steel piping exposed to steam. The PSPM program is credited to manage loss of material due to flow accelerated corrosion instead of the FAC program, and Table 1 line item 3.2.1-19 is cited. Explain why the PSPM program is consistent with the flow-accelerated corrosion program for this AMR line item.

LR Response

Augmented inspections are performed at JAFNPP on selected piping components not part of inspections required by Generic Letter 89-08 and included in the Flow-Accelerated Corrosion Program. Because inspections outside the FAC program are performed on these components, the PSPM program is credited for management of loss of material due to erosion.

Plant-specific Note 204 is listed for line items where augmented inspections apply.

JAFNPP AMP and AMR Database

Audit Question

482

LR Request

AMR line-item 3.2.1-18 addresses cracking due to SCC and IGSCC for stainless steel piping, piping components, and piping elements exposed to treated water >60C (>140F). The AMR credits the Water Chemistry-BWR and One-Time Inspection programs instead of the Water Chemistry and BWR Stress Corrosion Cracking programs, which are recommended by NUREG-1801. Please explain why a single inspection under the one-time inspection program is adequate to replace the periodic inspections included in the BWR SCC program for the AMRs associated with this line item since these are Class 1 pressure boundary components.

LR Response

BWR SCC program is applicable to all BWR piping and piping welds made of austenitic SS and nickel alloy that is 4 in. or larger in nominal diameter and contains reactor coolant at a temperature above 93°C (200°F) during power operation, regardless of code classification. The piping components included in section 3.2 with temperatures above 200 for this line item are less than 4" NPS and are outside the reactor coolant system (RCS) pressure boundary. They are, therefore, outside the scope of the BWR SCC program. As a result the Water Chemistry Control – BWR program is used. As stated in LRA Section B.1.29.2, the Water Chemistry Control – BWR Program is consistent with the program described in NUREG-1801, Section XI.M2, "Water Chemistry." The One-Time Inspection Program, described in LRA Section B.1.21 includes inspections to verify the effectiveness of the water chemistry control aging management programs (Water Chemistry Control – Auxiliary Systems, Water Chemistry Control – BWR, and Water Chemistry Control – Closed Cooling Water) by confirming that unacceptable cracking, loss of material, and fouling is not occurring.

In addition, the components where line item 3.2.1-18 is applicable are included in the scope of the JAFNPP ISI program.

JAFNPP AMP and AMR Database

Audit Question

483

LR Request

Section A.2.2.7 of the LRA states that "loss of preload and cracking of the core plate rim hold-down bolts is a TLAA in accordance with the NRC's safety evaluation report on Topical Report-25." The Section states that JAFNPP "commits to preform a plant-specific calculation prior to the period of extended operation unless core plate wedges are installed during the remainder of the current operating period. The staff requests the following information relative to LRA Section A.2.2.7:

A. Clarify, using a technical discussion, how the TLAA provided in LRA Section 4.7.3.2 manages cracking in the core plate rim hold-down bolts.

B. The staff request that the LRA be amended to include Entergy's commitment to include options for managing or analyzing loss of preload (due to irradiation-assisted stress relaxation) in the core plate rim hold-down bolts.

LR Response

A. The loss of preload analysis does not specifically manage cracking of the core plate rim hold down bolts. Instead, the credited BWRVIP-25 inspections in the Reactor Vessel Internals Program manage cracking. The loss of preload analysis discussed in LRA Section 4.7.3.2 in conjunction with a plant-specific calculation will provide the acceptance criteria for cracking of the bolts, i.e. how many intact bolts are required to maintain adequate clamping force.

B. The JAFNPP response to RAI 4.7.3.2-1 will address the need for a commitment to perform the plant-specific analysis required in accordance with LRA Section A..2.2.7. The response to RAI 4.7.3.2-1 will be submitted under oath and affirmation.

1. Install core plate wedges prior to the period of extended operation, or,

2. Complete a plant-specific analysis to determine acceptance criteria for continued inspection of core plate rim hold down bolting in accordance with BWRVIP-25 and submit the inspection plan, INCL ACCEPT & JUSTIF FOR INSP PLAN, to the NRC two years prior to the period of extended operation for NRC review and approval.

3. Perform inspection of core plate rim hold down bolts in accordance with ASME Code Section XI or in accordance with an NRC-approved version of BWRVIP-25.

If Option 2 is selected, the analysis to determine acceptance criteria will address all the requests identified in RAI 4.7.3.2-1.

This requires an LRA amendment.

JAF Commitment 23.
Reference RAI 4.7.3.2-1.

JAFNPP AMP and AMR Database

Audit Question

484

LR Request

The staff has determined that the JAFNPP reactor building cranes are within the scope of license renewal and have been screened in for an aging management review. Clarify whether the reactor building crane is designed in accordance with CMAA-70 and if so, clarify whether the lift load analysis for the reactor building crane is a TLAA for the JAFNPP LRA. Provide your basis for concluding that the lift load analysis is or is not a TLAA for the LRA. If the lift load analysis for the reactor building crane is a TLAA for the LRA, amend the LRA to include the TLAA for staff review and provide your basis for concluding why the TLAA for the reactor building crane is acceptable in accordance with 10 CFR 54.21(c)(1)(i), (ii) or (iii).

LR Response

The JAF reactor building crane design complies with the guidelines of CMAA-70 as determined in response to NUREG-0612 in the late 1970s. No JAFNPP calculation or analysis related to cumulative fatigue damage for steel cranes met the definition of TLAA in 10 CFR 54.3. Steel cranes are evaluated as structural components in Section 3.5 of the JAFNPP LRA.

The license renewal rule, in 10 CFR 54.3, defines a TLAA as a licensee calculation or analysis that, among other things, involves time-limited assumptions defined by the current operating term. The estimated JAFNPP crane cycles in 40 years are 5000 cycles (Section 2.7.1 of LRPD03). The cycle range for class A cranes in CMAA-70 is 20,000 to 200,000 cycles. If the 5000 cycles is multiplied by 1.5 to project the number of cycles to 60 years, the resulting 7500 cycles is still well below the CMAA-70 Class A cycle limit.

JAFNPP AMP and AMR Database

Audit Question

485

LR Request

Section 4.3.3 of LRA provides the TLAA on environmentally-impacted metal fatigue of ASME Class 1 components. The TLAA discussion and evaluation in LRA does not include any environmentally impacted CUF value results for the RHR Class 1 piping or the FW line Class 1 piping at JAFNPP. These are among the locations identified, as a minimum, in NUREG/CR-6260 for environmental CUF evaluations. Discuss the activities and/or usage factor calculations that Entergy will conduct, if any, to ensure that environmentally impacted fatigue of the RHR Class 1 piping and FW line Class 1 piping will be managed in accordance with the acceptance criterion in 10 CFR 54.21(c)(1)(iii) or analyzed and projected for the PEO in accordance with 10 CFR 54.21(c)(1)(ii). In addition, the staff requests that Commitment #20 on the JAFNPP LRA be amended to be consistent the wording proposed by Entergy Nuclear Operations, Inc. for Commitment #31 of the LRA for the Pilgrim Nuclear Power Station.

LR Response

To satisfy LRA Commitment 20, JAFNPP will perform a fatigue analysis, i.e., calculate a CUF, for the RHR and FW piping and then adjust the CUF for environmentally assisted fatigue.

Commitment 20 is revised to match the wording proposed for Commitment 31 for PNPS license renewal. The revised wording for Commitment 20 is included in the response to Question 317.

JAFNPP AMP and AMR Database

Audit Question

487

LR Request

At the time Entergy performed its revised environmentally-assisted fatigue analysis, Entergy used hydrogen water chemistry (HWC) implementation to establish the oxygen concentrations (in ppm) used in its Fen adjustment factor calculations. Clarify whether Entergy factored in the oxygen concentrations derived from implementation of normal water chemistry (NWC) in the Fen calculations for those operational periods when NWC was being implemented instead of HWC.

LR Response

JAFNPP instituted hydrogen water chemistry (HWC) in August of 1988. Entergy will re-calculate the Fen values accounting for normal water chemistry (NWC) oxygen concentrations (150 – 200 ppb) and apply the revised Fen to the appropriate CUF values in LRA Table 4.3-3. The results of the revised calculation will be submitted as a change to LRA Table 4.3-3.

This requires an LRA amendment

JAF Commitment 20.

JAFNPP AMP and AMR Database

Audit Question

488

LR Request

In Table 8 of JAFNPP Document No. EAS-149-1286, dated January 1987, the fatigue evaluation for the reactor pressure vessel (RPV) closure region bolts calculated the Salt value according to the following equation:

Salt = Sp 2

The value of Sn was not provided. When Sp = 488 ksi, Sn is quite significant and Ke in normally higher than 1.0. Please provide the Sn value for the first load set and describe how it was calculated. Justify that Ke = 1.0.. This question is also applicable to the first load set combination in Table 3-1 of JAFNPP Report SIR-02-045, Revision 1.

LR Response

The Ke factor is not applicable based on the following explanation.

The design of the vessel bolts are based on 1965 ASME code section III paragraph N-416.

A. Paragraph N-416-1 (attached) requires that: 1) The maximum value of service stress, averaged across the bolt cross section and neglecting stress concentrations, shall not exceed two times the stress values of Table N-422; 2) The maximum value of service stress at the periphery of the bolt cross section (resulting from direct tension plus bending) and neglecting stress concentrations shall not exceed three times the stress values of Table N-422. Original design calculation page A-114 (attached) shows that both of these limits are met.
B. Paragraph N-416.2 b(1) requires that the peak stresses be calculated using a stress intensification factor of 4.0 (specified in paragraph N-416.4). Original design calculation page A-107 shows that a stress concentration factor of 4.0 was used to calculate peak stresses.
C. Paragraph N-416.2 b(2) states that Salt is equal to one-half of the stress range (max peak stress minus min peak stress). Original design calculation page A-115 shows that Salt were calculated using this method required by the code.

ASME code in section N-416 does not require an additional correction factor to Salt (the Ke factor stated above). The peak alternating stresses already contain a factor of 4.0 due to stress concentration.
Since the stresses in calculation EAS-149-1286 (DRF B13-01391) [Ref 3] were obtained from the original vessel calculations [Ref 1], then the methodology used in the original calculations apply to this calculation also.

References:

1. Combustion Engineering Calculation CENC-1159, Analytical Report for JAF Reactor Vessel, 1969.
2. 1965 ASEM Boiler and Pressure Vessel Code
3. GE Calculation EAS-149-1286 (DRF B13-01391), Reactor Pressure Vessel Fatigue Evaluation for the James A. Fitzpatrick Nuclear Power Plant, January, 1987

JAFNPP AMP and AMR Database

Audit Question

489

LR Request

Table 2 of Minor Change Calculation No. DRN-03-00749 to Calculation
No. SIR-02-045, Revision 1, provides a value of 0.852 for the original 40-year CUF and a value of 0.0114 for the 60-year CUF value for the CRD nozzle housing/stub tube junction. This is a factor of 112 difference between the CUF values. Provide your technical basis for the difference in the CUF values.

LR Response

The difference in the CUF values is attributed to:

1. The original calculations [1] were performed by very conservative hand computations. These calculations computed the CUF to be 0.780. Subsequently, this CUF value was revised to account for the Power Uprate conditions
[2]. The original CUF of 0.780 was multiplied by a factor to obtain a CUF of 0.852 for power uprate conditions.

The latest calculations [3, 4] performed utilized a detailed finite element model to determine the CUFs for 60-year plant operation. The stresses in the CRD nozzle region were obtained by the use of ANSYS computer program and this finite element model. The stresses developed reflect the actual geometry and the loading conditions around the CRD nozzle region. These stresses obtained from the finite element analysis are lower compared to the original calculations [1].

2. The original calculations [1, 2] assumed that all transients result in the maximum calculated peak stresses. Therefore, all transient cycles were added together and this total was divided by the allowable number of cycles based on the maximum alternating stress. This is very conservative.

The latest calculations [3, 4] take into account all different transients and determine stresses and allowable cycles based on each transient. This yields in a lower CUF than the conservative methodology used in the original calculations [1, 2].

References:
1. Combustion Engineering Calculation CENC-1159, Analytical Report for PASNY Reactor Vessel for FitzPatrick Station, 1971
2. GE Report NEDC-32068, RPV Power Uprate Stress Report Reconciliation for the FitzPatrick Power Plant, 3/23/92
3. Structural Integrity Associates SIR-02-045, Updated Fatigue Analysis for JA FitzPatrick Nuclear Power Plant Reactor Pressure Vessel Components, 9/23/2002
4. Minor Calculation Change No: DRN-03-00794, 7/9/2003

JAFNPP AMP and AMR Database

Audit Question
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LR Request
TLAA on Metal Fatigue: Please provide a summary for the various metal fatigue analyses (including minor design calculation changes) performed to date for all Class 1 components (e.g., reactor vessel components, reactor internals, Class 1 piping, etc.) that have been analyzed in accordance with ASME Section III for fatigue cumulative usage factors (CUF). For each analysis performed to date, identify which vendor (e.g., GE, CE, SIA) performed the analysis, what the reference document pertains to the analysis, and the date that the analysis was performed. For each component analyzed, identify which fatigue analysis is the analysis of record as of today's date and describe the conditions, assumptions, and the applicable Code edition and addenda associated with the analysis.

LR Response
1.Show the chronology of the RPV analysis for the following issues:
a.Discuss CE>>>GE 1987 analysis>>>GE Uprate Analysis >>> SIA Analysis – Code of record, Why changed, etc.
B.List all calculations from CE calculation to present SIA analysis and any margin analysis.

Calculation - ASME Code Version - Reason for Calculation - Comments
Original
Combustion Engineering calculations
Dated 8/30/1971
ASME Section III, 1965 Edition and addenda through Winter 1966. Code cases 1332-4, 1335-2, 1336 and 1339-2.
Original design calculation

General Electric
EAS-149-1286
DRF B13-01391
Dated January 1987
ASME Section III, 1965 Edition and addenda through Winter 1966. Code cases 1332-4, 1335-2, 1336 and 1339-2.
Fatigue analysis was updated based on actual plant operating data for approximately the first eleven years. Fatigue usage factors were calculated and extrapolated to 40 years.
Fatigue Usage Factors were updated. Controlling four components were: 1) Closure Region Bolts, 2) Recirculation Inlet Nozzle, 3) Feedwater Nozzle, and 4) Control Rod Drive Nozzle

General Electric
NEDC-32068
DRF 137-0010
Dated March 1992
ASME Section III, 1965 Edition and addenda through Winter 1966. Code cases 1332-4, 1335-2, 1336 and 1339-2
ASME Section III 1974 Edition with Addenda to and including Summer 1976
Fatigue analysis was updated for Power Uprate conditions using the bounding components, i.e. the components with the highest usage factors. Fatigue Usage Factors were updated for components: 1) Closure Region Bolts, 2) Recirculation Inlet Nozzle, 3) Feedwater Nozzle, 4) Control Rod Drive Nozzle, 5) Shroud Support, and 6) Vessel Shell

Structural Integrity Associates
SIR-02-045, Rev 1
Dated 9/23/2002
ASME Section III, 1989 Edition Fatigue analysis was updated for a 60-year plant operation based on actual plant transient information
Fatigue Usage Factors were updated. Controlling four components were: 1) Closure Region Bolts, 2) Recirculation Inlet Nozzle, 3) Feedwater Nozzle, and 4) Control Rod Drive Nozzle

Entergy
Minor Calculation Change No: DRN-03-00794
ASME Section III, 1965 Edition and addenda through Winter 1966
A code reconciliation was performed on SIA calculation SIR-02-045 Rev. 1, to revise CUFs calculated in the SIA calculation

JAFNPP AMP and AMR Database

The only change in the CUFs were for the 1) Recirculation Inlet Nozzle and, 2) CRD Nozzle

c.Shroud Tie Rod – Analysis of record and any margin calculations (list – with discussion).

The analysis of record for the shroud tie rod fatigue usage factors is:
1.Original MPR design calculation 291-9401-202, "Tie Rod Assembly Stress Evaluation", Rev. 1, 10/21/1994. This calculates the maximum CUF as 0.0575 for 40-year operation. This CUF was multiplied by a ratio to obtain the 60-year operation CUF.
2. There are no margin calculations on shroud tie rod fatigue evaluation.

D.Jet Pump Fatigue Evaluation

The CUF for the jet pump diffuser adapter was obtained from the UFSAR (pg 16.2-7) maximum value of 0.65 multiplied by a factor of 1.5. The UFSAR states that the fatigue analysis method is described in GE document APED-5460 "Design and Performance of GE-BWR Jet Pumps", dated September 1968.

2.From the 1987 GE Analysis – (EAS-149-1286/DRF B13-01391) provide the following input:
a.Justify the Operating Data Reduction as discussed in Table 2, 3.

Actual plant data is listed in Table 2 from initial start-up through 7/3/1986.These events are summarized in Table 3. Based on these actual plant transients, projections were made for 40-year operation.

The actual plant data included the following:
a.Summary of events from operator logs
b.Post trip computer edits if available
c.Recirculation temperature and flow rate strip charts.
D.Feedwater and main steam flow rate strip charts.
E.Reactor Pressure strip charts.
F.Balance of plant logs
g.Closure region tensioning data.

B.Provide justification on page 19 of the 6 transients that exceeded the original design basis.

These events are considered to be less severe than the original design basis events based on the following reasoning:
1) The ΔT's occur over a finite period of time, i.e. they are not instantaneous.
2) Whenever data was available from balance of plant logs, it suggested that the temperature changes occurred relatively slowly, i.e. less than 100 oF/hour. Since it is a Technical Specifications requirement to shut down or startup the reactor less than or equal to 100 oF/hour this assumption was used when data was not available. This is conservative.
3) The original analysis (CE analysis) thermal stresses are inherently conservative because they are based on shell interaction equations and use conservative assumptions.
Thus, it is considered conservative to use the original design basis thermal stresses for the updated fatigue evaluation.

3.Why seismic loading was not included in the RV head bolting fatigue analysis?

The vertical seismic Load Factor of 0.2 g's is in the original design parameters as shown in Attachment 1, pg 3. However, transient conditions stated on page 4 does not include seismic loading. This is due to the fact that the low vertical seismic is compensated by dead weight, resulting in zero tensile stress in the reactor vessel studs.