FENOC
FirstEnergy Nuclear Operating Company

Peter P. Sena III
Site Vice President

724-682-5234
Fax: 724-643-8069

July 21, 2008
L-08-212

10 CFR 54

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

SUBJECT:
Beaver Valley Power Station, Unit Nos. 1 and 2
BV-1 Docket No. 50-334, License No. DPR-66
BV-2 Docket No. 50-412, License No. NPF-73
Reply to Request for Additional Information for the Review of the Beaver Valley Power Station, Units 1 and 2, License Renewal Application (TAC Nos. MD6593 and MD6594), and License Renewal Application Amendment No. 17

Reference 1 provided the FirstEnergy Nuclear Operating Company (FENOC) License Renewal Application (LRA) for the Beaver Valley Power Station (BVPS). Reference 2 requested additional information from FENOC regarding the BVPS license renewal integrated plant assessment in Sections 3.1.2.2, 3.2.2.2.3, 3.3.2.1.X, 3.3.2.2, 3.3.2.3, 3.3.2.3-X, 3.4.2.2, 3.4.2.3, B.2, B.2.28, B.2.33, B.2.40, and B.2.41 of the BVPS LRA.

The Attachment provides the FENOC reply to the U.S. Nuclear Regulatory Commission request for additional information. The Enclosure provides Amendment No. 17 to the BVPS License Renewal Application.

There are no regulatory commitments contained in this letter. If there are any questions or if additional information is required, please contact Mr. Clifford I. Custer, Fleet License Renewal Project Manager, at 724-682-7139.

I declare under penalty of perjury that the foregoing is true and correct. Executed on July 21, 2008.

Sincerely,

Peter P. Sena III

A108
NRR

References:

1. FENOC Letter L-07-113, "License Renewal Application," August 27, 2007.
2. NRC Letter, "Request for Additional Information for the Review of the Beaver Valley Power Station, Units 1 and 2, License Renewal Application (TAC Nos. MD6593 and MD6594)," June 5, 2008.

Attachment:

Reply to Request for Additional Information Regarding Beaver Valley Power Station, Units 1 and 2, License Renewal Application, Sections 3.1.2.2, 3.2.2.2.3, 3.3.2.1.X, 3.3.2.2, 3.3.2.3, 3.3.2.3-X, 3.4.2.2, 3.4.2.3, B.2, B.2.28, B.2.33, B.2.40, and B.2.41

Enclosure:

Amendment No. 17 to the BVPS License Renewal Application

cc: Mr. K. L. Howard, NRC DLR Project Manager
Mr. S. J. Collins, NRC Region I Administrator

cc: w/o Attachment or Enclosure
Mr. B. E. Holian, NRC DLR Director
Mr. D. L. Werkheiser, NRC Senior Resident Inspector
Ms. N. S. Morgan, NRC DORL Project Manager
Mr. D. J. Allard, PA BRP/DEP Director
Mr. L. E. Ryan, PA BRP/DEP

ATTACHMENT
L-08-212

Reply to Request for Additional Information Regarding
Beaver Valley Power Station, Units 1 and 2,
License Renewal Application,
Sections 3.1.2.2, 3.2.2.2.3, 3.3.2.1.X, 3.3.2.2, 3.3.2.3, 3.3.2.3-X,
3.4.2.2, 3.4.2.3, B.2, B.2.28, B.2.33, B.2.40, and B.2.41

Section 3.1.2.2

Question RAI 3.1.2.2.7.1-1

The staff has determined that the applicant has credited: (1) the Water Chemistry Program to manage cracking due to stress corrosion cracking (SCC) in the bottom mounted instrumentation (BMI) guide tubes as a result of exposure to the components to the reactor coolant, and (2) the One-Time Inspection Program to verify the effectiveness of a Water Chemistry Program in precluding or mitigating cracking due to SCC in these components. The staff has also noted that, in the BVPS LRA, the applicant credits a combination of the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsection IWB, IWC, and IWD Program to manage cracking due to SCC on other stainless steel (including CASS) ASME Code Class 1 components that are exposed to the reactor coolant. These BMI guide tubes are ASME Code Class 1 reactor coolant pressure boundary (RCPB) components. The staff requests that the applicant provide the following information with respect to the program that are credited for management of cracking in the BMI guide tubes. Part 1: Identify whether there is any applicable BPVS-specific in industry generic operating experience on cracking due to SCC of stainless steel PWR BMI guide tubes. Part 2: Provide your basis why a One-Time Inspection Program is justified to manage cracking due to SCC in the stainless steel BMI guide tubes in lieu of crediting a periodic condition monitoring program, such as the ASME Section XI, Subsections IWB, IWC, and IWD Program, particularly when the BMI guide tubes are categorized as an ASME Code Class 1 RCPB components.

RESPONSE RAI 3.1.2.2.7.1-1

FENOC has determined that the Beaver Valley Power Station (BVPS) ASME Section XI Inservice Inspection Subsections IWB, IWC, and IWD Program is applicable to the bottom-mounted instrumentation guide tubes. The BVPS License Renewal Application, (LRA), Table 3.1.2-1 is revised to replace row 2, which assigns the One-Time Inspection Program to manage cracking of the bottom-mounted guide tubes, with a row that assigns the ASME Section XI Inservice Inspection Subsections IWB, IWC, and IWD Program to manage cracking of the bottom-mounted guide tubes. Based on this change, LRA Table 3.1.1, row 23 and LRA Further Evaluation Section 3.1.2.2.7.1 are revised to identify the assignment of the ASME Section XI Inservice Inspection

Subsections IWB, IWC, and IWD Program instead of the One-Time Inspection Program to manage cracking of the bottom-mounted guide tubes. Also, LRA Section 3.1.2.1.1, list of assigned programs, is revised to remove the One-Time Inspection Program from the list of aging management programs for the Reactor Vessel System, because there are no other component types in the system that credit the One-Time Inspection Program.

Part 1:

FENOC has not identified any plant-specific operating experience regarding cracking of the bottom-mounted instrument guide tubes. A search of the Institute for Nuclear Power Operations (INPO) Operating Experience database identified a 1989 event at Turkey Point in which transgranular stress corrosion cracking (TGSCC) was identified in several bottom-mounted instrument guide tubes. The cracking occurred above the seal table due to chloride contamination and intermittent wetting. Additionally, NRC Information Notice 2003-11, "Leakage Found on Bottom-Mounted Instrumentation Nozzles," describes axially-oriented cracks that were identified in two bottom-mounted instrumentation penetration nozzles at South Texas Project Unit 1. The utility concluded that the most likely root cause explanation for the degradation was "manufacturing (welding) flaws resulting in excessive stress in the nozzle/weld material leading to crack initiation with low cycle fatigue/primary water stress corrosion cracking then supporting crack propagation."

Part 2:

FENOC is crediting the BVPS ASME Section XI Inservice Inspection Subsections IWB, IWC, and IWD Program as a periodic condition monitoring program for the bottom-mounted instrumentation guide tubes.

See the Enclosure to this letter for the revision to the BVPS LRA.

Question RAI 3.1.2.2.13-1

GALL AMR IV.C2-21 provides the staff's AMR recommendations for managing cracking due to pressurized water stress corrosion cracking pressurizer instrumentation penetrations, heater sheaths and sleeves, heater bundle diaphragm plate, and manways and flanges that are fabricated from Nickel-alloy materials or are designed with internal Nickel-alloy cladding. In WCAP-14574-A, "License Renewal Evaluation: Aging Management Evaluation for Pressurizers" (ADAMS ML010660292), as approved in the staff's safety evaluation of October 26, 2000 (ADAMS ML003763768), Westinghouse Electric Corporation (WEC) provides a generic design basis for Westinghouse-designed pressurizers. In this report WEC identifies that the Nickel-alloy locations in Westinghouse-designed pressurizers are those for the safe end welds for the pressurizer safety,

relief, spray and surge nozzles. In order to assist the staff in verifying whether or not GALL AMR IV.C2-21 is applicable to the BVPS LRA and to confirm the applicability of the generic conclusions in WCAP-15474-NP-A, clarify whether or not the BPVS design includes pressurizer instrumentation penetrations, heater sheaths and sleeves, heater bundle diaphragm plate, and manways and flanges that are made from Nickel-alloy materials or are designed with internal Nickel-alloy cladding. ***NOTE TO FENOC: The NRC reviewer did find some entries in the LRA that may correspond to some of these component commodity groups but the names did not match up exactly to the GALL names.***

RESPONSE RAI 3.1.2.2.13-1

The only nickel alloy locations (materials or cladding) associated with the BVPS pressurizer components are the spray nozzle safe end welds (both units), the surge nozzle safe-end weld (Unit 2 only), and the safety and relief nozzle safe-end welds (both units). Aging management for these components are compared to NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," row IV.C2-24, for cracking in LRA Table 3.1.2-3, rows 111, 112 and 113.

Question RAI 3.1.2.2.16.2-1

SRP-LR Section 3.1.2.2.16.2, in part, makes the following recommendation for pressurizer spray heads that are fabricated with Nickel-alloy structural/pressure retaining materials:

> ***"For nickel alloy welded spray heads, the GALL Report recommends no further aging management review if the applicant complies with applicable NRC Orders and provide a commitment in the FSAR supplement to implement applicable (1) Bulletins and Generic Letters and (2) staff-accepted industry guidelines."***

Clarify whether or not the CASS pressurizer spray heads are secured to the pressurizer upper head using a Nickel-alloy weld material. If Nickel-alloy welds are used as the basis for securing the CASS pressurizer spray heads to the upper pressurizer heads, provide your basis why the commitment mentioned SRP-LR Section 3.1.2.2.16.2 and in GALL AMR item IV.C2-17 has not been credited for aging management of cracking due to SCC and/or PWSCC in the pressurizer spray heads at BVPS.

RESPONSE RAI 3.1.2.2.16.2-1

There are no nickel alloy components or weld material associated with the pressurizer spray heads within the pressurizers. The spray heads at both units are fabricated of cast austenitic stainless steel and are secured by threading to spray head couplings (pipes) and locking bars, which are fabricated of stainless steel. These components are compared to NUREG-1801, row IV.C2-17, for management of cracking in LRA Table 3.1.2-3, rows 126 and 127. See also LRA Table 3.1.1, Item Number 3.1.1-36, and Further Evaluation Section 3.1.2.2.16.2.

However, the pressurizer spray nozzle safe end welds (external to the pressurizer upper head) at both units are nickel alloy, and are compared to NUREG-1801, row IV.C2-24, for management of cracking in LRA Table 3.1.2-3, items 111, 112, and 113. See also LRA Table 3.1.1, Item Number 3.1.1-31, and Further Evaluation Section 3.1.2.2.13. FENOC provided commitments for the nickel-alloy components and nickel-alloy clad components in LRA Table A.4-1, "Unit 1 License Renewal Commitments," Item Number 15, and Table A.5-1, "Unit 2 License Renewal Commitments," Item Number 17, to develop a plant-specific aging management program that will implement applicable (1) NRC Orders, Bulletins and Generic Letters, and (2) staff-accepted industry guidelines.

Section 3.2.2.2.3

Question RAI 3.2.2.2.3.1-1

In LRA Section 3.2.2.2.3.1, FENOC indicates that the AMRs on loss of material due to pitting and crevice corrosion of stainless steel containment isolation piping components under exposure to a treated water environment would be handled by the Type "2" AMR tables for their parent system. However, the staff has noted that the AMRs on loss of material in LRA Tables 3.2.2-1 though 3.2.2-3, LRA Tables 3.3.2-1 through 3.3.2-32, and LRA Tables 3.4.2-1 through 3.4.2-10 do not specifically identify which of the AMR items in the tables, if any, cover management of loss of material in these containment isolation components. Identify all plant systems that contain containment isolation system components that are within the scope of LRA Section 3.2.2.2.3.1 and which of the specific AMR items in LRA Tables 3.1.2-1 through 3.1.2-3, LRA Tables 3.2.2-1 though 3.2.2-3, LRA Tables 3.3.2-1 through 3.3.2-32, and LRA Tables 3.4.2-1 through 3.4.2-10, if any, cover the scope of the stainless steel containment isolation components that are addressed in LRA Section 3.2.2.2.3.1. Clarify which AMPs are credited to manage loss of material due to pitting and crevice corrosion in the containment isolation component surfaces that are exposed to treated water.

RESPONSE RAI 3.2.2.2.3.1-1

LRA Section 3.2.2.2.3.1 and Table 3.2.1, Item 3.2.1-03, address loss of material for stainless steel containment isolation piping and components internal surfaces that are exposed to treated water. The only NUREG-1801 Volume 2 row that aligns to NUREG-1801, Volume 1, Table 2, Item 3, and to Further Evaluation 3.2.2.2.3.1, is row V.C-4. This NUREG-1801 row recommends management of loss of material by the NUREG-1801, Section XI.M2, "Water Chemistry," program, augmented by verification of effectiveness with the Section XI.M32, "One-Time Inspection," program.

BVPS does not have one single system that consolidates containment isolation components. Additionally, NUREG-1801, Section V.C, does not address some materials, environments, and aging effects associated with containment penetrations (NUREG-1801, Section V.C, does not address materials such as copper, used in compressed air systems, does not address environments such as raw water other than open-cycle cooling water, gas environments such as nitrogen or dried air, and treated borated water, and does not address aging effects such as cracking of stainless steel in any environment other than "Closed cycle cooling water"). Therefore, FENOC did not consider NUREG-1801, Section V.C, as a comprehensive reference section for aging evaluation comparisons, and used other NUREG-1801 Chapters for aging comparisons of piping elements.

In addition to row V.C-4, NUREG-1801 contains 18 other rows in Sections IV, V, VII and VIII that address loss of material for stainless steel components in treated water. In each case, NUREG-1801 recommends the Section XI.M2, "Water Chemistry," and XI.M32, "One-Time Inspection," programs. For each instance of a stainless steel component in the "Treated water," "Treated water >60°C (>140°F)," or "Treated water >250°C (>482°F)" environments in LRA Sections 3.1, 3.2, 3.3, and 3.4, FENOC credited the BVPS Water Chemistry and One-Time Inspection Programs with management of loss of material. Therefore, the containment penetration components in various systems that would have been compared to NUREG-1801, row V.C-4, (and for which Further Evaluation Section 3.2.2.2.3.1 would have applied) for consistency with material, environment and aging effect, are consistent with the recommendations of NUREG-1801 row V.C-4 and NUREG-1800, Section 3.2.2.2.3.1, for the assigned aging management programs.

Question RAI 3.2.2.2.3.3-1

In LRA Section 3.2.2.2.3.3, FENOC states that, while the recommendations in SRP-LR Section 3.2.2.2.3.3 are applicable only to the evaluation of loss of material in aluminum or stainless steel BWR emergency safety feature (ESF) piping, piping components, and piping elements that are exposed treated water, FENOC conservatively decided to use this SRP-LR section to further evaluate the

potential for loss of material to occur in the BVPS stainless steel emergency safety feature (ESF) components that are exposed to a treated NaOH-based water environment (i.e., a hydroxide-based alkaline water environment). The staff noted that consistent with this SRP-LR guidance, FENOC credits its Water Chemistry Program to manage loss of material due to pitting and crevice corrosion in the BVPS chemical injection/addition pumps that are exposed to a treated NaOH-based water environment and its One-Time Inspection Program to verify the effectiveness of the Water Chemistry Program in managing this aging effect.

Part 1: Clarify why the NaOH-based treated water environment discussed in LRA Section 3.2.2.3.3 is considered to be the equivalent of the BWR treated water environment addressed in SRP-LR Section 3.2.2.2.3.3. Part 2: Clarify why the AMR for managing loss of material due to pitting and crevice corrosion is limited only to the stainless steel ESF systems that are exposed to the NaOH-based treated water, and of these systems, only to the surfaces of chemical injection or addition pumps that are exposed to the NaOH-treated water environment.

RESPONSE RAI 3.2.2.2.3.3-1

Part 1:

NUREG-1801, Section IX.D, "Selected Definitions and Use of Terms for Describing and Standardizing Environments," describes "Treated water" as demineralized water, which is the base water for all clean systems in BWRs and PWRs. The Electric Power Research Institute (EPRI) document EPRI-1010639 "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools," (EPRI Mechanical Tools) indicates that the common alkalis, such as caustic soda (sodium hydroxide - NaOH), are not particularly corrosive. Aging effects of components exposed to sodium hydroxide solutions used at nuclear power plants for pH control are no different than those for other water treatments except for the potential for caustic corrosion, and caustic cracking. The potential for caustic corrosion and caustic cracking is dependent upon both temperature and concentration of the NaOH. Austenitic stainless steels are very resistant to caustic corrosion in NaOH concentrations up to 50%. Austenitic stainless steels are susceptible to caustic cracking when NaOH concentrations exceed 25% and temperatures are above 212°F. NaOH concentrations do not exceed 25% in the BVPS Containment Depressurization System, and operating temperatures of the tanks do not exceed 125°F. Therefore, neither caustic corrosion nor caustic cracking are aging effects requiring management for the components exposed to NaOH, and the aging effects for components exposed to the solution are equivalent to those for other treated water environments. Since the aging effects for the selected components exposed to the NaOH solution are equivalent to those for other treated water environments, then the comparison to the BWR treated water environment is considered to be acceptable.

The applicable aging effects of loss of material due to pitting and crevice corrosion were identified for each of the components for which loss of material was compared to NUREG-1801, row V.D2-28. NUREG-1801, row V.D2-28, is the only row used in the BVPS LRA that links to Table 3.2.1-5, and to Further Evaluation Section 3.2.2.2.3.3.

Part 2:

The AMR results in LRA Table 3.2.2-1 that link to Section 3.2.2.2.3.3 through Table 3.2.1-5 are not limited only to stainless steel chemical injection or addition pumps that are exposed to NaOH-treated water. The first paragraph of LRA Section 3.2.2.2.3.3 was intended to address all treated water environments that are compared to NUREG-1801, row V.D2-28, and which link to LRA Section 3.2.2.2.3.3 via Table 3.2.1-5, not just the NaOH-treated water environment. The first sentence of the second paragraph was intended to provide clarification for what a reviewer might consider to be an unusual match (i.e., the NaOH environment), and does not list all component types exposed to the NaOH-treated water environment. Piping, valve body and tank components in the Chemical Addition / Chemical Injection subsystem are also exposed to NaOH treated water. The text of LRA Section 3.2.2.2.3.3 is revised to include a discussion regarding the use of NaOH-treated water and the components that are exposed to the NaOH solution.

See the Enclosure to this letter for the revision to the BVPS LRA.

Question RAI 3.2.2.2.3.6-1

In LRA Section 3.2.2.2.3.6, FENOC credits its Internal Surfaces of Miscellaneous Piping and Ducting Program (LRA AMP B.2.28) to manage loss of material due to pitting and crevice corrosion in internal stainless steel tank surfaces of the emergency safety feature systems (i.e., in the containment depressurization systems and safety injection systems) as a result of exposure to condensation. FENOC categorizes its Internal Surfaces of Miscellaneous Piping and Ducting Program as a new AMP that is entirely consistent with the program elements in GALL AMP XI.M38, "Inspection of Internal Surfaces of Miscellaneous Piping and Ducting," without exception or the need for enhancement. The staff has noted that the scope of GALL AMP XI.M38 is limited to visual inspections of the internal surfaces of steel (including carbon steel, alloy steel and cast irons) piping, piping elements, ducting, and components that are not addressed in other aging management programs, and that the scope of GALL AMP XI.M38 does not include the internal surfaces of stainless steel components. Part 1: Identify which specific tank in the safety injection system is exposed internally to the condensation environment. Part 2:, Justify and provide your basis why the scope of the Inspection of Internal Surfaces of Miscellaneous Piping and Ducting Program is considered to be acceptable for managing the loss of material due to

pitting and crevice corrosion in the stainless steel emergency safety feature (ESF) tank surfaces (including those in the RWSTs, chemical addition tanks, and the miscellaneous tank grouping in the SI system) under exposure to an internal condensation environment.

RESPONSE RAI 3.2.2.2.3.6-1

Part 1:

The specific tank in the safety injection system for which "Loss of material" is compared to NUREG-1801, row V.D1-29, and which is linked to LRA Section 3.2.2.2.3.6 via LRA Table 3.2.1-8, is the Unit 1 Boron Injection Surge Tank (1SI-TK-2, shown on LR Drawing 1-11-1, grid B-2, colored blue for the 10 CFR 54.4(a)(2) function).

Part 2:

The BVPS Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components Program is used to manage the internal surfaces of the tank at and above the normal waterline. While the NUREG-1801, Section XI.M38, "Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components," program description does not identify applicability to materials other than steel, similar inspections are capable of detecting loss of material from stainless steel surfaces prior to loss of the component intended function. Loss of material at or above the normal waterline is expected to result in surface irregularities of sufficient size as to be identified visually prior to loss of component function.

Section 3.3.2.2

Question RAI 3.3.2.2.6-1

LRA Section 3.3.2.2.6 provides your AMR further evaluation assessment for the boral and boraflex materials used in the BVPS spent fuel pool storage rack designs. In this section, FENOC states that reduction of neutron absorption capability is not an aging effect requiring management for the Boral coupons used in the BPVS Unit 1 spent fuel storage rack design. The staff has verified that, in AMR item 3.3-13 of LRA Table 3.3.1, the applicant identifies that loss of material is an applicable aging effect requiring management (AERM) for boral coupons used in the design of the BVPS Unit 1 spent fuel storage racks. The staff is of the opinion that loss of material in the Boral materials may impact the neutron absorption capability of the Boral coupons used in the spent fuel storage rack designs. Part 1. Justify why reduction of neutron absorption capability has not been identified as an AERM for the Boral materials used in the design of the BVPS Unit 1 spent fuel pool storage racks, particularly when loss of material has

been identified as an AERM for this material. Part 2. Justify why a one-time inspection of the Boral coupons has not been credited and coupled to the Water Chemistry Program, in order to confirm that the Water Chemistry Program is effective in managing potential loss of material, and possibly reduction of neutron absorption capability, in the Boral coupons.

RESPONSE RAI 3.3.2.2.6-1

Part 1:

The loss of material aging effect for Boral® identified by FENOC is associated with the aluminum cladding, not with the boron carbide neutron absorber material sandwiched within the cladding.

Boral® in the Unit 1 spent fuel pool rack walls is credited with maintaining sub-criticality with $k_{eff} \leq 0.95$ for stored fuel. Boral® is a neutron absorbing material of a uniformly dispersed mixture of boron carbide and aluminum powders, clad in aluminum sheets, and hot-rolled to produce an integral three-layer panel. No aging effects have been identified in the industry that affect the boron carbide's neutron absorption function.

FENOC used the EPRI Mechanical Tools to determine that the aluminum cladding of Boral® may be susceptible to pitting and/or crevice corrosion in treated water. Aluminum develops a strongly-bonded oxide film, which gives it excellent corrosion resistance in many environments. This film is quite stable in neutral and many acidic solutions, but is attacked by alkalis. Aluminum alloys exhibit negligible action in boric acid solutions. The normal environment of the Unit 1 spent fuel pool is borated water. FENOC credits the Water Chemistry Program to manage loss of material by maintaining chemistry parameters within the normal range in which aging effects are negligible.

NRC Memo, "Resolving Spent Fuel Storage Pool Action Plan Issues" (July 26, 1996; Attachment, Section 3.3.1), concludes that degradation of neutron absorption performance has not been observed in materials other than Boraflex® for any operating reactors in the United States. Potential aging effects resulting from sustained irradiation of Boral® were previously evaluated by the NRC (BNL-NUREG-25582, dated January 1979) and determined to be insignificant. Therefore, reduction of neutron absorption is not an aging effect requiring management for Boral® in a treated water environment.

Part 2:

FENOC credited only the Water Chemistry Program to manage loss of material of Boral® aluminum cladding because the EPRI Mechanical Tools indicate that aluminum alloys exhibit negligible corrosion in boric acid solutions. NUREG-1801 does not address aluminum in treated borated water, so FENOC considered stainless steel in treated borated water to be an analogous combination for NUREG-1801 comparison of aging management for this issue. NUREG-1801, rows V.A-27 and V.D1-30,

recommend management of loss of material due to pitting and crevice corrosion for some stainless steel components in treated borated water environments (including components with low or stagnant flow, such as tanks) with the Water Chemistry Program, and without verification by a One-time Inspection Program. Therefore, FENOC considered the assignment of the Water Chemistry Program without the additional assignment of a One-Time Inspection Program to have precedent in NUREG-1801 for management of loss of material in treated borated water.

As described in Part 1 of this response, industry operating experience has not identified degradation of neutron absorption performance for Boral®, and the BVPS aging management reviews did not identify reduction of neutron absorption as an aging effect requiring management. Since reduction of neutron absorption was not identified as an aging effect requiring management, FENOC did not assign a program to manage the effect. However, the 1993 Safety Evaluation Report for BVPS Unit 1 License Amendment 178 that supported the Unit 1 fuel pool rerack (and installation of Boral®) includes a commitment for a Boral® Surveillance Program that will characterize the performance of the Boral® panels during the remaining life time of the plant. The surveillance program calls for removing and testing one coupon from the mounting jacket at the following intervals relative to the installation of the racks: 1st cycle, 2nd cycle, 4th cycle, 7th cycle, 10th cycle, 20th cycle, 30th cycle, and 40th cycle. Each coupon, upon its removal from the mounting jacket, is required to be analyzed according to the following tests:

- Visual Observation and Photography
- Neutron Attenuation
- Dimensional Measurements (length, width, and thickness)
- Weight and Specific Gravity

The neutron attenuation and the dimensional measurements are used to determine whether or not the coupons are exhibiting any signs of boron loss or structural deformation, respectively. The gravimetric analyses are performed to augment the results of the neutron attenuation studies should boron loss be indicated.

The BVPS operating experience from this program includes identification of coupon blistering, as well as oxidation that did not appear to be progressing. The evaluation of these results considered the potential for these effects to have an impact on the neutron absorption properties, and concluded that the results of the tests were indicative of satisfactory material performance. No changes to the current surveillance interval are planned. The next set of coupons are scheduled to be removed, inspected and tested in 2011, and are required to be compared to previous test results and other available industry OE at that time. While this program is not credited for License Renewal, the commitment for the program under the current licensing basis will remain in effect. Since the 40th cycle after installation occurs

roughly 60 years after installation of the Boral®, the planned program duration exceeds the end of the period of extended operation.

Question RAI 3.3.2.2.13-1

Part 1. Provide your technical basis why the internal and external surfaces of elastomeric seals or components in the control area and plant area ventilations systems would not be subject to the mechanical aging mechanism of wear or abrasion. Part 2. Using the information in Part 1 of this question and any other relevant information, provide your basis on whether or not GALL AMR items VII.F1-5 and VII.F1-6 (as applicable to the management of loss of material/wear in external and internal elastomeric seal or component surfaces of control room area ventilation systems under exposure to indoor air) are applicable to the BPVS LRA and whether or not GALL AMR items VII.F2-5, VII.F2-6, VII.F3-5, VII.F2-6, VII.F4-4, and VII.F4-5 (as applicable to the management of loss of material/wear in external and internal elastomeric seal or component surfaces of the plant area ventilation systems]) are applicable to the BVPS LRA.

RESPONSE RAI 3.3.2.2.13-1

Part 1:

FENOC used the EPRI Mechanical Tools and EPRI-1002950, "Aging Effects for Structures and Structural Components (Structural Tools)," supplemented by operating experience reviews, to identify potential aging effects for material-environment combinations. In the EPRI Mechanical and Structural Tools, "wear" is evaluated as a design consideration, rather than an aging effect. Instances of significant wear or fretting are not related to normal aging, and are expected to manifest well before the period of extended operation and be corrected. As such, it is expected that loss of material due to wear or fretting from normal plant operations is insufficient to result in loss of component function during the period of extended operation. The EPRI Tools do not specifically consider loss of material due to wear or abrasion to be applicable aging mechanisms for internal or external surfaces of elastomers, but recommends plant-specific consideration for the potential that loss of material due to wear may occur. FENOC's review of plant-specific operating experience did not identify any elastomeric components for which loss of material due to wear was determined to be an additional aging effect that required management.

Part 2:

As described in Part 1 of this response, FENOC did not identify loss of material due to wear to be an applicable aging effect requiring management for elastomeric components. As a result, NUREG-1801, rows VII.F1-5, VII.F1-6, VII.F2-5, VII.F2-6,

VII.F3-5, VII.F3-6, VII.F4-4 and VII.F4-5, which all address loss of material due to wear for elastomers, are not applicable to the BVPS LRA. It should be noted, however, that the aging effects of "Cracking" and "Hardening and loss of strength" were identified as aging effects requiring management for the external surfaces of elastomeric flexible ventilation connections that are subject to aging management review. As identified in the FENOC response to RAI-3.3.2.3-1 / 3.4.2.3-1, other elastomeric components in LRA Sections 3.1, 3.2, 3.3, and 3.4 will be addressed by repetitive maintenance tasks such that they are classified as "short-lived" and not subject to aging management review per 10 CFR 54.21(a)(1)(ii).

Question RAI 3.3.2.2.5.1-1/3.4.2.3-1A

The staff has noted that FENOC is crediting its External Surfaces Monitoring Program to manage hardening and loss of strength in: (1) the elastomeric auxiliary system components that are exposed, either internally or externally, to uncontrolled indoor air or to dry air, and (2) the elastomeric flexible hoses in the auxiliary feedwater system (a steam and power conversion system) that are exposed externally to uncontrolled indoor air. GALL AMP XI.M36, "External Surfaces Monitoring," pertains to the external surfaces of steel components in systems that are within the scope of license renewal and are subject to AMRs for loss of material and leakage. The GALL program does not apply to elastomeric components or to the management of material property changes (including hardening or loss of strength) in elastomeric components. Justify your basis for crediting the External Surfaces Monitoring Program to manage hardening and loss of strength in: (1) the elastomeric auxiliary system seals or components that are exposed, either internally or externally, to uncontrolled indoor air or to dry air, and (2) the elastomeric flexible hoses in auxiliary feedwater system that are exposed externally to uncontrolled indoor air. Using a technical basis, clarify how a visual examination is considered to be capable of demonstrating that a change in a elastomeric material property is occurring, including a potential change in the hardness property or strength property of each elastomeric material that are used in the fabrication of these components.

RESPONSE RAI 3.3.2.2.5.1-1/3.4.2.3-1A

Part 1:

The BVPS External Surfaces Monitoring Program implements aging management elements described in the NUREG-1801, XI.M36, "External Surfaces Monitoring," program. Additionally, the BVPS External Surfaces Monitoring Program contains increased scope beyond the NUREG-1801 program to include aging management of elastomeric ventilation flexible connections. This increased scope includes new inspection activities in addition to the visual inspections, such as physical manipulation

of elastomeric components, to identify aging effects that are unique to elastomers. A visual examination alone is insufficient to identify hardening and loss of strength, and may not be sufficient to identify cracking. FENOC did not originally identify the elastomer increased scope nor include an evaluation of the 10 program elements related to the increased scope in the External Surfaces Monitoring Program discussion in Appendix B of the LRA.

LRA Section B.2.15 is revised to include the following 10-element summary description for the aging management of elastomeric components by the BVPS External Surfaces Monitoring Program:

- ***Scope of Program***

  In addition to the program scope described in NUREG-1801, Section XI.M36, the External Surfaces Monitoring program will require monitoring of the external surfaces of flexible elastomeric connections in ventilation systems for cracking and for hardening and loss of strength. The program is also credited with managing these aging effects for the internal surfaces of these components, in which both the internal and external surface environments are ambient or dry air.

- ***Preventive Actions***

  The External Surfaces Monitoring Program is a monitoring program that does not include preventive actions.

- ***Parameters Monitored or Inspected***

  In addition to the parameters specified by the NUREG-1801, Section XI.M36 program, the External Surfaces Monitoring program will require the use of periodic plant system inspections and walkdowns to monitor for material degradation of elastomeric flexible connections in ventilation systems. These inspections include a visual inspection coupled with physical manipulation of elastomeric components to identify aging parameters such as cracks, hardening and loss of strength.

- ***Detection of Aging Effects***

  In addition to the detection methods specified by the NUREG-1801, Section XI.M36 program, the External Surfaces Monitoring program will require a periodic visual inspection, coupled with physical manipulation of in-scope elastomeric ventilation components, to identify cracking, hardening and loss of strength.

  Physical manipulation of elastomeric components, such as by pinching or prodding flexible connections in ventilation systems, will aid in identification of elastomer aging effects. Cracking of elastomeric components becomes evident at the outside radius of elastomer deformations as the cracks open. Changes in material properties, such as hardening and loss of strength, can be detected during manipulation of elastomeric components by the relative inflexibility of the component, or by the

failure of the component to return to its previous shape or configuration. Additionally, since the external environment of ventilation systems is similar to the internal environment, the condition of the external surface is expected to be representative of the internal surface condition.

- ***Monitoring and Trending***

  In addition to the monitoring and trending specified by the NUREG-1801 Section XI.M36 program, the External Surfaces Monitoring program will require a periodic visual inspection, coupled with physical manipulation of in-scope elastomeric components to identify cracking, hardening and loss of strength. The program provides qualification requirements for personnel associated with visual inspection and physical manipulation of elastomers in accordance with FENOC procedures and processes.

- ***Acceptance Criteria***

  In addition to the acceptance criteria specified by the NUREG-1801, Section XI.M36 program, the External Surfaces Monitoring program will provide acceptance criteria for elastomer inspections. The proposed program defines acceptance criteria as no unacceptable visual or tactile indication of leakage, hardening, loss of strength, or cracking that would lead to loss of intended function during the period of extended operation. Visual or tactile indications with respect to system design standards, procedural requirements, current licensing basis, industry codes or standards, and engineering evaluations shall be evaluated by assigned engineering personnel. Evaluation of visual and tactile indications will determine whether the results are acceptable or if corrective action is required.

- ***Corrective Actions***

  This element is discussed further in LRA Section B.1.3.

- ***Confirmation Process***

  This element is discussed further in LRA Section B.1.3.

- ***Administrative Controls***

  This element is discussed further in LRA Section B.1.3.

- ***Operating Experience***

  BVPS has experienced leakage from flexible elastomeric hoses in the cooling water environment associated with diesel engines (both diesel generators and the diesel-driven air compressor), and in the lubricating oil environment associated with the turbine oil purifier. Corrective actions for these conditions included hose replacement and administrative changes to ensure leakage does not result in inoperability of important equipment.

BVPS has also identified a tear in an elastomeric ventilation flexible connection between a control room emergency fan and associated ductwork. The cause of the tear could not be identified. The tear may have been caused by maintenance activities, aging, or it may have been present during initial installation. An evaluation of the consequences of the 3/8-inch by 1/8-inch slit determined that the consequences to system operation were insignificant.

The available operating experience relative to elastomers provides reasonable assurance that visual inspection, coupled with physical manipulation, is sufficient to identify aging effects in elastomeric components prior to loss of function.

Part 2:

As identified in the FENOC response to RAI-3.3.2.3-03 / 3.4.2.3-3, (with the exception of elastomeric flexible ventilation connections), FENOC will perform repetitive maintenance tasks prior to the period of extended operation, to replace the elastomeric components identified in LRA sections 3.1, 3.2, 3.3, and 3.4 such that those components are classified as "short-lived" and not subject to aging management per 10 CFR 54.21(a)(1)(ii). The frequency of the repetitive tasks will be determined based upon manufacturer recommendations and operating experience. The flexible hoses in the auxiliary feedwater system are, therefore, classified as short-lived and excluded from aging management review.

See the Enclosure to this letter for the revision to the BVPS LRA.

Section 3.3.2.3/3.4.2.3

Question RAI 3.3.2.3-1/3.4.2.3-1

GALL Volume 2 Table IX.F, "Selected Definitions and Use of Terms for Describing and Standardizing - Aging Mechanisms," states that the scope of elastomeric degradation covers:

> ***"Degradation may include cracking, crazing, fatigue breakdown, abrasion, chemical attacks, and weathering. [20, 21] Elastomer hardening refers to the degradation in elastic properties of the elastomer."***

Justify your basis for concluding that loss of material due to wear (including wear induced by abrasion), chemical reaction/decomposition (including that induced by chemical attacks) or weathering are not aging effects requiring management (AERMs) for: (1) each elastomeric auxiliary system component that is exposed, either internally or externally, to uncontrolled indoor air or to dry air, and (2) the flexible hoses in the auxiliary feedwater system (a steam and power conversion

system) that are exposed externally to uncontrolled indoor air. If any of these aging effects are determined be AERMs, clarify which AMP will be credited to manage the aging effect or effects in the elastomeric components that are exposed to these environments and justify why the AMP or AMPs credited for aging management is (are) considered to be valid for aging management.
NOTE: the issue on whether loss of material due to wear is an AERM for elastomeric components in the control area and plant area ventilation systems under exposure to uncontrolled indoor air has been addressed in RAI # 3.3.2.2.13-1; however, this question pertains, in part, to the management of wear in other auxiliary system elastomeric components that are exposed to this environment or to management of wear in elastomeric auxiliary system components exposed to dry air.

RESPONSE RAI 3.3.2.3-1/3.4.2.3-1

The potential for chemical degradation of elastomers (other than by exposure to oxygen or ozone) is limited to applications in which the component contains a liquid or gas other than air. As identified in the response to RAI-3.3.2.3-3 / 3.4.2.3-3, (with the exception of elastomeric flexible ventilation connections), FENOC will perform repetitive maintenance tasks prior to the period of extended operation, to replace the elastomeric components identified in LRA Sections 3.1, 3.2, 3.3, and 3.4 such that those components are classified as "short-lived" and not subject to aging management per 10 CFR 54.21(a)(1)(ii). The frequency of the repetitive tasks will be determined based upon manufacturer recommendations and operating experience. The flexible hoses in the auxiliary feedwater system are, therefore, classified as short-lived and excluded from aging management review. The remainder of this response is applicable to elastomeric flexible ventilation connections.

FENOC used the EPRI Mechanical Tools and Structural Tools, supplemented by operating experience reviews, as the primary references to identify potential aging effects for material-environment combinations. In the EPRI Tools, "wear" is evaluated as a design consideration, rather than an aging effect. Instances of significant wear or fretting are not related to normal aging, and are expected to manifest well before the period of extended operation and be corrected. As such, it is expected that loss of material due to wear or fretting from normal plant operations is insufficient to result in loss of component function during the period of extended operation. The EPRI Tools do not specifically consider loss of material due to wear or abrasion to be applicable aging mechanisms for internal or external surfaces of elastomers. The EPRI Tools do, however, recommend plant-specific consideration for the potential that loss of material due to wear may occur. FENOC's review of plant-specific operating experience did not identify any elastomeric components for which loss of material due to wear was determined to be an additional aging effect that required management.

Weathering of elastomers is addressed in the EPRI Structural Tools as an aging mechanism encompassed within the aging effect of "Change in material properties." NUREG-1801, Section IX.F, "Selected Definitions and Use of Terms for Describing and Standardizing Aging Mechanisms," defines aging mechanisms that cause the aging effects. NUREG-1801, Section IX.F, groups "weathering" under "Elastomer degradation." NUREG-1801, IX.F, defines "weathering" as "Degradation of external surfaces of materials when exposed to outside environment." The BVPS LRA, Sections 3.1, 3.2, 3.3 and 3.4, do not contain elastomers in an air-outdoor environment. Therefore, weathering is not applicable to the BVPS elastomeric components in mechanical systems that are subject to aging management review.

Question RAI 3.3.2.3-2/3.4.2.3-2

The staff has noted that FENOC is crediting its External Surfaces Monitoring Program to manage cracking in: (1) the elastomeric auxiliary system components that are exposed, either internally or externally, to uncontrolled indoor air or to dry air, and (2) the elastomeric flexible hoses in the auxiliary feedwater systems (i.e., subsystems of the steam and power conversion system grouping) that are exposed externally to uncontrolled indoor air. GALL AMP XI.M36, "External Surfaces Monitoring," pertains to the external surfaces of steel components in systems that are within the scope of license renewal and are subject to AMRs on loss of material and leakage. The GALL program does not apply to elastomeric components or to the management of cracking in elastomeric components.
Part 1: Justify your basis for crediting the External Surfaces Monitoring Program to manage cracking in: (1) the elastomeric auxiliary system components that are exposed, either internally or externally, to uncontrolled indoor air or to dry air, and (2) the flexible hoses in the auxiliary feedwater systems that are exposed externally to uncontrolled indoor air. Part 2: The FENOC External Surfaces Monitoring credits only visual examinations of the external seal surfaces to manage cracking in the elastomeric surfaces that are exposed, either internally or externally, to uncontrolled indoor air or dry air. Visual examination techniques in ASME Code Section XI, Article IWA-2000 credit only VT-1 visual examination techniques as being acceptable inspection techniques for managing cracking. The FENOC program does not: (1) specify whether the visual examination techniques for cracking would be enhanced VT-1 techniques, or (2) explain how a visual examination of the external surface could be capable of detecting a subsurface crack or a crack that only penetrated the internal surface of the component. Thus, in your response to Part 1, include a technical basis on: (1) the specific visual examination technique that FENOC is crediting to manage cracking in these elastomeric components, and (2) on how the specific visual examination technique selected is capable of detecting a crack that may have initiated in these materials, particularly if the crack is categorized only as a subsurface flaw or an internal surface penetrating flaw.

RESPONSE RAI 3.3.2.3-2/3.4.2.3-2

The responses to Parts 1 and 2 of the RAI are provided together, below.

As identified in the response to RAI-3.3.2.3-3 / 3.4.2.3-3, (with the exception of elastomeric flexible ventilation connections), FENOC will perform repetitive maintenance tasks prior to the period of extended operation, to replace the elastomeric components identified in LRA Sections 3.1, 3.2, 3.3, and 3.4 such that those components are classified as "short-lived" and not subject to aging management per 10 CFR 54.21(a)(1)(ii). The frequency of the repetitive tasks will be determined based upon manufacturer recommendations and operating experience. The flexible hoses in the auxiliary feedwater system are, therefore, classified as short-lived and excluded from aging management review. The remainder of this response addresses aging management of elastomeric flexible connections in ventilation systems, which are the only remaining elastomeric components subject to aging management.

The FENOC External Surfaces Monitoring Program implements aging management elements described in the NUREG-1801, XI.M36 program. Additionally, the BVPS External Surfaces Monitoring Program contains increased scope beyond the NUREG-1801 program to include aging management of elastomeric ventilation flexible connections. This increased scope includes new inspection activities in addition to the visual inspections, such as physical manipulation of elastomeric components, to identify aging effects that are unique to elastomers. A visual examination alone is insufficient to identify hardening and loss of strength, and may not be sufficient to identify cracking. FENOC did not originally identify the elastomer increased scope nor include an evaluation of the 10 program elements related to the increased scope in the External Surfaces Monitoring Program discussion in Appendix B of the LRA. A 10 element summary of the increased scope to address elastomers is provided in the FENOC response to RAI 3.3.2.2.5.1-1 / 3.4.2.3-1A.

Physical manipulation of elastomeric components will deform the material. Flexible ventilation connections can be pinched or pushed to create a bend. If cracks are present in elastomeric flexible ventilation connections, they will open on the outer radius of the bend and become more visible as the outer surface stretches to accommodate the bend. Cracks may not be apparent visually if the elastomer surface is not placed under tensile loading.

Aging of the internal surfaces of elastomers in ventilation systems is similar to that of the external surfaces. The environmental conditions that result in elastomer aging effects are related to temperature, ozone, and ultraviolet or ionizing radiation exposure. External surfaces are more likely to be exposed to ultraviolet radiation than internal surfaces, and equally likely to be exposed to oxygen, and ozone. Temperature and ionizing radiation will affect the internal and external surfaces similarly. Therefore, the condition of the external surfaces of elastomers is expected to be representative of the internal surfaces. The External Surfaces Monitoring Program provides reasonable

assurance that aging effects of elastomeric components will be identified by visual inspection of the external surfaces of elastomeric components, enhanced by physical manipulation, prior to loss of ventilation system function.

Question RAI 3.3.2.3-3/3.4.2.3-3

The staff has noted that FENOC includes the following plant-specific AMRs (i.e. LRA Type "2" AMRs associated with Footnotes G) for the following elastomeric auxiliary system components or elastomeric steam and power conversion system (i.e., auxiliary feedwater system) components that are either exposed externally to air with borated water leakage, or to fuel oil, lubricating oil, or close-cycle cooling water:

Area Ventilation - Control Area	**Flexible Connection**	**Pressure Boundary**	**Elastomers**	**Air with borated water leakage - EXT**
Area Ventilation - Other	**Flexible Connection**	**Pressure Boundary**	**Elastomers**	**Air with borated water leakage - EXT**
Auxiliary Feedwater	**Flexible Hose**	**Pressure Boundary**	**Elastomers**	**Lubricating oil**
Auxiliary Feedwater	**Flexible Hose**	**Pressure Boundary**	**Elastomers**	**Air with borated water leakage - EXT**
Chemical and Volume Control	**Sight glass**	**Leakage Boundary (spatial)**	**Elastomers**	**Air with borated water leakage - EXT**
Compressed Air	**Flexible Hose**	**Pressure Boundary**	**Elastomers**	**Closed cycle cooling water**
Compressed Air	**Flexible Hose**	**Pressure Boundary**	**Elastomers**	**Fuel oil**
Compressed Air	**Flexible Hose**	**Pressure Boundary**	**Elastomers**	**Lubricating oil**

Emergency Diesel Generators & Support	Flexible Hose	Pressure Boundary	Elastomers	Fuel oil
Emergency Diesel Generators & Support	Flexible Hose	Pressure Boundary	Elastomers	Lubricating oil
Emergency Diesel Generators & Support	Flexible Hose	Leakage Boundary (spatial)	Elastomers	Lubricating oil
Emergency Diesel Generators & Support	Flexible Hose	Pressure Boundary	Elastomers	Closed cycle cooling water
Security Diesel Generator	Flexible Hose	Pressure Boundary	Elastomers	Closed cycle cooling water
Security Diesel Generator	Flexible Hose	Pressure Boundary	Elastomers	Fuel oil
Security Diesel Generator	Flexible Hose	Pressure Boundary	Elastomers	Lubricating oil
Solid Waste Disposal	Flexible Hose	Leakage Boundary (spatial)	Elastomers	Air with borated water leakage - EXT
Supplementary Leak Collection and Release System	Flexible Connection	Pressure Boundary	Elastomers	Air with borated water leakage - EXT

In these AMRs, the applicant identifies that there are not any aging effects requiring management (AERMs) for the surfaces that are either exposed externally to air with borated water leakage, or to fuel oil, lubricating oil, or close-cycle cooling water. The fabrication method used to fabricate a particular elastomer (a type of polymetric material) is polymer-material specific. Examples include radiation induced polymerization, cationic or anionic polymerization (induced by acids or bases), or free-radical induced polymerization. These types of environments can also degrade, decompose, or change the material properties of a polymetric material, depending on the specific material composition of the polymer in question. The staff is concerned that the specific elastomeric materials used in fabrication of these auxiliary system components or steam and power conversion system components could be subject to aging, particularly if the specific environment could induce reactive conditions, such as those induced by acids (including boric acid), bases (lyes), radiation, free radicals, or heat. The staff seeks additional information regarding these AMRs.

Part 1: For those plant-specific Type "2" AMR items that do not specifically identify the specific elastomeric material of fabrication identify the specific elastomeric material (including polymer repeating chemical composition) used in the fabrication of the component listed in the AMR item.

Part 2: For each specific elastomeric material used in the fabrication of the elastomeric components, identify all environmental conditions (e.g., radiation, acidic conditions, basic [lye-based] conditions, exposure to organic fluids or solvents, free-radical conditions, etc.) that could potentially result in age-related degradation (e.g. cracking, etc.), in a change in a specific material property (e.g., hardening, reduction in elastic strength, loss of fracture toughness due to thermal aging embrittlement or radiation embrittlement, etc.), or chemical reaction/chemical decomposition of the specific elastomeric material.

Part 3: For each specific elastomer material-environment used in the particular AMR, discuss whether the particular environment to which the specific elastomeric material is exposed to can result in the environmental conditions and AERMs that have been addressed in your response to Part 2 of this question. Provide specific technical details to support your determination of whether or not there are any AERMs for the specific component-elastomer material-environment combinations in these AMRs. If additional AERMs are applicable, clarify which AMP is credited for aging management and justify (using a technical basis) why the AMP or AMPs selected is (are) valid for the management of the applicable AERM or AERMs.

RESPONSE RAI 3.3.2.3-3/3.4.2.3-3

The BVPS LRA is revised to include a new License Renewal Future Commitment to address elastomeric components. With the exception of ventilation flexible connections, FENOC will perform repetitive maintenance tasks prior to the period of extended operation, to replace the elastomeric components identified in LRA Sections 3.1, 3.2, 3.3, and 3.4 such that those components are classified as "short-lived" and not subject to aging management per 10 CFR 54.21(a)(1)(ii). The frequency of the repetitive tasks will be determined based upon manufacturer recommendations and operating experience. Therefore, elastomeric flexible hoses and sight glasses associated with fuel oil, lubricating oil, and closed cycle cooling water will be included within preventive maintenance activities such that they are short-lived components and excluded from aging management. Elastomeric flexible connections in ventilation systems are long-lived and remain subject to aging management review.

The LRA is further revised to delete, as appropriate, the elastomeric component types, materials and aging effects from the LRA Table 2s and the summary lists of materials and environments in LRA Sections 3.1, 3.2, 3.3 and 3.4.

See the Enclosure to this letter for the revision to the BVPS LRA.

Part 1:

Elastomeric flexible connections within ventilation systems are fabricated of fiberglass, double coated with neoprene (polychloroprene).

Part 2:

EPRI Structural Tools, Section 7.1.1, documents that,

> *"Neoprene is chemically and structurally similar to natural rubber, and its mechanical properties are also similar. Its resistance to oils, chemicals, sunlight, weathering, aging and ozone is outstanding. It retains its properties at temperatures up to 250°F."*

The EPRI Structural Tools identifies various changes in elastomer properties that FENOC corresponded to the aging effects identified as "cracking" and as "hardening and loss of strength" in NUREG-1801. The environmental conditions that result in elastomer aging effects are related to temperature, ozone, and ultraviolet or ionizing radiation exposure.

Part 3:

Neoprene is relatively insensitive to temperature, ozone, and ultraviolet and ionizing radiation exposure, but FENOC did not exclude the potential for the NUREG-1801 aging effects of "cracking" and "hardening and loss of strength" for neoprene in aging

evaluations. The presence of boric acid leakage does not result in additional aging effects for elastomers in general or neoprene specifically.

FENOC assigned both "Air-indoor uncontrolled" and "Air with borated water leakage" environments to in-scope components in areas containing borated water systems. Where the external environment of "Air with borated water leakage" exists, the environment of "Air-indoor uncontrolled" is also evaluated. The elastomeric components identified in this RAI have aging effects of "Cracking," and "Hardening and loss of strength" identified in the "Air-indoor uncontrolled" environment. No additional aging effects were identified that are associated specifically with the Air with borated water leakage environment. No additional aging effects requiring management were identified in response to this RAI beyond those listed in the LRA in the Air-indoor uncontrolled environment.

Question RAI 3.3.2.3-4

In the LRA, FENOC includes the following plant-specific AMRs (i.e. LRA Type "2" AMRs associated with either Footnotes F, G, H, I, or J) for polymetric components in the auxiliary systems:

LRA Table	LRA System	LRA Item	Component	Material	Function
3.3.2-16	EDG Water Cooling	45	Piping	Polymer	Pressure Boundary
3.3.2-16	EDG Water Cooling	46	Piping	Polymer	Pressure Boundary
3.3.2-16	EDG Water Cooling	54	Sight Glass	Polymer	Pressure Boundary
3.3.2-16	EDG Water Coaling	55	Sight Glass	Polymer	Pressure Boundary
3.3.2-16	EDG Water Cooling	56	Sight Glass	Polymer	Pressure Boundary
3.3.2-17	Emerg. Response Substation	75	Piping	Polymer	Pressure Boundary
3.3.2-17	Emerg. Response Substation	76	Piping	Polymer	Pressure Boundary

3.3.2-17	Emerg. Response Substation	77	Piping	Polymer	Pressure Boundary
3.3.2-18	Fire Protection	16	Flexible Hose	Polymer	Pressure Boundary
3.3.2-18	Fire Protection	17	Flexible Hose	Polymer	Pressure Boundary
3.3.2-26	Reactor Plant Sampling Sys.	10	Demineralizer	Polymer	Leakage Boundary (Spatial)
3.3.2-26	Reactor Plant Sampling Sys.	11	Demineralizer	Polymer	Leakage Boundary (Spatial)
3.3.2-26	Reactor Plant Sampling Sys.	12	Demineralizer	Polymer	Leakage Boundary (Spatial)
3.3.2-26	Reactor Plant Sampling Sys.	100	Tank	Polymer	Leakage Boundary (Spatial)
3.3.2-26	Reactor Plant Sampling Sys.	101	Tank	Polymer	Leakage Boundary (Spatial)
3.3.2-26	Reactor Plant Sampling Sys.	102	Tank	Polymer	Leakage Boundary (Spatial)
3.3.2-26	Reactor Plant Sampling Sys.	110	Tubing	Polymer	Leakage Boundary (Spatial)
3.3.2-29	Security Diesel Generator	69	Piping	Polymer	Pressure Boundary
3.3.2-29	Security Diesel Generator	70	Piping	Polymer	Pressure Boundary
3.3.2-29	Security Diesel Generator	71	Piping	Polymer	Pressure Boundary

3.3.2-31	Solid Waste Disposal Sys.	51	Tank	Polymer	Leakage Boundary (Spatial)
3.3.2-31	Solid Waste Disposal Sys.	52	Tank	Polymer	Leakage Boundary (Spatial)
3.3.2-31	Solid Waste Disposal Sys.	53	Tank	Polymer	Leakage Boundary (Spatial)

For these plant-specific AMRs, FENOC has identified that there are not any aging effects requiring management (AERMs). The fabrication method used to fabricate a particular polymetric material is polymer-material specific. Examples include radiation induced polymerization, cationic or anionic polymerization (induced by acids or bases), or free-radical induced polymerization. These types of environments can also degrade, decompose, or change the material properties of a polymetric material, depending on the specific material composition of the polymer in question. The staff is concerned that the specific polymetric materials used in fabrication of these auxiliary system components could be subject to aging, particularly if the specific environment could induce reactive conditions, such as those induced by acids (including boric acid), bases, radiation, free radicals, or heat. The staff seeks additional information regarding those AMRs for auxiliary system polymer components in which the applicant has not identified any AERMs.

Part 1: For those plant-specific Type "2" AMR items that do not specifically identify the particular polymetric material used in the fabrication of the component (e.g. halon, etc.), identify the polymetric material used to fabricate the polymer material for the component listed in the AMR item.

Part 2: For each specific polymetric material used in the particular AMR item, clarify whether the specific material is a elastomeric, thermoplastic, or thermoset material and identify all environmental conditions (e.g., radiation, acidic conditions, basic [lye-based] conditions, exposure to organic fluids or solvents, free-radical conditions, etc.) that could potentially result in age-related degradation (e.g. cracking, etc.), in a change in a specific material property (e.g., hardening, reduction in elastic strength, loss of fracture toughness due to thermal aging embrittlement or radiation embrittlement, etc.), or chemical reaction/chemical decomposition of the specific polymetric material.

Part 3: For each specific polymer material-environment used in the particular AMR, discuss whether the particular environment to which the specific polymer material is exposed to can result in the environmental conditions and AERMs addressed in your response to Part 2 of this question. Provide specific technical details to support your determination of whether or not there are any AERMs for the specific component-polymer material-environment combinations in these AMRs.

RESPONSE RAI 3.3.2.3-4

FENOC has reviewed details associated with the various polymer components addressed in the LRA. Polymer hoses in the Halon fire protection subsystems are periodically tested and replaced on condition, and, therefore, are considered consumables as described in LRA Section 2.1.2.4.3.

The BVPS LRA is revised to include a new License Renewal Future Commitment to address the remaining polymer components. Specifically, with the exception noted in this response, FENOC will perform repetitive maintenance tasks prior to the period of extended operation, to periodically replace, or to periodically test and replace on condition, polymer components identified in LRA Sections 3.1, 3.2, 3.3 and 3.4 such that those components are classified as "short-lived" and not subject to aging management, per 10 CFR 54.21(a)(1)(ii). The frequency of the repetitive tasks will be determined based upon manufacturer recommendations and operating experience.

The exception to testing/replacement of polymers by preventive maintenance is Geoflex®-D piping used as the buried fuel oil piping in the Security Diesel Generator System and the Emergency Response Facility Substation System diesel generator fuel oil systems.

The LRA is further revised to delete, as appropriate, the polymer component types, materials and aging effects from the LRA Table 2s and the summary lists of materials and environments in LRA Sections 3.1, 3.2, 3.3 and 3.4.

See the Enclosure to this letter for the revision to the BVPS LRA.

Part 1:

The Geoflex®-D piping is a double-walled, flexible piping system designed for direct burial. GeoFlex pipe is a totally-bonded, multi-layer composite construction with braided fiber reinforcement. The inner-most Kynar® (polyvinylidene fluoride) barrier layer is impermeable to diesel fuel. The exterior has a nylon barrier layer to protect the outer wall from chemical and microbial attack. Additional intermediate layers are made of polyethylene and nylon.

Part 2:

Kynar®, nylon and polyethylene are thermoplastics. FENOC used the EPRI Mechanical Tools to determine that polymers, such as those used in Geoflex® piping, are either completely resistant to the fluid environment, or they deteriorate. Unlike metals, plastics do not display corrosion rates. Rather than depending upon an oxide layer for protection, plastics depend upon chemical resistance to the environment to which they are exposed. Acceptability for the use of plastics within a given environment is a design-driven criterion; once the appropriate material is chosen, the system will have no aging effects due to exposure to the contained fluid. Chemical decomposition due to exposure to ozone and ultraviolet or ionizing radiation is a potential aging effect for some polymers.

Part 3:

The materials of construction of GeoFlex® piping were specifically chosen for use in transporting fuel oils and for direct burial. The product is Underwriters Laboratories (UL) listed for this application. The soil environment precludes exposure to ozone and to ultraviolet and ionizing radiation. An April 22, 1997, U.S. Environmental Protection Agency Memo (from Anna Hopkins Virbick, Director, Office of Underground Storage Tanks, to Environmental Protection Agency UST/LUST Regional Program Managers and State UST Program Managers - Subject: Transmittal of Survey of Flexible Piping Systems) transmitted the results of a survey of flexible piping used in underground fuel oil delivery systems, and included evaluation of GeoFlex® operating experience. The survey concluded that problems with the systems have been infrequent, and the performance of the technology has been excellent. Based on this review of industry operating experience and the use of proper design and application of the material, GeoFlex® piping materials with internal fuel oil and external buried (soil) environments do not exhibit aging effects requiring management.

Section 3.4.2.2

Question RAI 3.4.2.2.6-1

In the BVPS LRA, the Type "2" AMRs aligning to AMR item 14 in Table 4 of the GALL Report, Volume 1: (1) do not differentiate between which of the AMRs for stainless steel or Nickel-alloy steam and power conversion system components are exposed the treated water (greater than 60 °C [140 °F]) environment and which are exposed to the steam environment, and (2) do not include any AMRs aligning to AMR items VIII.C-2, VIII.E-30, VIII.E-38, or VIII.F-3 in the GALL Report, Volume 2.
Part 1: Identify which of the AMRs in LRA Tables 3.4.2-1 through -10 (as a collective Table grouping) aligning to AMR item 14 in Table 4 of the GALL Report, Volume 1, are for components that are exposed to the treated water (greater than 60 °C [140 °F]) environment and which of these AMRs are for the components

that are exposed to the steam environment. Part 2: Provide your basis why the Type "2" AMRs in LRA Tables 3.4.2-1 through -10 (as a collective Table grouping) do not include any AMR items that align to AMR items VIII.C-2, VIII.E-30, VIII.E-38, VIII.F-3, or VIII.G-33 in the GALL Report, Volume 2.

RESPONSE RAI 3.4.2.2.6-1

Part 1:

In License Renewal documentation, FENOC did not distinguish between components that contain treated water in the vapor phase and those that contain treated water in the liquid phase. FENOC used the "Treated water" environment to encompass the "Steam" environment. For stainless steel in which the temperature was above the threshold for cracking (whether liquid or vapor phase), FENOC used the environment name "Treated water >60°C (>140°F)." For cast austenitic stainless steel (CASS) in environments that exceed the threshold temperature for thermal embrittlement of CASS (whether liquid or vapor phase), FENOC used the environment name "Treated water >250°C (>482°F)." The environment names with temperature distinction were only applied to stainless steel to provide better consistency with NUREG-1801 (there are no NUREG-1801 rows for other materials in these environments). Aging effects associated with the lower temperature environments were considered matches to the higher temperature environments during NUREG-1801 comparisons (e.g., the aging effect "Loss of material" is applicable to Treated water >60°C (>140°F), although NUREG-1801 identifies "Loss of material" for Treated water, but Treated water >60°C (>140°F) in NUREG-1801 is only associated with cracking). These environment names were chosen because they correspond to actual aging effect thresholds, and because they correspond exactly to the majority of NUREG-1801 rows that could be used for aging evaluation comparison.

The FENOC aging evaluation method used the EPRI Mechanical Tools as the primary aging evaluation reference. In the EPRI Mechanical Tools, the "Treated water" environment definition includes (encompasses) the "Steam" environment. The material / aging effects / recommended program assignments in NUREG-1801, Chapter VIII, "Steam and Power Conversion System," for rows with "Steam" identified as the environment, include the following:

- Steel / Loss of material / Water Chemistry Program (PWR / BWR)
- Steel / Loss of material / Water Chemistry Program and One-Time Inspection Program (PWR / BWR)
- Steel / Cumulative fatigue damage / TLAA
- Steel / Wall thinning (loss of material in BVPS LRA) / Flow-Acceleration Corrosion Program
- Nickel-based alloys / Loss of material / Water Chemistry Program (PWR)

- Stainless steel / Loss of material / Water Chemistry Program (PWR / BWR)
- Stainless steel / Cracking / Water Chemistry Program (PWR)
- Stainless steel / Cracking / Water Chemistry Program and One-Time Inspection Program (BWR)

Each of these rows has a corresponding NUREG-1801, Chapter VIII row for Treated water (or Treated water >60°C (>140°F) in the case of cracking), with the exception that NUREG-1801 rows for Treated water in Chapter VIII do not recommend the Water Chemistry Program without augmentation by verification with the One-Time Inspection Program. Therefore, the only difference in aging comparisons to NUREG-1801 by using "Treated water" terminology instead of "Steam", is that the One-Time Inspection Program is recommended by NUREG-1801 for comparisons to rows citing the Treated water environment, where that program might not be recommended if the rows cite the Steam environment.

Part 2:

FENOC did not align to the NUREG-1801 rows cited in the question for aging management comparisons because they are not applicable to BVPS. The material / environment / aging effect / program combination, if present in the BVPS LRA, was also present in another NUREG-1801 section that was more appropriate. The bases for not selecting the questioned NUREG-1801 rows are:

- VIII.C-2 applies to the Extraction Steam System, which is not within the scope of License Renewal at BVPS.
- VIII.E-30 and VIII.E-38 apply to stainless steel components in Treated water >60°C (>140°F) in the Condensate system. No components that are subject to aging management within the BVPS Condensate system are exposed to an environment that exceeds 60°C (140°F).
- VIII.F-3 applies to Steam Generator Blowdown System stainless steel heat exchanger components in an environment that is >60°C (>140°F). There are no stainless steel heat exchanger components subject to aging management in the BVPS Steam Generator Blowdown System that are exposed to an environment that exceeds 60°C (140°F).
- VIII.G-33 applies to stainless steel components in the Auxiliary Feedwater System in Treated water >60°C (>140°F). BVPS does not have stainless steel components subject to aging management in the Auxiliary Feedwater system that are exposed to an environment that exceeds 60°C (140°F) (piping connected to the Main Feedwater System exceeds that temperature, but it is made of steel, not stainless steel).

Question RAI 3.4.2.2.7.1-1

In the BVPS LRA, the Type "2" AMRs aligning to AMR items 15 and 16 in Table 4 of the GALL Report, Volume 1, do not include any AMRs aligning to AMR items VIII.C-1, VIII.D1-1, VIII.E-4, VIII.F-12, VIII.F-27, or VIII.G17 in the GALL Report, Volume 2. Provide your basis why the Type "2" AMRs in LRA Tables 3.4.2-1 through -10 (as a collective Table grouping) do not include any AMR items that align to AMR items VIII.C-1, VIII.D1-1, VIII.E-4, VIII.F-12, VIII.F-27, or VIII.G17 in the GALL Report, Volume 2.

RESPONSE RAI 3.4.2.2.7.1-1

FENOC did not align to the NUREG-1801 rows cited in the question for aging management comparisons because they are not applicable to BVPS. The material / environment / aging effect / program combination, if present in the BVPS LRA, was also present in another NUREG-1801 section that was more appropriate. The bases for not selecting the questioned NUREG-1801 rows are:

- VIII.C-1 applies to the Extraction Steam System, which is not within the scope of License Renewal at BVPS.
- VIII.D1-1 applies to aluminum Feedwater System components in a treated water environment. There are no aluminum components subject to aging management review in the BVPS Main Feedwater System.
- VIII.E-4 applies to Condensate System heat exchangers. There are no heat exchangers in the BVPS Condensate System that are subject to aging management review.
- VIII.F-12 applies to aluminum components in the Steam Generator Blowdown System. There are no aluminum components subject to aging management review in the BVPS Steam Generator Blowdown System.
- VIII.F-27 applies to Steam Generator Blowdown System stainless steel heat exchanger components. There are no stainless steel heat exchanger components subject to aging management in the BVPS Steam Generator Blowdown System.
- VIII.G-17 applies to aluminum components in the Auxiliary Feedwater system. There are no aluminum components subject to aging management review in the BVPS Auxiliary Feedwater System.

Section 3.3.2.1.X

Question RAI 3.3.2.1.X-1

In LRA Table 3.3.2-5, 3.3.2-25, and 3.3.2-26, the applicant provide a number AMR line items that align to LRA AMR 3.3.1-38 and to AMR item 18 in Table 3 of the GALL Report, Volume 1, and AMR item VII.E4-15 in Table VII of the GALL Report, Volume. These AMR line items are applicable to the following systems and stainless steel components:

- **BVPS Unit 2 batch tank – jacket heat exchanger in the chemical and volume control system**
- **heat exchanger shells /channels in the radiation monitoring system and the reactor plant sample system**
- **piping components and valve bodies in the radiation monitoring system and the reactor plant sample system**

In these AMRs, the applicant credits its Water Chemistry Program and One-Time Inspection Program to manage cracking due to SCC in the components surfaces that are exposed to treated water (greater than 60 °C [140 °F]) environment. The staff has noted that the guidance in GALL AMR VII.E4-15 is applicable to stainless steel piping components/elements in BWR shutdown cooling systems and recommends in part that the BWR Stress Corrosion Cracking Program to manage cracking in these BWR components. The staff's requests additional clarification why it is valid to credit the One-Time Inspection to manage cracking due to SCC in these components and how the One-Time Inspection would be used to monitor for cracking in the components.

Part 1: Justify why it is valid to credit the One-Time Inspection Program in lieu of a periodic condition monitoring program that incorporates program element criteria that are analogous to those in GALL AMP XI.M7, "BWR Stress Corrosion Cracking." Part 2: Identify the type of inspection technique(s) will be used to detect cracking in these components, the sample size that will be used for the one-time inspection of these components, the acceptance criteria that will be used to evaluate inspection results, and the corrective actions that will be implemented (including assessing the need for crediting a periodic monitoring program for aging management) if relevant indications are determined to be unacceptable when assessed against the acceptance criteria for the examinations.

RESPONSE RAI 3.3.2.1.X-1

Part 1:

The One-Time Inspection Program is sufficient to confirm that "cracking" is being adequately managed by the Water Chemistry Program.

FENOC used the EPRI Mechanical Tools as the primary aging evaluation reference. Cracking due to stress corrosion cracking (SCC) may occur to stainless steel components in treated water environments at temperatures above 140°F if oxygen or chlorides are present in concentrations above thresholds. The BVPS Water Chemistry Program manages cracking by control of these contaminants. Therefore, the Water Chemistry Program is expected to manage cracking such that the aging effect does not occur, or is occurring very slowly. Consistent with the NUREG-1801 description of the XI.M32, "One-Time Inspection," program, the BVPS One-Time Inspection Program will provide verification of the effectiveness of the Water Chemistry Program in managing cracking in these components.

The FENOC methodology invoked for NUREG-1801 row assignment precluded comparison to a NUREG-1801 row outside the "parent" chapter of the system if that row specified that "Further Evaluation" was required. This convention was selected to assist in the review process by assuring that reviewers of a given LRA-NUREG-1801 section would not need to reference Further Evaluation text in another section; however, the methodology led to less than optimum row assignments on occasion.

In this particular case, the best fit for NUREG-1801 row assignments for the components in question would have been in Chapter VIII, "Steam and Power Conversion System," for cracking of stainless steel in treated water >60°C (>140° F) that specify the Water Chemistry and One-Time Inspection Programs (NUREG-1801 rows VIII.B1-5, VIII.C-2, VIII.D1-5, VIII.E-30, VIII.F-24 and VIII.G-33). These rows are related to various PWR system environments similar to the Auxiliary System in question and they have identical material, environment and aging effect/mechanism combinations; they are all managed through the Water Chemistry and One Time Inspection Programs.

Based on this discussion, it is valid to credit the combination of Water Chemistry and One-Time Inspection Programs to provide reasonable assurance that "cracking" is being adequately managed in lieu of a periodic condition monitoring program analogous to NUREG-1801, Section XI.M7, "BWR Stress Corrosion Cracking."

Part 2:

The One-Time Inspection Program is a new program that is consistent with the NUREG-1801, XI.M32 program. The following additional detail from the program element evaluation text is provided from the BVPS License Renewal Project program supporting documents:

- ***Detection of Aging Effects***

  The proposed program will require the use of 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 techniques will be consistent with the NUREG-1801, table titled "Examples of Parameters Monitored or Inspected And Aging Effect for Specific Structure or Component." The program owner will determine the inspection techniques as appropriate.

  The proposed program requires representative samples of system and component populations to be selected by the Program owner. Where practical, inspections focus on the bounding or lead components most susceptible to aging due to time in service, severity of operating conditions, and lowest design margin.

- ***Acceptance Criteria***

  Inspection findings (indication or relevant conditions of degradation) shall be evaluated by assigned engineering personnel and would include consideration of design standards, industry codes or standards, etc. Evaluation of inspection findings shall determine that the results are acceptable or that corrective action is required.

- ***Corrective Actions***

  BVPS 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. One of the potential corrective actions to address adverse conditions is assessing the need for a periodic monitoring program.

Section 3.3.2.3-X

Question RAI 3.3.2.3-X

LRA Table 3.3.2-30 includes AMR #109 on management of loss of material in CASS service water valve bodies that are exposed on the external surfaces to an outdoor air environment. In this AMR, the applicant credits its External Surfaces Monitoring Program to manage loss of material that may occur in the external valve body surfaces under exposure to this environment. The BVPS External

Surfaces Monitoring Program in given LRA Section B.2.15 and is identified as a new AMP that is entirely consistent with the recommended program element criteria in GALL AMP XI.M36, "External Surfaces Monitoring," without exception to GALL or the need for program enhancement. The scope of GALL AMP XI.M36, "External Surfaces Monitoring," is currently limited to the inspection of steel (i.e., carbon steel, alloy steel, or cast iron) components in order to manage: (1) loss of material that may occur in the steel components as a result of general corrosion, pitting corrosion, or crevice corrosion, or (2) cracking in the coatings that may be to line the external surfaces of these steel components. The scope of GALL AMP XI.M36, "External Surfaces Monitoring," does not currently apply to the management of loss of material in the external surfaces of stainless steel components. Justify your basis for crediting the External Surfaces Monitoring Program to manage loss of material in the external surfaces of these stainless steel valve body components and for extrapolating the scope of GALL AMP XI.M36, "External Surfaces Monitoring," to the management of loss of material in external stainless steel component surfaces.

RESPONSE RAI 3.3.2.3-X

Loss of material from an external surface of stainless steel (or other metals) will be evident by surface irregularities or localized discoloration before loss of function occurs. Although materials other than steel are not discussed in NUREG-1801 for this program, identification of the "Loss of material" aging effect for other metals is amenable to the same types of visual inspections. Therefore, inclusion of other metals was not considered an exception or an enhancement to NUREG-1801. The proposed BVPS External Surfaces Monitoring Program includes the following inspection parameters:

- corrosion and material wastage (loss of material);
- leakage from or onto external surfaces;
- worn, flaking, or oxide-coated surfaces;
- corrosion stains on thermal insulation; and,
- protective coating degradation (cracking and flaking).

The proposed program provides qualification requirements for personnel associated with visual inspection activities in accordance with site-controlled procedures and processes.

Therefore, the BVPS External Surfaces Monitoring Program is capable of managing loss of material for stainless steel.

Based on this discussion, LRA Section B.2.15, "External Surfaces Monitoring," is revised for clarity regarding loss of material from stainless steel or other metals.

See the Enclosure to this letter for the revision to the BVPS LRA.

Section B.2

Question RAI B.2-2

The staff has determined that the BVPS Unit 1 is scheduled to enter its 4th 10-Year ISI interval on April 1, 2008 and that BVPS Unit 2 is scheduled to enter its 3rd 10-Year ISI interval on August 29, 2008. The applicant is required under 10 CFR 50.55a to use the 2001 Edition of the ASME Code Section XI Edition, inclusive of the 2003 Addenda, for these 10-Year ISI Intervals. Given the fact that the 10-Year ISI Intervals will change during the license renewal review process, clarify which Edition of the ASME Code Section XI will be credited for those AMPs that credit (all or in part) the ASME Code Section XI for aging management of ASME Code Class components, structures, or supports.

RESPONSE RAI B.2-2

As the staff has noted, the ASME Code, Section XI edition that will be in effect for the 4th (Unit 1) and 3rd (Unit 2) BVPS 10-Year Inservice Inspection Intervals is the 2001 Edition including the 2002 and 2003 Addenda. The 2001 Edition of the ASME Code, Section XI, including the 2002 and 2003 Addenda, therefore, will be credited for aging management of ASME Code Class components and supports for the 4th (Unit 1) and 3rd (Unit 2) 10-Year Inservice Inspection Intervals for the following BVPS aging management programs:

- B.2.2 – ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and IWD
- B.2.4 – ASME Section XI, Subsection IWF
- B.2.34 – Reactor Head Closure Studs

Further updates to the ASME Code edition used by these programs will be governed by 10 CFR 50.55a.

The following ASME Code aging management programs reference the 1992 Edition with the 1992 Addenda, and are not currently on the same intervals as the B.2.2, B.2.4, and B.2.34 AMPs:

- B.2.3 – ASME Section XI, Subsection IWE
- B.2.5 – ASME Section XI, Subsection IWL

The ASME Code edition that will be used when these two aging management programs are updated will be in accordance with 10 CFR 50.55a.

Section B.2.28

Question RAI B.2.28-1

The staff has noted that the applicant's Nickel-Alloy Nozzles and Penetration Program does not have a specific corresponding program in Chapter XI of the GALL Report, Volume 2. As such, staff is of the opinion that, if the applicant is tying its basis for managing primary water stress corrosion cracking of a particular Nickel-Alloy component to the Nickel-Alloy Nozzles and Penetrations Program, the AMP would need to be defined as a plant-specific AMP for the application. Justify why AMP B.2.28, Nickel-Alloy Nozzles and Penetration Program, had not been identified as a plant specific AMP for the BVPS LRA and the program elements for the AMP provided in the application, consistent with the recommended program element criteria in Branch Position RSLB-01 in NUREG-1800, Revision 1, Volume 2.

RESPONSE RAI B.2.28-1

The BVPS LRA, Appendix B, "Aging Management Programs," Section B.2.28, "Nickel-Alloy Nozzles and Penetrations," was not intended to be a defined aging management program with 10 elements. Section B.2.28 was intended to identify a commitment, as specified in NUREG-1801. The commitment wording was included in Appendix B as a pointer and for ease of review.

To clarify the issue, BVPS LRA, Appendix B, Section B.2.28, and Appendix A, "Updated Final Safety Analysis Report Supplement," Section A.1.28, "Nickel-Alloy Nozzles and Penetrations Program," are revised to delete the text in these LRA sections. The LRA is further revised such that other sections of the LRA that referenced these sections, including Table 3.1.2-1 and Table 3.1.2-3 in LRA Section 3.1, are revised to delete references to the aging management program, and to include references to the commitments provided in LRA Appendix A, Table A.4-1 (Unit 1), Item 15, and Table A.5-1 (Unit 2), Item 17.

See the Enclosure to this letter for the revision to the BVPS LRA.

Question RAI B.2.28-2

LRA Tables 3.1.2-1 and 3.1.2-3 collectively identify that AMP B.2.28, "Nickel Alloy Nozzles and Penetrations," will be used to manage following components/commodity groups:

- **Core support pad and guide lug**
- **Nozzle (Unit 2 inlet/outlet safe end weld)**
- **Penetration (Bottom - instrument tube)**
- **Vessel shell (Flange leak detection tube)**
- **Flexible hose (Unit 2)**
- **Steam generator (Drain tube - Unit 2 only)**
- **Steam generator (Primary safe end weld)**
- **Steam generator (Tubesheet)**

Clarify whether or not these are the commodity groups that are within the scope of LRA B.2.28, "Nickel Alloy Nozzles and Penetrations," LRA UFSAR Supplement Section, A.1.28, and the scope of LRA Commitment No. 15 for Unit 1 and Commitment No. 17 for Unit 2, as subject to the unit identification clarifications in the commodity group descriptions.

RESPONSE RAI B.2.28-2

In FENOC response to RAI-B.2.28-1, LRA Section B.2.28, and Appendix A, Section A.1.28, are revised to delete the text in these LRA sections. The LRA is further revised such that the component types / commodity groups listed by the NRC in this RAI and included in LRA Tables 3.1.2-1 and 3.1.2-3 are revised to delete references to the aging management program, and to include references to the commitments provided in LRA Appendix A, Table A.4-1 (Unit 1), Item 15, and Table A.5-1 (Unit 2), Item 17.

In addition to the components / commodity groups listed by the NRC in this RAI, the component type "Pressurizer (Safe end welds)" should be included in the list of components that will be managed by the Nickel Alloy Nozzles and Penetrations Program. The "Pressurizer (Safe end welds)" component type (LRA Table 3.1.2-3, Item No. 112) is included in the LRA revisions described above and in the FENOC response to RAI-B.2.28-1.

See the Enclosure to this letter for the revision to the BVPS LRA.

Question RAI B.2.28-3

Part A: Clarify whether NRC Bulletin 2003-02, and NRC Bulletin 2004-01, the FENOC's letter replies made in response to these Bulletins, and any regulatory commitments contained in these Bulletin responses are within the scope of the applicant's Nickel-Alloy Nozzles and Penetrations Program and the particular license renewal commitment or commitments for this program (i.e., to either LRA Commitment No. 15 for BVPS Unit 1 and/or LRA Commitment No. 17 for BVPS Unit 2). Part B ; Clarify whether the FENOC letter of February 27, 2007 and any regulatory commitments or actions made in this letter, and staff's basis for approval in the NRC's Confirmatory Action Letter to FENOC of March 20, 2007, are within the scope of the applicant's Nickel-Alloy Nozzles and Penetrations Program and the applicable license renewal commitment or commitments for this program, as made relevant to BVPS in the March 20, 2007 response letter. Part C: identify any additional NRC generic communications, and BVPS specific commitments made in response to these additional generic communications that are within the scope of the applicant's Nickel-Alloy Nozzles and Penetrations Program and the applicable license renewal commitments for this program (i.e., to Commitment No. 15 for BVPS and/or to Commitment No. 17 for BVPS Unit 2).

RESPONSE RAI B.2.28-3

The responses to Parts A, B, and C of the RAI are provided together, below.

In response to RAI-B.2.28-1, LRA Section B.2.28, and Appendix A, Section A.1.28, are revised to delete the text in these LRA sections. The LRA is further revised such that the applicable component types in LRA Tables 3.1.2-1 and 3.1.2-3 are revised to delete references to the aging management program, and to include references to the commitments provided in LRA Appendix A, Table A.4-1 (Unit 1), Item 15, and Table A.5-1 (Unit 2), Item 17.

See the Enclosure to this letter for the revision to the BVPS LRA.

The FENOC responses to NRC Bulletin 2003-02, "Leakage from Reactor Pressure Vessel Lower Head Penetrations and Reactor Coolant Pressure Boundary Integrity," NRC Bulletin 2004-01, "Inspection of Alloy 82/182/600 Materials Used in the Fabrication of Pressurizer Penetrations and Steam Space Piping Connections at Pressurized-Water Reactors," and other NRC letters and communications, and the Regulatory Commitments made by FENOC in these responses, are implemented at BVPS as part of the current licensing basis. Industry research associated with nickel alloy components and the recommended management techniques are still evolving. As such, FENOC has not submitted any corresponding aging management program for license renewal. Instead, as specified in NUREG-1801, FENOC included License Renewal Future Commitments in the BVPS LRA, Tables A.4-1, Item 15, and Table

A.5-1, Item 17, for Unit 1 and Unit 2, respectively, to develop a plant-specific aging management program prior to the period of extended operation that will implement applicable NRC Orders, Bulletins and Generic Letters; and, staff-accepted industry guidelines.

Section B.2.33

Question RAI B.2.33-1

The staff noted that, in LRA Table 3.1.2-2, "Reactor Vessel Internals - Summary of Aging Management Review," the applicant credits its PWR Vessel Internals as the basis for managing applicable aging effects for a significant number of RV internal commodity groups at BVPS Units 1 and 2. The staff also noted that the applicant's PWR Vessel Internals Program for the BVPS application does not have a specific corresponding program in Chapter XI of the GALL Report, Volume 2. As such, staff is of the opinion that, if the applicant is tying its basis for aging management to the applicant's PWR Vessel Internals Program, the AMP would need to be defined as a plant-specific AMP for the application. Provide your basis why the AMP B.2.33, PWR Vessel Internals Program, has not been identified as a plant specific AMP for the BVPS LRA and the program elements for the AMP provided for in the application, consistent with the recommended program element criteria in Branch Position RSLB-01 in NUREG-1800, Revision 1, Volume 2.

RESPONSE RAI B.2.33-1

BVPS LRA, Section B.2.33, "PWR Vessel Internals," was not intended to be a defined aging management program with 10 elements. Section B.2.33 was intended to identify a commitment, as specified in NUREG-1801. The commitment wording was included in Appendix B as a pointer and for ease of review.

To clarify the issue, BVPS LRA, Appendix B, Section B.2.33, and Appendix A, Section A.1.33, "PWR Vessel Internals Program," are revised to delete the text in these LRA sections. The LRA is further revised such that other sections of the LRA that referenced these sections are revised to delete references to the aging management program, and to include references to the commitments provided in LRA Appendix A, Table A.4-1 (Unit 1), Item 18, and Table A.5-1 (Unit 2), Item 20.

See the Enclosure to this letter for the revision to the BVPS LRA.

Question RAI B.2.33-2

LRA Tables 3.1.2-2 identifies that AMP B.2.33, "PWR Vessel Internals," will be used for aging management of the following components/commodity groups:

Lower internals assembly (Unit 1 lower support column casting)	Lower internals assembly (Clevis insert bolt)	Lower internals assembly (Lower core plate)	Upper internals assembly (Support column)	Lower internals assembly (Fuel alignment pin)	Upper internals assembly (Hold down spring)	Lower internals assembly (Lower core plate)
Upper internals assembly (Support column mixer base)	Lower internals assembly (Clevis insert bolt)	Lower internals assembly (Lower support column bolt)	Upper internals assembly (Upper core plate, upper support plate and support assembly)	Lower internals assembly (Lower core plate)	Upper internals assembly (Support column)	Lower internals assembly (Lower support column bolt)
Lower internals assembly (Unit 1 lower support column casting)	Core baffle/former assembly (Bolt}	Lower internals assembly (Radial key)	Upper internals assembly (Upper support column bolt)	Lower internals assembly (Lower support column bolt)	Upper internals assembly (Upper core plate, upper support plate and support assembly)	RCCA guide tube assembly (Bolt)
Upper internals assembly (Support column mixer base)	Core baffle/former assembly (Plates)	Lower internals assembly (Secondary core support, head/vessel alignment pin, head cooling spray nozzle)	Core baffle/former assembly (Bolt)	Lower internals assembly (Radial key)	Upper internals assembly (Upper support column bolt)	Core baffle/ former assembly (Bolt)

Lower internals assembly (Clevis insert bolt	Core barrel (Shell, ring, flange, nozzle, thermal shield/pad)	Lower internals assembly (Unit 1 diffuser plate	Core baffle/former assembly (Plates)	Lower internals assembly (Secondary core support, head/vessel alignment pin, head cooling spray nozzle)	Core baffle/former assembly (Bolt)	Core barrel assembly (Bolt)
Lower internals assembly (Clevis insert)	Core barrel assembly (Bolt)	RCCA guide tube assembly (Bolt)	Core barrel (Shell, ring, flange, nozzle, thermal shield/pad)	Lower internals assembly (Unit 1 diffuser plate)	Core baffle/former assembly (Plates)	Lower internals assembly (Lower support column bolt)
RCCA guide tube assembly (Support pin)	Instrumentation support structure (Flux thimble guide tube)	RCCA guide tube assembly (Guide tube)	Core barrel assembly (Bolt)	RCCA guide tube assembly (Bolt)	Core barrel (Shell, ring, flange, nozzle, thermal shield/pad)	RCCA guide tube assembly (Bolt)
Lower internals assembly (Clevis insert bolt)	Instrumentation support structure (Thermocouple conduit)	Upper internals assembly (Core plate alignment pin)	Instrumentation support structure (Flux thimble guide tube)	RCCA guide tube assembly (Guide tube)	Core barrel assembly (Bolt)	Upper internals assembly (Hold down spring)
Lower internals assembly (Clevis insert bolt)	Lower internals assembly (Core support forging and lower support column)	Upper internals assembly (Fuel alignment pin)	Instrumentation support structure (Thermocouple conduit)	Upper internals assembly (Core plate alignment pin)	Lower internals assembly (Core support forging and lower support column)	Upper internals assembly (Upper support column bolt)

RCCA guide tube assembly (Support pin)	Lower internals assembly (Fuel alignment pin)	Upper internals assembly (Hold down spring)	Lower internals assembly (Core support forging and lower support column)	Upper internals assembly (Fuel alignment pin)	Lower internals assembly (Fuel alignment pin)

Clarify which of the reactor vessel (RV) internal component commodity groups within the scope of the LRA for BVPS Unit 1 and BVPS Unit 2 are within the scope of LRA B.2.33, "PWR Vessel Internals Program," LRA UFSAR Supplement Section, A.1.33, and the scope of LRA Commitment No. 18 for Unit 1 and Commitment No. 20 for Unit 2.

RESPONSE RAI B.2.33-2

In the FENOC response to RAI-B.2.33-1, LRA Appendix B, Section B.2.33, and Appendix A, Section A.1.33, are revised to delete the text in these LRA sections. Applicable components in LRA Table 3.1.2-2 that previously referred to the PWR Vessel Internals Program are revised to delete references to the aging management program, and to include references to the commitments provided in LRA Appendix A, Table A.4-1, Item 18, and Table A.5-1, Item 20.

See the Enclosure to this letter for the revision to the BVPS LRA.

The component types / commodity groups that credit the License Renewal Future Commitments in LRA Appendix A, Table A.4-1, Item 18 for Unit 1, and Table A.5-1, Item 20 for Unit 2, are:

Component Types / Commodity Groups
Core baffle/former assembly (Bolt)
Core baffle/former assembly (Plates)
Core barrel (Shell, ring, flange, nozzle, thermal shield/pad)
Core barrel assembly (Bolt)
Instrumentation support structure (Flux thimble guide tube)
Instrumentation support structure (Thermocouple conduit)
Lower internals assembly (Clevis insert bolt)
Lower internals assembly (Clevis insert)
Lower internals assembly (Core support forging and lower support column)
Lower internals assembly (Fuel alignment pin)
Lower internals assembly (Lower core plate)
Lower internals assembly (Lower support column bolt)
Lower internals assembly (Radial key)

Component Types / Commodity Groups
Lower internals assembly (Secondary core support, head/vessel alignment pin, head cooling spray nozzle)
Lower internals assembly (Unit 1 diffuser plate)
Lower internals assembly (Unit 1 lower support column casting)
RCCA guide tube assembly (Bolt)
RCCA guide tube assembly (Guide tube)
RCCA guide tube assembly (Support pin)
Upper internals assembly (Core plate alignment pin)
Upper internals assembly (Fuel alignment pin)
Upper internals assembly (Hold-down spring)
Upper internals assembly (Support column mixer base)
Upper internals assembly (Support column)
Upper internals assembly (Upper core plate, upper support plate and support assembly)
Upper internals assembly (Upper support column bolt)

Question RAI B.2.33-3

Clarify whether or not the examination requirements in ASME Code Section XI, Table IWB-2500-1, Examination Categories B-N-1, B-N-2, or B-N-3 are applicable to the RV internal components at BVPS Units 1 and 2, and if so, whether the applicant is crediting the applicable examination category requirements for aging management either under the applicant's ASME Section XI, Subsection IWB, IWB, and IWD Program or the applicant's PWR Vessel Internals Program.

RESPONSE RAI B.2.33-3

Examinations of the:

- interior of the Unit 1 and Unit 2 Reactor Vessels (Category B-N-1),
- integrally welded core support structures and interior attachments to the Reactor Vessels (B-N-2), and
- removable core support structures (B-N-3),

are scheduled and performed in accordance with the ASME Boiler and Pressure Vessel Code, Section XI, Table IWB-2500-1, under the BVPS ASME Section XI, Inservice Inspection Program, subject to the limitations and modifications of 10 CFR 50.55a. However, for license renewal, consistent with the recommendations of NUREG-1801, rows IV.B2-26 and IV.B2-34, only three line items from the Reactor Vessel Internals System credit the ASME Section XI, Inservice Inspection, Subsections IWB, IWC, and

IWD Program (LRA Section B.2.2) for aging management. The component types in these three line items are:

- Lower internals assembly (Clevis insert);
- Lower internals assembly (Radial key); and,
- Upper internals assembly (Core plate alignment pin).

For the Reactor Vessel Internals component types listed in the FENOC response to RAI-B.2.33-2, FENOC provided License Renewal Future Commitments in LRA Appendix A, Table A.4-1, Item 18 for Unit 1, and Table A.5-1, Item 20 for Unit 2, to:

1. Participate in the industry programs applicable to BVPS for investigating and managing aging effects on reactor internals;
2. Evaluate and implement the results of the industry programs as applicable to the BVPS reactor internals; and,
3. Upon completion of these programs, but not less than 24 months before entering the period of extended operations, submit an inspection plan for the BVPS reactor internals to the NRC for review and approval.

No ASME examination categories are specified or credited in these License Renewal Future Commitments.

In the FENOC response to RAI-B.2.33-1, LRA Appendix B, Section B.2.33, and Appendix A, Section A.1.33, are revised to delete the text in these LRA sections. Applicable components in LRA Table 3.1.2-2 that previously referred to the PWR Vessel Internals Program are revised to delete references to the aging management program, and to include references to the commitments provided in LRA Appendix A, Table A.4-1, Item 18, and Table A.5-1, Item 20.

See the Enclosure to this letter for the revision to the BVPS LRA.

Section B.2.40/B.2.41

Question RAI B.2.40-1/B.2.41-1

In FENOC's Program Evaluation Document for AMP B.2.40, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS), the applicant indicates that the inspections of the CASS reactor vessel internal components will be done using ultrasonic testing (UT) techniques. The staff is of the opinion that the current state-of-the-art UT inspection methods may not be capable of detecting the presence of cracks (i.e., have not been adequately qualified) for CASS materials. Identify the UT inspection techniques that are

credited for the examinations of the CASS RVI components, and clarify whether or not the state-of-the art technology for these techniques are capable of detecting surface penetrating and subsurface cracks in the CASS materials. Clarify whether Performance Demonstration Initiative (PDI) will be used to qualify the UT techniques for CASS materials. If it is determined that the state-of-art-technology UT technology is not capable of detecting the presence of cracks in CASS components, identify the alternative inspection techniques or analyses will be credited to manage reduction of fracture toughness in the CASS RVI components as a result of thermal aging or neutron irradiation embrittlement and provide your basis why these alternative techniques are acceptable for management of this aging effect.

RESPONSE RAI B.2.40-1/B.2.41-1

In the FENOC response to RAI-B.2.40-2, LRA Appendix B, Section B.2.40, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)," and Appendix A, Section A.1.40, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program," are revised to delete the text in these sections. The applicable components in LRA Table 3.1.2-2 that previously referred to the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program are revised to delete references to the aging management program, and to include references to the commitments provided in LRA Appendix A, Table A.4-1, Item 18, and Table A.5-1, Item 20, which, following revision as identified in the Enclosure to this letter, reads as follows:

"Regarding activities for managing the aging of Reactor Vessel internal components and structures, BVPS commits to:

1. *Participate in the industry programs applicable to BVPS for investigating and managing aging effects on reactor internals;*
2. *Evaluate and implement the results of the industry programs as applicable to the BVPS reactor internals; and,*
3. *Upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for the BVPS reactor internals to the NRC for review and approval."*

Question RAI B.2.40-2

In FENOC's Program Evaluation Document for AMP B.2.40, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS), the applicant indicates that it may use the industry initiatives of the EPRI MRP Integrated Task Group of reactor vessel internal (RVI) components as an alternative basis to implementing the program elements of Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program. The applicant's basis for using the EPRI MRP's flaw evaluation and inspection guidelines is currently provided through implementation of AMP B.2.33, PWR Vessel Internals Program, which includes Commitment #18 for BVPS Unit 1, as provided in UFSAR Supplement Table A.2-4 and Commitment #20 for BVPS Unit 2, as provided in UFSAR Supplement Table A.2-5. The staff requests, if FENOC seeks to use the industry initiatives of the EPRI MPR as an alternative for managing reduction of fracture toughness (resulting from either thermal aging or neutron irradiation embrittlement) in the CASS RVI components, that AMP B.2.40, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS), and the associated UFSAR supplement in LRA Section A.1.40, be amended to identify this as an exception to the "scope of program" program element in GALL XI.M13 and state that management of reduction of fracture toughness will be managed through the applicant's PWR Vessel Internals Program and the specific provisions in LRA Commitment #18 for BVPS Unit 1 and Commitment #20 for BVPS Unit 2.

RESPONSE RAI B.2.40-2

The BVPS LRA is revised to delete the "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program," described in Sections B.2.40 and A.1.40. The applicable sections of the LRA that previously referred to the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program are revised to delete references to the aging management program, and to include references to the commitments provided in LRA Appendix A, Table A.4-1, Item 18, and Table A.5-1, Item 20.

The LRA revision to delete the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program allows FENOC to use the industry initiatives of the EPRI Material Reliability Project as an alternative for managing reduction of fracture toughness.

See the Enclosure to this letter for the revision to the BVPS LRA.

ENCLOSURE

Beaver Valley Power Station (BVPS), Unit Nos. 1 and 2

Letter L-08-212

Amendment No. 17 to the
BVPS License Renewal Application

License Renewal Application
Sections Affected

Table 2.3.3-13	Table 3.1.2-1
Table 2.3.3-14	Table 3.1.2-2
Table 2.3.3-16	Table 3.1.2-3
Table 2.3.3-26	Section 3.2.2.2.3.3
Table 2.3.3-31	Section 3.3.2.1.1
Section 3.1.2.1.1	Section 3.3.2.1.5
Section 3.1.2.1.2	Section 3.3.2.1.7
Section 3.1.2.1.3	Section 3.3.2.1.11
Section 3.1.2.2.6	Section 3.3.2.1.12
Section 3.1.2.2.7.1	Section 3.3.2.1.13
Section 3.1.2.2.9	Section 3.3.2.1.14
Section 3.1.2.2.12	Section 3.3.2.1.15
Section 3.1.2.2.13	Section 3.3.2.1.16
Section 3.1.2.2.15	Section 3.3.2.1.17
Section 3.1.2.2.17	Section 3.3.2.1.18
Table 3.1.1	Section 3.3.2.1.26

License Renewal Application
Sections Affected, cont.

Section 3.3.2.1.29	Table 3.3.2-31
Section 3.3.2.1.31	Section 3.4.2.1.1
Table 3.3.2-1	Table 3.4.2-1
Table 3.3.2-5	Section A.1.28
Table 3.3.2-7	Section A.1.33
Table 3.3.2-11	Section A.1.40
Table 3.3.2-12	Table A.4-1
Table 3.3.2-13	Table A.5-1
Table 3.3.2-14	Table B.1-1
Table 3.3.2-15	Table B.1-2
Table 3.3.2-16	Table B.1-3
Table 3.3.2-17	Section B.2.15
Table 3.3.2-18	Section B.2.28
Table 3.3.2-26	Section B.2.33
Table 3.3.2-29	Section B.2.40

The Enclosure identifies the revision by Affected License Renewal Application (LRA) Section, LRA Page No., and Affected Paragraph and Sentence. The count for the affected paragraph, sentence, bullet, etc. starts at the beginning of the affected Section or at the top of the affected page, as appropriate. Below each section the reason for the change is identified, and the sentence affected is printed in *italics* with deleted text ~~*lined-out*~~ and added text *underlined*.

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 2.3.3-13	**Page 2.3-75**	**3rd Row**

LRA Table 2.3.3-13, "Emergency Diesel Generators—Crankcase Vacuum System Components Subject to Aging Management Review," 3rd row, requires revision to delete the Component Type "Flexible hose," because FENOC plans to periodically replace elastomeric components in mechanical systems (with the exception of ventilation flexible connections) such that these components are short-lived and not subject to aging management review. LRA Table 2.3.3-13, 3rd row is revised to read:

Component Type	Intended Function
~~*Flexible Hose*~~	~~*Leakage boundary (spatial)*~~

Table 2.3.3-14	**Page 2.3-77**	**4th Row**

LRA Table 2.3.3-14, "Emergency Diesel Generators—Fuel Oil System Components Subject to Aging Management Review," 4th row, requires revision to delete the Component Type "Flexible hose (Unit 2 only)," because FENOC plans to periodically replace elastomeric components in mechanical systems (with the exception of ventilation flexible connections) such that these components are short-lived and not subject to aging management review. LRA Table 2.3.3-14, 4th row is revised to read:

Component Type	Intended Function
~~*Flexible Hose (Unit 2 only)*~~	~~*Pressure boundary*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 2.3.3-16	**Page 2.3-82**	**8th Row**

LRA Table 2.3.3-16, "Emergency Diesel Generators—Water Cooling System Components Subject to Aging Management Review," 8th row, requires revision to delete the Component Type "Sight glass," because FENOC plans to periodically replace, or periodically test and replace on condition, polymer components in mechanical systems (with the exception of Geoflex®-D piping) such that these components are short-lived and not subject to aging management review. LRA Table 2.3.3-16, 8th row is revised to read:

Component Type	Intended Function
~~*Sight glass*~~	~~*Pressure boundary*~~

Table 2.3.3-26 **Page 2.3-111** **2nd Row**

LRA Table 2.3.3-26, "Reactor Plant Sample System Components Subject to Aging Management Review," 2nd row, requires revision to delete the Component Type "Demineralizer," because FENOC plans to periodically replace, or periodically test and replace on condition, polymer components in mechanical systems (with the exception of Geoflex®-D piping) such that these components are short-lived and not subject to aging management review. LRA Table 2.3.3-26, 2nd row is revised to read:

Component Type	Intended Function
~~*Demineralizer*~~	~~*Leakage Boundary (spatial)*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 2.3.3-31	**Page 2.3-126**	**3rd Row**

LRA Table 2.3.3-31, "Solid Waste Disposal System Components Subject to Aging Management Review," 3rd row, requires revision to delete the Component Type "Flexible hose," because FENOC plans to periodically replace elastomeric components in mechanical systems (with the exception of ventilation flexible connections) such that these components are short-lived and not subject to aging management review. LRA Table 2.3.3-31, 3rd row is revised to read:

Component Type	Intended Function
~~*Flexible Hose*~~	~~*Leakage boundary (spatial)*~~

Table 3.1.2.1.1 **Page 3.1-3** **Aging Management Programs, 6th Bullet**

LRA Section 3.1.2.1.1, "Reactor Vessel," Subsection "Aging Management Programs," 6th bullet, requires revision to delete reference to the "One-Time Inspection," program item because FENOC is crediting the ASME Section XI Inservice Inspection Subsections IWB, IWC, and IWD Program to manage cracking of the bottom-mounted instrument guide tubes instead of the One-Time Inspection Program. LRA Section 3.1.2.1.1, Subsection "Aging Management Programs," 6th bullet, is revised to read:

"Aging Management Programs

- ~~*One-Time Inspection (Section B.2.30)"*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.2.1.1	**Page 3.1-3**	**Aging Management Programs, 4th Bullet**

LRA Section 3.1.2.1.1, "Reactor Vessel," Subsection "Aging Management Programs," 4th bullet, requires revision to delete reference to the "Nickel-Alloy Nozzles and Penetrations," program item. FENOC has committed in the LRA, Appendix A, to develop a plant-specific program for managing the aging of nickel-alloy components and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations). Therefore, the Nickel-Alloy Nozzles and Penetrations Program is replaced with a reference to the commitment location (Appendix A). LRA Section 3.1.2.1.1, Subsection "Aging Management Programs," 4th bullet, is revised to read:

"Aging Management Programs

- ~~*Nickel-Alloy Nozzles and Penetrations*~~ *Commitments provided in Appendix A, Table A.4-1, Item 15, and Table A.5-1, Item 17"*

Table 3.1.2.1.2	**Page 3.1-4**	**Aging Management Programs, 2nd Bullet**

LRA Section 3.1.2.1.2, "Reactor Vessel Internals," Subsection "Aging Management Programs," 2nd bullet, requires revision to delete reference to the "PWR Vessel Internals," program item. FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the PWR Vessel Internals Program is replaced with a reference to the commitment location (Appendix A). LRA Section 3.1.2.1.2, Subsection "Aging Management Programs," 4th bullet, is revised to read:

"Aging Management Programs

- ~~*PWR Vessel Internals*~~ *Commitments provided in Appendix A, Table A.4-1, Item 18, and Table A.5-1, Item 20"*

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence

Table 3.1.2.1.2 Page 3.1-4 Aging Management Programs, 3rd Bullet

LRA Section 3.1.2.1.2, "Reactor Vessel Internals," Subsection "Aging Management Programs," 3rd bullet, requires revision to delete reference to the "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)," program item. FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is replaced with a reference to the commitment location (Appendix A). LRA Section 3.1.2.1.2, Subsection "Aging Management Programs," 3rd bullet, is revised to read:

"Aging Management Programs

- ~~*Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)*~~ *Commitments provided in Appendix A, Table A.4-1, Item 18, and Table A.5-1, Item 20"*

Table 3.1.2.1.3 Page 3.1-5 Aging Management Programs, 6th Bullet

LRA Section 3.1.2.1.3, "Reactor Coolant System," Subsection "Aging Management Programs," 6th bullet, requires revision to delete reference to the "Nickel-Alloy Nozzles and Penetrations," program item. FENOC has committed in the LRA, Appendix A, to develop a plant-specific program for managing the aging of nickel-alloy components and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations). Therefore, the Nickel-Alloy Nozzles and Penetrations Program is replaced with a reference to the commitment location (Appendix A). LRA Section 3.1.2.1.3, Subsection "Aging Management Programs," 6th bullet, is revised to read:

"Aging Management Programs

- ~~*Nickel-Alloy Nozzles and Penetrations*~~ *Commitments provided in Appendix A, Table A.4-1, Item 15, and Table A.5-1, Item 17"*

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.2.2.6	**Page 3.1-9**	**2nd and 3rd Paragraphs**

LRA Section 3.1.2.2.6, "Loss of Fracture Toughness Due to Neutron Irradiation Embrittlement and Void Swelling," 2nd and 3rd paragraphs, require revision to delete references to the "PWR Vessel Internals Program." FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the PWR Vessel Internals Program is replaced with a reference to the commitment location (Appendix A). LRA Section 3.1.2.2.6, 2nd and 3rd paragraphs, are revised to read:

"BVPS provides in the UFSAR Supplement ~~(Section A.1.33)~~ a commitment to..."

"This commitment is identified in the UFSAR Supplement (Appendix A) ~~PWR Vessel Internals Program description (Section B.2.33)~~."

Table 3.1.2.2.7.1	**Pages 3.1-9 & 10**	**2nd and 3rd Paragraphs**

LRA Section 3.1.2.2.7.1, "PWR Vessel Bottom-Mounted Instrument Guide Tubes," 2nd and 3rd paragraphs, require revision to delete reference to the "One-Time Inspection Program," because FENOC is crediting the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program to manage cracking of the bottom-mounted instrument guide tubes instead of the One-Time Inspection Program. LRA Section 3.1.2.2.7.1, 2nd and 3rd paragraphs, are revised to read:

"BVPS manages cracking from SCC of these lines by a combination of the Water Chemistry Program and the ASME Section XI Inservice Inspection, Subsections IWB, IWC, IWD ~~One-Time Inspection~~ Program.

The Water Chemistry Program provides for monitoring and controlling of water chemistry using site procedures and processes for the prevention or mitigation of the cracking aging effect. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program has been shown to be effective in managing aging effects in Class 1, 2 or 3 components and their integral attachments in light-water cooled power plants. ~~The One-Time Inspection Program provides an inspection that either verifies that unacceptable degradation is not occurring or triggers additional actions that assure the intended function of affected components will be maintained during the period of extended operation."~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence

Table 3.1.2.2.9 **Pages 3.1-10 & 11** **1st and 2nd Paragraphs**

LRA Section 3.1.2.2.9, "Loss of Preload Due to Stress Relaxation," 1st and 2nd paragraphs, require revision to delete references to the "PWR Vessel Internals Program." FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the PWR Vessel Internals Program is replaced with a reference to the commitment location (Appendix A). LRA Section 3.1.2.2.9, 1st and 2nd paragraphs, are revised to read:

"BVPS provides in the UFSAR Supplement ~~(Section A.1.33)~~ a commitment to..."

"This commitment is identified in the UFSAR Supplement (Appendix A) ~~PWR Vessel Internals Program description (Section B.2.33)~~."

Table 3.1.2.2.12 **Page 3.1-11** **2nd and 3rd Paragraphs**

LRA Section 3.1.2.2.12, "Cracking Due to Stress Corrosion Cracking and Irradiation-Assisted Stress Corrosion Cracking (IASCC)," 2nd and 3rd paragraphs, require revision to delete references to the "PWR Vessel Internals Program." FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the PWR Vessel Internals Program is replaced with a reference to the commitment location (Appendix A). LRA Section 3.1.2.2.12, 2nd and 3rd paragraphs, are revised to read:

"BVPS manages the Reactor Vessel Internals components exposed to reactor coolant with the Water Chemistry Program (Section B.2.42) and a ~~PWR Vessel Internals Program (Section B.2.33)~~ commitment, provided in the UFSAR Supplement (Appendix A)."

"... In addition, BVPS provides in the UFSAR Supplement ~~(Section A.1.33)~~ a commitment to..."

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.2.2.13	**Page 3.1-12**	**4th Paragraph**

LRA Section 3.1.2.2.13, "Cracking Due to Primary Water Stress Corrosion Cracking (PWSCC)," 4th paragraph, requires revision to delete reference to the "Nickel-Alloy Nozzles and Penetrations Program." FENOC has committed in the LRA, Appendix A, to develop a plant-specific program for managing the aging of nickel-alloy components and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations). Therefore, the Nickel-Alloy Nozzles and Penetrations Program is deleted from the section. LRA Section 3.1.2.2.13, 4th paragraph, is revised to read:

"In addition, for nickel alloy, ~~within the Nickel-Alloy Nozzles and Penetrations Program (Section B.2.28) description in the UFSAR Supplement (Section A.1.28),~~ BVPS provided a commitment to develop a plant-specific aging management program that will implement applicable (1) NRC Orders, Bulletins and Generic Letters, and (2) staff-accepted industry guidelines."

Table 3.1.2.2.15	**Page 3.1-13**	**2nd and 3rd Paragraphs**

LRA Section 3.1.2.2.15, "Changes in Dimensions Due to Void Swelling," 2nd and 3rd paragraphs, require revision to delete references to the "PWR Vessel Internals Program." FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the PWR Vessel Internals Program is replaced with a reference to the commitment location (Appendix A). LRA Section 3.1.2.2.15, 2nd and 3rd paragraphs, are revised to read:

"BVPS provides in the UFSAR Supplement ~~(Section A.1.33)~~ a commitment to..."

"This commitment is contained within the UFSAR Supplement (Appendix A) ~~description of the PWR Vessel Internals Program (Section B.2.33)~~."

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.2.2.17	**Page 3.1-15**	**2nd, 3rd and 4th Paragraphs**

LRA Section 3.1.2.2.17, "Cracking Due to Stress Corrosion Cracking, Primary Water Stress Corrosion Cracking, and Irradiation-Assisted Stress Corrosion Cracking," 2nd, 3rd and 4th paragraphs, require revision to delete references to the "PWR Vessel Internals Program." FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the PWR Vessel Internals Program is replaced with a reference to the commitment location (Appendix A). LRA Section 3.1.2.2.17, 2nd, 3rd and 4th paragraphs, are revised to read:

"BVPS manages cracking due to SCC of the PWR stainless steel and nickel alloy Reactor Vessel Internals components with the Water Chemistry Program (Section B.2.42) and a ~~PWR Vessel Internals Program (Section B.2.33)~~ commitment, provided in the UFSAR Supplement (Appendix A)."

"In addition, BVPS provides in the UFSAR Supplement ~~(Section A.1.33)~~ a commitment to..."

"This commitment is identified in the UFSAR Supplement (Appendix A) ~~PWR Vessel Internals Program description (Section B.2.33)~~."

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.1	**Page 3.1-26**	**Item 3.1.1-23, Discussion column, 2nd Paragraph**

LRA Table 3.1.1, "Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for the Reactor Vessel, Vessel Internals, and Reactor Coolant System," row 3.1.1-23, requires revision to delete reference to the "One-Time Inspection Program," because FENOC is crediting the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program to manage cracking of the bottom-mounted instrument guide tubes instead of the One-Time Inspection Program. LRA Table 3.1.1, row 3.1.1-23 – Discussion column only, 2nd paragraph, is revised to read:

Item Number	Discussion
3.1.1-23	*BVPS manages the stainless steel bottom-mounted guide tubes with the Water Chemistry (B.2.42) and ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.2) ~~One-Time Inspection (B.2.30)~~ Programs.*

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.1	**Page 3.1-29**	**Item 3.1.1-31, Discussion column, 3rd Paragraph**
	Page 3.1-31	**Item 3.1.1-34, Discussion column, 3rd Paragraph**

LRA Table 3.1.1, "Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for the Reactor Vessel, Vessel Internals, and Reactor Coolant System," rows 3.1.1-31 and 3.1.1-34 require revision to delete reference to the "Nickel-Alloy Nozzles and Penetrations," program item. FENOC has committed in the LRA, Appendix A, to develop a plant-specific program for managing the aging of nickel-alloy components and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations). Therefore, the Nickel-Alloy Nozzles and Penetrations Program is replaced with a reference to the commitment location (Appendix A). LRA Table 3.1.1, rows 3.1.1-31 and 3.1.1-34 – Discussion column only, 3rd paragraph of each row, is revised to read:

Item Number	Discussion
3.1.1-31 & 3.1.1-34	*The BVPS commitment is described in Appendix A ~~within the Nickel-Alloy Nozzles and Penetrations Program (A.1.28) description~~.*

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.1	**Page 3.1-25**	**Item 3.1.1-22, Discussion column, 2nd Paragraph**
	Page 3.1-27	**Item 3.1.1-27, Discussion column, 2nd Paragraph**
	Page 3.1-28	**Item 3.1.1-30, Discussion column, 3rd Paragraph**
	Page 3.1-30	**Item 3.1.1-33, Discussion column, 2nd Paragraph**
	Page 3.1-34	**Item 3.1.1-37, Discussion column, 2nd and 3rd Paragraphs**

LRA Table 3.1.1, "Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for the Reactor Vessel, Vessel Internals, and Reactor Coolant System," rows 3.1.1-22. -27. -30, -33, and 37 require revision to delete references to the "PWR Vessel Internals Program." FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the PWR Vessel Internals Program is replaced with a reference to the commitment location (Appendix A). LRA Table 3.1.1, rows 3.1.1-22. -27. -30, -33, and 37 – Discussion column only (paragraphs as identified above), is revised to read:

Item Number	Discussion
3.1.1-22, 3.1.1-27, 3.1.1-30 & 3.1.1-33	*The BVPS commitment is described in Appendix A ~~within the PWR Vessel Internals Program (A.1.33) description~~.*
3.1.1-37	*BVPS manages the aging effect with the Water Chemistry (B.2.42) Program and a commitment ~~for the PWR Vessel Internals (B.2.33) Program~~.* *The BVPS commitment is described in Appendix A ~~within the PWR Vessel Internals Program (A.1.33) description~~.*

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.1	**Page 3.1-48**	**Item 3.1.1-80, Discussion column**

LRA Table 3.1.1, "Summary of Aging Management Evaluations in Chapter IV of NUREG-1801 for the Reactor Vessel, Vessel Internals, and Reactor Coolant System," row 3.1.1-80, requires revision to delete reference to the "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program." FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is replaced with a reference to the commitment location (Appendix A). LRA Table 3.1.1, row 3.1.1-80 – Discussion column only, is revised to read:

Item Number	Discussion
3.1.1-80	*Consistent with NUREG-1801, with a different program assigned. The aging effect will be managed through the commitments provided in Appendix A, Table A.4-1, Item 18, and Table A.5-1, Item 20.* ~~*BVPS manages the aging effect with the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) (B.2.40) Program.*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.2-1	**Page 3.1-51**	**Row No. 2, Aging Management Program column**

LRA Table 3.1.2-1, "Reactor Vessel, Vessel Internals, and Reactor Coolant System – Reactor Vessel – Summary of Aging Management Evaluation," row 2 requires revision to delete reference to the "One-Time Inspection Program," because FENOC is crediting the ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD Program to manage cracking of the bottom-mounted instrument guide tubes instead of the One-Time Inspection Program. LRA Table 3.1.2-1, row 2 – Aging Management Program column only, is revised to read:

Row No.	Aging Management Program
2	*ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD (B.2.2)* ~~*One-Time Inspection (B.2.30)*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.2-1	**Page 3.1-58**	**Row No. 36, Aging Management Program column**
	Page 3.1-69	**Row No. 86, Aging Management Program column**
	Page 3.1-71	**Row No. 100, Aging Management Program column**
	Page 3.1-75	**Row No. 123, Aging Management Program column**

LRA Table 3.1.2-1, "Reactor Vessel, Vessel Internals, and Reactor Coolant System – Reactor Vessel – Summary of Aging Management Evaluation," row numbers 36, 86, 100, and 123 require revision to delete reference to the "Nickel-Alloy Nozzles and Penetrations," program item. FENOC has committed in the LRA, Appendix A, to develop a plant-specific program for managing the aging of nickel-alloy components and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations). Therefore, the Nickel-Alloy Nozzles and Penetrations Program is replaced with a reference to the commitment location (Appendix A). LRA Table 3.1.2-1, row numbers 36, 86, 100, and 123 – Aging Management Program column only, is revised to read:

Row Nos.	Aging Management Program
36, 86, 100 & 123	*Commitments provided in Appendix A, Table A.4-1, Item 15, and Table A.5-1, Item 17* ~~*Nickel-Alloy Nozzles and Penetrations (B.2.28)*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.2-2	**Page 3.1-83 – All pages**	**Row Nos. [See list below], Aging Management Program column**

In LRA Table 3.1.2-2, "Reactor Vessel, Vessel Internals, and Reactor Coolant System – Reactor Vessel Internals – Summary of Aging Management Evaluation," multiple row numbers require revision to delete references to the "PWR Vessel Internals," program item. FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the PWR Vessel Internals Program is replaced with a reference to the commitment location (Appendix A). LRA Table 3.1.2-2, row numbers as listed in the table shown below – Aging Management Program column only, is revised to read:

Row Nos.	Aging Management Program
1, 2, 5, 7, 8, 9, 12, 14, 15, 18, 20, 21, 24, 26, 27, 28, 32, 33, 37, 39, 41, 43, 44, 46, 50, 51, 54, 56, 58, 60, 62, 63, 66, 68, 69, 72, 74, 75, 76, 81, 82, 86, 87, 91, 92, 97, 98, 101, 102, 103, 104, 108, 109, 113, 115, 119, 120, 124, 125, 129, 130, 132, 136, 137, 141, 142, 146, 147 & 151	*Commitments provided in Appendix A, Table A.4-1, Item 18, and Table A.5-1, Item 20* ~~*PWR Vessel Internals (B.2.33)*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.2-2	**Pages 3.1-100 & 3.1-106**	**Row Nos. 95 and 134 Aging Management Program column and Notes column**

LRA Table 3.1.2-2, "Reactor Vessel, Vessel Internals, and Reactor Coolant System – Reactor Vessel Internals – Summary of Aging Management Evaluation," row numbers 95 and 134, requires revision to delete reference to the "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program." FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is replaced with a reference to the commitment location (Appendix A). LRA Table 3.1.2-2, row numbers 95 and 134 – Aging Management Program and Notes columns only, is revised to read:

Row Nos.	Aging Management Program	Notes
95 & 134	*Commitments provided in Appendix A, Table A.4-1, Item 18, and Table A.5-1, Item 20* ~~*Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) (B.2.40)*~~	*E* ~~*A*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table 3.1.2-3	**Page 3.1-113**	**Row No. 15 Aging Management Program column**
	Page 3.1-129	**Row No. 112, Aging Management Program column**
	Page 3.1-139	**Row No. 171, Aging Management Program column**
	Page 3.1-144	**Row No. 200, Aging Management Program column**
	Page 3.1-149	**Row No. 234, Aging Management Program column**

LRA Table 3.1.2-3, "Reactor Vessel, Vessel Internals, and Reactor Coolant System – Reactor Coolant System – Summary of Aging Management Evaluation," row numbers 15, 112, 171, 200, and 234, requires revision to delete reference to the "Nickel-Alloy Nozzles and Penetrations," program item. FENOC has committed in the LRA, Appendix A, to develop a plant-specific program for managing the aging of nickel-alloy components and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations). Therefore, the Nickel-Alloy Nozzles and Penetrations Program is replaced with a reference to the commitment location (Appendix A). LRA Table 3.1.2-3, row numbers 15, 112, 171, 200, and 234 – Aging Management Program column only, is revised to read:

Row Nos.	Aging Management Program
15, 112, 171, 200 & 234	*Commitments provided in Appendix A, Table A.4-1, Item 15, and Table A.5-1, Item 17* ~~*Nickel-Alloy Nozzles and Penetrations (B.2.28)*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Section 3.2.2.2.3.3	**Page 3.2-7**	**1st and 2nd Paragraphs**

LRA Section 3.2.2.2.3.3, "BVR Stainless Steel and Aluminum Piping," 1st two paragraphs, requires revision for clarity to include discussion of sodium hydroxide (NaOH) solution and the component types that are exposed to the NaOH solution. LRA Section 3.2.2.2.3.3, 1st two paragraphs, is revised to read:

"Loss of material from pitting and crevice corrosion could occur for BWR stainless steel and aluminum piping, piping components, and piping elements exposed to treated water. For the purpose of NUREG-1801 comparison, loss of material for BWR stainless steel piping components was determined to be applicable to PWR systems with treated (unborated) water, and to treated (unborated) water containing sodium hydroxide (NaOH) solution. This NUREG-1801 environment ~~and~~ was used for comparison because no corresponding NUREG-1801 row existed for PWRs.

BVPS Unit 1 and Unit 2 Chemical Addition Subsystems (including piping, pump casing, tank, and valve body component types) ~~chemical injection pumps and Unit 1 and 2 chemical addition pumps~~ have an internal fluid of NaOH solution. The BVPS position is that this environment is equivalent to the NUREG-1801 "Treated water" environment for aging comparisons. Nickel alloy in this environment was determined to be equivalent to stainless steel for aging comparisons. BVPS manages the aging effects by a combination of the Water Chemistry Program (Section B.2.42) in combination with the One-Time Inspection Program (Section B.2.30)."

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Section 3.3.2.1.1	**Page 3.3-5**	**Materials, 7th Bullet**
Section 3.3.2.1.12	**Page 3.3-19**	**Materials, 5th Bullet**
Section 3.3.2.1.16	**Page 3.3-24**	**Materials, 6th Bullet**
Section 3.3.2.1.18	**Page 3.3-27**	**Materials, 8th Bullet**
Section 3.3.2.1.26	**Page 3.3-37**	**Materials, 6th Bullet**
Section 3.3.2.1.31	**Page 3.3-44**	**Materials, 5th Bullet**

The LRA Sections and Subsections listed above require revision to delete the Material "Polymer." FENOC plans to periodically replace, or periodically test and replace on condition, polymer components in mechanical systems (with the exception of Geoflex®-D piping) such that these components are short-lived and not subject to aging management review. These LRA Sections and Subsections are revised to read:

"Materials

- ~~*Polymers*~~"

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Section 3.3.2.1.5	Page 3.3-10 Page 3.3-11	Materials, 4th Bullet, and Aging Effects Requiring Management, 3rd Bullet
Section 3.3.2.1.7	Page 3.3-13 Page 3.3-14	Materials, 5th Bullet, and Aging Effects Requiring Management, 3rd Bullet
Section 3.3.2.1.11	Page 3.3-18 Page 3.3-19	Materials, 4th Bullet, and Aging Effects Requiring Management, 3rd Bullet
Section 3.3.2.1.12	Page 3.3-19 Page 3.3-20	Materials, 4th Bullet, and Aging Effects Requiring Management, 3rd Bullet
Section 3.3.2.1.13	Page 3.3-19 Page 3.3-20	Materials, 2nd Bullet, and Aging Effects Requiring Management, 1st and 2nd Bullets
Section 3.3.2.1.14	Page 3.3-22 Page 3.3-22	Materials, 1st Bullet (at top of page), and Aging Effects Requiring Management, 2nd Bullet
Section 3.3.2.1.15	Page 3.3-23 Page 3.3-23	Materials, 3rd Bullet, and Aging Effects Requiring Management, 1st and 2nd Bullets
Section 3.3.2.1.16	Page 3.3-24 Page 3.3-25	Materials, 4th Bullet, and Aging Effects Requiring Management, 1st Bullet (at top of page)
Section 3.3.2.1.17	Page 3.3-25 Page 3.3-26	Materials, 3rd Bullet, and Aging Effects Requiring Management, 3rd Bullet
Section 3.3.2.1.29	Page 3.3-41 Page 3.3-42	Materials, 3rd Bullet, and Aging Effects Requiring Management, 3rd Bullet

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Section 3.3.2.1.31	**Page 3.3-44**	**Materials, 2nd Bullet, and**
	Page 3.3-44	**Aging Effects Requiring Management, 1st and 2nd Bullets**
Section 3.4.2.1.1	**Page 3.4-3**	**Materials, 4th Bullet, and**
	Page 3.4-3	**Aging Effects Requiring Management, 3rd Bullet**

The LRA Sections and Subsections listed above require revision to delete the Material "Elastomers," and the Aging Effects Requiring Management "Cracking" (Sections 3.3.2.1.13, 3.3.2.1.15, and 3.3.2.1.31 only) and "Hardening and loss of strength." FENOC plans to periodically replace elastomeric components in mechanical systems (with the exception of ventilation flexible connections) such that these components are short-lived and not subject to aging management review. These LRA Sections and Subsections are revised to read:

"Materials

- ~~*Elastomers*~~"

"Aging Effects Requiring Management

- ~~*Cracking*~~ (Sections 3.3.2.1.13, 3.3.2.1.15, and 3.3.2.1.31 only)
- ~~*Hardening and loss of strength*~~"

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Tables 3.3.2-X	**[Listed below]**	**Rows [Listed below]**
Table 3.4.2-1	**[Listed below]**	**Rows [Listed below]**

The LRA Tables (listed below) in Section 3.3.2, "Auxiliary Systems – Summary of Aging Management Evaluation," and Table 3.4.2-1, "Steam and Power Conversion Systems – Auxiliary Feedwater System – Summary of Aging Management Evaluation," and the row numbers listed below, require revision to delete Component Types made of the Materials "Elastomer" or "Polymer." FENOC plans to periodically replace [selected] elastomeric components in mechanical systems (with the exception of ventilation flexible connections), and to periodically replace, or periodically test and replace on condition, [selected] polymer components in mechanical systems (with the exception of Geoflex®-D piping), such that these components are short-lived and not subject to aging management review. Therefore, the affected LRA Tables, showing the rows selected for deletion, are revised to read:

Table 3.3.2-1 Page 3.3-104

Row No.	Component Type	Material
28	*[Deleted]* ~~*Filter housing (bowl)*~~	~~*Polymer*~~
29	*[Deleted]* ~~*Filter housing (bowl)*~~	~~*Polymer*~~

Table 3.3.2-5 Page 3.3-231

Row No.	Component Type	Material
215	*[Deleted]* ~~*Sight glass*~~	~~*Elastomers*~~
216	*[Deleted]* ~~*Sight glass*~~	~~*Elastomers*~~
217	*[Deleted]* ~~*Sight glass*~~	~~*Elastomers*~~
218	*[Deleted]* ~~*Sight glass*~~	~~*Elastomers*~~
219	*[Deleted]* ~~*Sight glass*~~	~~*Elastomers*~~

Table 3.3.2-7 Pages 3.3-266 & 267

Row No.	Component Type	Material
28	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
29	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
30	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
31	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
32	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~

Table 3.3.2-11 Pages 3.3-353 & 354

Row No.	Component Type	Material
5	*[Deleted]* ~~*Expansion joint*~~	~~*Elastomers*~~
6	*[Deleted]* ~~*Expansion joint*~~	~~*Elastomers*~~
7	*[Deleted]* ~~*Expansion joint*~~	~~*Elastomers*~~
8	*[Deleted]* ~~*Expansion joint*~~	~~*Elastomers*~~

Table 3.3.2-12 Pages 3.3-364 & 365

Row No.	Component Type	Material
12	*[Deleted]* ~~*Flexible hose*~~	~~*Polymer*~~
13	*[Deleted]* ~~*Flexible hose*~~	~~*Polymer*~~
16	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
17	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
18	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
19	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~

Table 3.3.2-13 Page 3.3-379

Row No.	Component Type	Material
7	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
8	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
9	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~

Table 3.3.2-14 Page 3.3-385

Row No.	Component Type	Material
13	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
14	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
15	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~

Table 3.3.2-15 Pages 3.3-401 & 402

Row No.	Component Type	Material
6	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
7	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~
8	*[Deleted]* ~~*Flexible hose*~~	~~*Elastomers*~~

Table 3.3.2-16 Pages 3.3-412, 418, 419 & 420

Row No.	Component Type	Material
3	[Deleted] ~~Flexible hose~~	~~Elastomers~~
4	[Deleted] ~~Flexible hose~~	~~Elastomers~~
5	[Deleted] ~~Flexible hose~~	~~Elastomers~~
45	[Deleted] ~~Piping~~	~~Polymer~~
46	[Deleted] ~~Piping~~	~~Polymer~~
54	[Deleted] ~~Sight glass~~	~~Polymer~~
55	[Deleted] ~~Sight glass~~	~~Polymer~~
56	[Deleted] ~~Sight glass~~	~~Polymer~~

Table 3.3.2-17 Page 3.3-423

Row No.	Component Type	Material
3	[Deleted] ~~Expansion joint~~	~~Elastomers~~
4	[Deleted] ~~Expansion joint~~	~~Elastomers~~
5	[Deleted] ~~Expansion joint~~	~~Elastomers~~
6	[Deleted] ~~Expansion joint~~	~~Elastomers~~

Table 3.3.2-18 Page 3.3-444

Row No.	Component Type	Material
16	*[Deleted]* ~~*Flexible hose (halon)*~~	~~*Polymer*~~
17	*[Deleted]* ~~*Flexible hose (halon)*~~	~~*Polymer*~~

Table 3.3.2-26 Pages 3.3-591, 592, 608, 609 & 610

Row No.	Component Type	Material
10	*[Deleted]* ~~*Demineralizer*~~	~~*Polymer*~~
11	*[Deleted]* ~~*Demineralizer*~~	~~*Polymer*~~
12	*[Deleted]* ~~*Demineralizer*~~	~~*Polymer*~~
100	*[Deleted]* ~~*Tank*~~	~~*Polymer*~~
101	*[Deleted]* ~~*Tank*~~	~~*Polymer*~~
102	*[Deleted]* ~~*Tank*~~	~~*Polymer*~~
110	*[Deleted]* ~~*Tubing*~~	~~*Polymer*~~
111	*[Deleted]* ~~*Tubing*~~	~~*Polymer*~~
112	*[Deleted]* ~~*Tubing*~~	~~*Polymer*~~
113	*[Deleted]* ~~*Tubing*~~	~~*Polymer*~~

Table 3.3.2-29 Page 3.3-677

Row No.	Component Type	Material
8	[Deleted] ~~Flexible hose~~	~~Elastomers~~
9	[Deleted] ~~Flexible hose~~	~~Elastomers~~
10	[Deleted] ~~Flexible hose~~	~~Elastomers~~
11	[Deleted] ~~Flexible hose~~	~~Elastomers~~
12	[Deleted] ~~Flexible hose~~	~~Elastomers~~
13	[Deleted] ~~Flexible hose~~	~~Elastomers~~
14	[Deleted] ~~Flexible hose~~	~~Elastomers~~

Table 3.3.2-31 Pages 3.3-716, 717 & 724

Row No.	Component Type	Material
12	[Deleted] ~~Flexible hose~~	~~Elastomers~~
13	[Deleted] ~~Flexible hose~~	~~Elastomers~~
14	[Deleted] ~~Flexible hose~~	~~Elastomers~~
15	[Deleted] ~~Flexible hose~~	~~Elastomers~~
16	[Deleted] ~~Flexible hose~~	~~Elastomers~~
51	[Deleted] ~~Tank~~	~~Polymer~~
52	[Deleted] ~~Tank~~	~~Polymer~~
53	[Deleted] ~~Tank~~	~~Polymer~~
54	[Deleted] ~~Tank~~	~~Polymer~~

Table 3.4.2-1 Page 3.4-39

Row No.	Component Type	Material
11	[Deleted] ~~Flexible hose~~	~~Elastomers~~
12	[Deleted] ~~Flexible hose~~	~~Elastomers~~
13	[Deleted] ~~Flexible hose~~	~~Elastomers~~
14	[Deleted] ~~Flexible hose~~	~~Elastomers~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Section A.1.28	**Page A.1-12**	**Entire Section**

LRA Section A.1.28, "Nickel-Alloy Nozzles and Penetrations Program," requires deletion. FENOC has committed in the LRA, Appendix A, to develop a plant-specific program for managing the aging of nickel-alloy components and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations). Therefore, the Nickel-Alloy Nozzles and Penetrations Program text is deleted from the section. LRA Section A.1.28 is revised to read:

"A.1.28 *[Deleted]* ~~***NICKEL-ALLOY NOZZLES AND PENETRATIONS PROGRAM***~~

~~*For the Nickel-Alloy Nozzles and Penetrations Program, regarding activities for managing the aging of nickel-alloy and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations), BVPS commits to develop a plant-specific aging management program that will implement applicable:*~~

~~*1. NRC Orders, Bulletins and Generic Letters, and,*~~

~~*2. staff-accepted industry guidelines.*~~"

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Section A.1.33	**Page A.1-14**	**Entire Section**

LRA Section A.1.33, "PWR Vessel Internals Program," requires deletion. FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the PWR Vessel Internals Program text is deleted from the section. LRA Section A.1.33 is revised to read:

"A.1.33 ***[Deleted]*** ~~***PWR VESSEL INTERNALS PROGRAM***~~

~~*For the PWR Vessel Internals Program, regarding activities for managing the aging of Reactor Vessel internal components and structures, BVPS provided in Table A.4-1 (Unit 1 only) and Table A.5-1 (Unit 2 only) commitments to:*~~

1. ~~*Participate in the industry programs applicable to BVPS for investigating and managing aging effects on reactor internals;*~~
2. ~~*Evaluate and implement the results of the industry programs as applicable to the BVPS reactor internals; and,*~~
3. ~~*Upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for the BVPS reactor internals to the NRC for review and approval.*~~"

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Section A.1.40	**Page A.1-17**	**Entire Section**

LRA Section A.1.40, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program," requires deletion. FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program text is deleted from the section. LRA Section A.1.40 is revised to read:

"A.1.40 *[Deleted]* ~~*THERMAL AGING AND NEUTRON IRRADIATION EMBRITTLEMENT OF CAST AUSTENITIC STAINLESS STEEL (CASS) PROGRAM*~~

~~*The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program inspects Reactor Vessel Internals in accordance with ASME Code Section XI, Subsection IWB, Category B-N-3. This inspection is augmented to detect the effects of loss of fracture toughness due to thermal aging and neutron irradiation embrittlement of CASS components. The program includes identification of the limiting susceptible components from the standpoint of thermal aging susceptibility, neutron fluence, and cracking. For each identified component, aging management is accomplished through either a supplemental examination or a component-specific evaluation, including a mechanical loading assessment.*~~

~~*BVPS participates in the EPRI Materials Reliability Project established to investigate the impacts of aging on PWR vessel internal components. The results of this project provide additional bases for the inspections and evaluations performed under this program.*~~"

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table A.4-1	**Page A.4-6**	**Item Number 15**

LRA Table A.4-1, "Unit 1 License Renewal Commitments," Item Number 15 regarding nickel-alloy components, requires clarification. The Nickel-Alloy Nozzles and Penetrations Program is not a defined program. Therefore, the commitment needs to be revised to remove the program title from the commitment. Item Number 15 in LRA Table A.4-1 is revised to read:

Item No.	Commitment	Implementation Schedule	Source	Related LRA Section No./ Comments
15	~~*For the Nickel-Alloy Nozzles and Penetrations Program, r*~~ *Regarding activities for managing the aging of nickel-alloy components and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations), BVPS commits to develop a plant-specific aging management program that will implement applicable:* *1. NRC Orders, Bulletins and Generic Letters; and,* *2. Staff-accepted industry guidelines.*	January 29, 2016	LRA	*None* ~~*A.1.28*~~ ~~*B.2.28*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table A.4-1	**Page A.4-7**	**Item Number 18**

LRA Table A.4-1, "Unit 1 License Renewal Commitments," Item Number 18 regarding Reactor Vessel internal components and structures, requires clarification. The PWR Vessel Internals Program is not a defined program. Therefore, the commitment needs to be revised to remove the program title from the commitment. Item Number 18 in LRA Table A.4-1 is revised to read:

Item No.	Commitment	Implementation Schedule	Source	Related LRA Section No./ Comments
18	~~*For the PWR Vessel Internals Program, r*~~ *Regarding activities for managing the aging of Reactor Vessel internal components and structures, BVPS commits to:* 1. *Participate in the industry programs applicable to BVPS Unit 1 for investigating and managing aging effects on reactor internals;* 2. *Evaluate and implement the results of the industry programs as applicable to the BVPS Unit 1 reactor internals; and,* 3. *Upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for the BVPS Unit 1 reactor internals to the NRC for review and approval.*	January 29, 2014	LRA	*None* ~~*A.1.33*~~ ~~*B.2.33*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table A.4-1	**Page A.4-8**	**Item Number 21**

LRA Table A.4-1, "Unit 1 License Renewal Commitments," Item Number 21 requires deletion. FENOC has committed in the LRA, Table A.4-1, Item Number 18, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program commitment is not required and is deleted. Item Number 21 in LRA Table A.4-1 is revised to read:

Item No.	Commitment	Implementation Schedule	Source	Related LRA Section No./ Comments
21	*[Deleted]* ~~*Implement the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program as described in LRA Section B.2.40.*~~	~~January 29, 2016~~	~~LRA~~	~~*A.1.40*~~ ~~*B.2.40*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table A.4-1	**Page A.4-8**	**New Item Number 21**

LRA Table A.4-1, "Unit 1 License Renewal Commitments," requires a new License Renewal Future Commitment related to elastomeric components. FENOC plans to periodically replace elastomeric components in mechanical systems (with the exception of ventilation flexible connections) such that these components are short-lived and not subject to aging management review. A table that provides a list of elastomeric components that are the focus of this new commitment is included following the commitment. New Item Number 21 is created, and LRA Table A.4-1 is revised to read:

Item No.	Commitment	Implementation Schedule	Source	Related LRA Section No./ Comments
21	*With the exception of flexible connections in ventilations systems, prior to the period of extended operation, FENOC will perform repetitive maintenance tasks to replace mechanical system elastomeric components that would otherwise be subject to aging management review. Subsequent frequencies of the repetitive replacements will be based on manufacturer recommendations and applicable operating experience.* ~~*[Deleted]*~~	*January 29, 2016*	*FENOC Letter L-08-212*	*None*

[See "Elastomeric Components and Affected Systems" table on next page.]

Elastomeric Components and Affected Systems

Component	System Name	Deleted from LRA Section / Table
Expansion joint	Emergency Diesel Generators & Support	2.3.3.11 / 3.3.2-11
Flexible hose	Emergency Diesel Generators & Support	2.3.3.12 / 3.3.2-12
Flexible hose	Emergency Diesel Generators & Support	2.3.3.13 / 3.3.2-13
Flexible hose	Emergency Diesel Generators & Support	2.3.3.14 / 3.3.2-14
Flexible hose	Emergency Diesel Generators & Support	2.3.3.15 / 3.3.2-15
Flexible hose	Emergency Diesel Generators & Support	2.3.3.16 / 3.3.2-16
Expansion joint	ERF Diesel Generator Support	2.3.3.17 / 3.3.2-17
Flexible hose	Security Diesel Generator	2.3.3.29 / 3.3.2-29
Flexible hose	Solid Waste Disposal	2.3.3.31 / 3.3.2-31
Sight glass	Chemical and Volume Control	2.3.3.5 / 3.3.2-5
Flexible hose	Compressed Air	2.3.3.7 / 3.3.2-7
Flexible hose	Auxiliary Feedwater	2.3.4.1 / 3.4.2-1

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table A.4-1	**N/A**	**New Item Number 28**

LRA Table A.4-1, "Unit 1 License Renewal Commitments," requires a new License Renewal Future Commitment related to polymer components. FENOC plans to periodically replace, or to periodically test and replace on condition, polymer components in mechanical systems (with the exception of underground Geoflex®-D piping), such that these components are short-lived and not subject to aging management review. A table that provides a list of polymer components that are the focus of this new commitment is included following the commitment. New Item Number 28 is created, and LRA Table A.4-1 is revised to read:

Item No.	Commitment	Implementation Schedule	Source	Related LRA Section No./ Comments
28	*With the exception of underground GeoFlex® fuel oil piping, prior to the period of extended operation, FENOC will perform repetitive maintenance tasks to replace, or to test and replace on condition, mechanical system polymer components that would otherwise be subject to aging management review. Subsequent frequencies of the repetitive tests/replacements will be based on manufacturer recommendations and applicable operating experience.*	*January 29, 2016*	*FENOC Letter L-08-212*	*None*

[See "Polymer Components and Affected Systems" table on next page.]

Polymer Components and Affected Systems

Component	System Name	Deleted from LRA Section / Table
Filter housing (1VS-FL-47/48 bowl)	Area Ventilation – Control Area	2.3.3.1 / 3.3.2-1
Flexible hose	Emergency Diesel Generators & Support	2.3.3.12 / 3.3.2-12
Piping	Emergency Diesel Generators & Support	2.3.3.16 / 3.3.2-16
Sight glass	Emergency Diesel Generators & Support	2.3.3.16 / 3.3.2-16
Flexible hose (Halon)	Fire Protection	2.3.3.18 / 3.3.2-18
Demineralizer	Reactor Plant Sample	2.3.3.26 / 3.3.2-26
Tank	Reactor Plant Sample	2.3.3.26 / 3.3.2-26
Tubing	Reactor Plant Sample	2.3.3.26 / 3.3.2-26
Tank	Solid Waste Disposal	2.3.3.31 / 3.3.2-31

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table A.5-1	**Page A.5-6**	**Item Number 17**

LRA Table A.5-1, "Unit 2 License Renewal Commitments," Item Number 17 regarding nickel-alloy components, requires clarification. The Nickel-Alloy Nozzles and Penetrations Program is not a defined program. Therefore, the commitment needs to be revised to remove the program title from the commitment. Item Number 17 in LRA Table A.5-1 is revised to read:

Item No.	Commitment	Implementation Schedule	Source	Related LRA Section No./ Comments
17	~~*For the Nickel-Alloy Nozzles and Penetrations Program, r*~~ *Regarding activities for managing the aging of nickel-alloy components and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations), BVPS commits to develop a plant-specific aging management program that will implement applicable:* 1. *NRC Orders, Bulletins and Generic Letters; and,* 2. *Staff-accepted industry guidelines.*	May 27, 2027	LRA	*None* ~~*A.1.28*~~ ~~*B.2.28*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table A.5-1	**Page A.5-7**	**Item Number 20**

LRA Table A.5-1, "Unit 2 License Renewal Commitments," Item Number 20 regarding Reactor Vessel internal components and structures, requires clarification. The PWR Vessel Internals Program is not a defined program. Therefore, the commitment needs to be revised to remove the program title from the commitment. Item Number 20 in LRA Table A.5-1 is revised to read:

Item No.	Commitment	Implementation Schedule	Source	Related LRA Section No./ Comments
20	~~*For the PWR Vessel Internals Program, r*~~ *Regarding activities for managing the aging of Reactor Vessel internal components and structures, BVPS commits to:* 1. *Participate in the industry programs applicable to BVPS Unit 2 for investigating and managing aging effects on reactor internals;* 2. *Evaluate and implement the results of the industry programs as applicable to the BVPS Unit 2 reactor internals; and,* 3. *Upon completion of these programs, but not less than 24 months before entering the period of extended operation, submit an inspection plan for the BVPS Unit 2 reactor internals to the NRC for review and approval.*	May 27, 2025	LRA	*None* ~~*A.1.33*~~ ~~*B.2.33*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table A.5-1	**Page A.5-8**	**Item Number 23**

LRA Table A.5-1, "Unit 2 License Renewal Commitments," Item Number 23 requires deletion. FENOC has committed in the LRA, Table A.4-1, Item Number 18, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program commitment is not required and is deleted. Item Number 23 in LRA Table A.5-1 is revised to read:

Item No.	Commitment	Implementation Schedule	Source	Related LRA Section No./ Comments
23	*[Deleted]* ~~*Implement the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program as described in LRA Section B.2.40.*~~	~~May 27, 2027~~	~~LRA~~	~~*A.1.40*~~ ~~*B.2.40*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table A.5-1	**Page A.5-8**	**New Item Number 23**

LRA Table A.5-1, "Unit 2 License Renewal Commitments," requires a new License Renewal Future Commitment related to elastomeric components. FENOC plans to periodically replace elastomeric components in mechanical systems (with the exception of ventilation flexible connections) such that these components are short-lived and not subject to aging management review. A table that provides a list of elastomeric components that are the focus of this new commitment is included following the commitment. New Item Number 23 is created, and LRA Table A.5-1 is revised to read:

Item No.	Commitment	Implementation Schedule	Source	Related LRA Section No./ Comments
23	*With the exception of flexible connections in ventilations systems, prior to the period of extended operation, FENOC will perform repetitive maintenance tasks to replace mechanical system elastomeric components that would otherwise be subject to aging management review. Subsequent frequencies of the repetitive replacements will be based on manufacturer recommendations and applicable operating experience.* ~~*[Deleted]*~~	*May 27, 2027*	*FENOC Letter L-08-212*	*None*

[See "Elastomeric Components and Affected Systems" table on next page.]

Elastomeric Components and Affected Systems

Component	System Name	Deleted from LRA Section / Table
Expansion joint	Emergency Diesel Generators & Support	2.3.3.11 / 3.3.2-11
Flexible hose	Emergency Diesel Generators & Support	2.3.3.12 / 3.3.2-12
Flexible hose	Emergency Diesel Generators & Support	2.3.3.13 / 3.3.2-13
Flexible hose	Emergency Diesel Generators & Support	2.3.3.14 / 3.3.2-14
Flexible hose	Emergency Diesel Generators & Support	2.3.3.15 / 3.3.2-15
Flexible hose	Emergency Diesel Generators & Support	2.3.3.16 / 3.3.2-16
Expansion joint	ERF Diesel Generator Support	2.3.3.17 / 3.3.2-17
Flexible hose	Security Diesel Generator	2.3.3.29 / 3.3.2-29
Flexible hose	Solid Waste Disposal	2.3.3.31 / 3.3.2-31
Sight glass	Chemical and Volume Control	2.3.3.5 / 3.3.2-5
Flexible hose	Compressed Air	2.3.3.7 / 3.3.2-7
Flexible hose	Auxiliary Feedwater	2.3.4.1 / 3.4.2-1

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table A.5-1	**N/A**	**New Item Number 27**

LRA Table A.5-1, "Unit 2 License Renewal Commitments," requires a new License Renewal Future Commitment related to polymer components. FENOC plans to periodically replace, or to periodically test and replace on condition, polymer components in mechanical systems (with the exception of underground Geoflex®-D piping), such that these components are short-lived and not subject to aging management review. A table that provides a list of polymer components that are the focus of this new commitment is included following the commitment. New Item Number 27 is created, and LRA Table A.5-1 is revised to read:

Item No.	Commitment	Implementation Schedule	Source	Related LRA Section No./ Comments
27	*With the exception of underground GeoFlex® fuel oil piping, prior to the period of extended operation, FENOC will perform repetitive maintenance tasks to replace, or to test and replace on condition, mechanical system elastomeric components that would otherwise be subject to aging management review. Subsequent frequencies of the repetitive tests/replacements will be based on manufacturer recommendations and applicable operating experience.*	*May 27, 2027*	*FENOC Letter L-08-212*	*None*

[See "Elastomeric Components and Affected Systems" table on next page.]

Polymer Components and Affected Systems

Component	System Name	Deleted from LRA Section / Table
Filter housing (1VS-FL-47/48 bowl)	Area Ventilation – Control Area	2.3.3.1 / 3.3.2-1
Flexible hose	Emergency Diesel Generators & Support	2.3.3.12 / 3.3.2-12
Piping	Emergency Diesel Generators & Support	2.3.3.16 / 3.3.2-16
Sight glass	Emergency Diesel Generators & Support	2.3.3.16 / 3.3.2-16
Flexible hose (Halon)	Fire Protection	2.3.3.18 / 3.3.2-18
Demineralizer	Reactor Plant Sample	2.3.3.26 / 3.3.2-26
Tank	Reactor Plant Sample	2.3.3.26 / 3.3.2-26
Tubing	Reactor Plant Sample	2.3.3.26 / 3.3.2-26
Tank	Solid Waste Disposal	2.3.3.31 / 3.3.2-31

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table B.1-1	**Page B.1-6**	**15th Row**
	Page B.1-7	**1st and 8th Rows**

LRA Table B.1-1, "BVPS Aging Management Programs," requires deletion of several rows based on the removal of the Nickel-Alloy Nozzles and Penetrations, the PWR Vessel Internals, and the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Programs from Appendix B. These programs were not well-defined, and License Renewal Future Commitments are to be used to develop the programs that will manage the aging of the components that previously credited these programs. Therefore, the Table B.1-1 rows that correspond to these [deleted] programs are deleted. LRA Table B.1-1 is revised to read:

Aging Management Program Title	LRA Section	Status
~~*Nickel-Alloy Nozzles and Penetrations*~~	~~*B.2.28*~~	~~*New*~~
~~*PWR Vessel Internals*~~	~~*B.2.33*~~	~~*New*~~
~~*Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)*~~	~~*B.2.40*~~	~~*New*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table B.1-2	**Page B.1-9**	**4th, 7th and 10th Rows**

LRA Table B.1-2, "BVPS Aging Management Program Correlation to NUREG-1801 Aging Management Programs," requires deletion of BVPS-specific program information in several table cells based on the removal of the Nickel-Alloy Nozzles and Penetrations, the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS), and the PWR Vessel Internals Programs from Appendix B. These programs were not well-defined, and License Renewal Future Commitments are to be used to develop the programs that will manage the aging of the components that previously credited these programs. Therefore, the BVPS-specific program information in Table B.1-2 table cells that corresponds to these [deleted] BVPS programs is deleted. LRA Table B.1-2 is revised to read:

NUREG-1801 Number	NUREG-1801 Program	BVPS Program	LRA Section
XI.M11	Nickel-Alloy Nozzles and Penetrations	~~*Nickel-Alloy Nozzles and Penetrations*~~	~~*B.2.28*~~
XI.M13	Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)	~~*Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)*~~	~~*B.2.40*~~
XI.M16	PWR Vessel Internals	~~*PWR Vessel Internals*~~	~~*B.2.33*~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Table B.1-3	**Page B.1-15**	**9th Row**
	Page B.1-16	**2nd and 9th Rows**

LRA Table B.1-3, "BVPS Aging Management Program Consistency with NUREG-1801 Aging Management Programs," requires deletion of table rows based on the removal of the Nickel-Alloy Nozzles and Penetrations, the PWR Vessel Internals, and the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Programs from Appendix B. These programs were not well-defined, and License Renewal Future Commitments are to be used to develop the programs that will manage the aging of the components that previously credited these programs. Therefore, the Table B.1-3 rows that correspond to these [deleted] programs are deleted. LRA Table B.1-3 is revised to read:

Program Name	Plant-Specific	NUREG-1801 Comparison		
		Programs Consistent with NUREG-1801	Programs with Enhancement(s)	Programs with Exception(s) to NUREG-1801
~~*Nickel-Alloy Nozzles and Penetrations*~~	~~--~~	~~**Yes**~~	~~--~~	~~--~~
~~*PWR Vessel Internals*~~	~~--~~	~~**Yes**~~	~~--~~	~~--~~
~~*Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)*~~	~~--~~	~~**Yes**~~	~~--~~	~~--~~

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Section B.2.15	**Pages B.2-39 through B.2-42**	**Multiple locations in Section**

LRA Section B.2-15, "External Surfaces Monitoring," requires revision to address the increased scope to the NUREG-1801, Section XI.M36, "External Surfaces Monitoring," program that manages aging of elastomer ventilation flexible connections. Multiple subsections of the program are affected, so the entire External Surfaces Monitoring Program is reproduced for clarity. LRA Section B.2-15 is revised to read:

"B.2-15 EXTERNAL SURFACES MONITORING

Program Description

The External Surfaces Monitoring Program is a new program that BVPS will implement prior to the period of extended operation.

The External Surfaces Monitoring Program is based on system inspections and walkdowns. This program will consist of periodic inspections to monitor the external surfaces of in-scope steel components and other metal components for material degradation and leakage, and periodic inspection of in-scope elastomer components for hardening, loss of strength or cracking through physical manipulation. The program will also require inspection of radiators (fins and tubes) associated with diesel engines and diesel-driven equipment for build-up of dust, dirt and debris. Additionally, the program is credited with managing aging effects of internal surfaces, for situations in which material and environment combinations are the same for internal and external surfaces such that external surface condition is representative of internal surface condition.

Loss of material due to boric acid corrosion is managed by the Boric Acid Corrosion Program [Section B.2.7].

NUREG-1801 Consistency

The External Surfaces Monitoring Program is a new program that is consistent with NUREG-1801, Section XI.M36, External Surfaces Monitoring.

Exceptions to NUREG-1801

None

Enhancements

None

Aging Management Program Elements

The results of an evaluation of each of the 10 aging management program elements described in NUREG-1801, Section XI.E1, are provided as follows:

- ***Scope of Program***

  The program will require visual inspection of the external surfaces of in-scope components and monitoring of the external surfaces of steel components and other metal components within the scope of license renewal and subject to aging management review for loss of material and leakage. The program will require monitoring of the external surfaces of flexible elastomeric connections in ventilation systems for cracking and for hardening and loss of strength. ~~The program will require inspection of in-scope elastomer components for hardening, loss of strength or cracking.~~ The program will also require inspection of radiators (fins and tubes) associated with diesel engines and diesel-driven equipment for build-up of dust, dirt and debris.

  Inspections shall include, but will not be limited to the following types of inspection:

  - *Visual inspection for indications of general corrosion ~~(applicable to steel components)~~, pitting corrosion, and crevice corrosion of exposed metal surfaces. For steel components, general corrosion is expected to be present and detectable. If pitting and crevice corrosion should exist, then general corrosion will manifest itself as visible rust or rust by-products (e.g., discoloration or coating degradation) and will be detectable prior to any loss of intended function. Loss of material from external surfaces of stainless steel (or other metals) will be evident by surface irregularities or localized discoloration before loss of function occurs. Although materials other than steel are not discussed in NUREG-1801 for this program, identification of the loss of material aging effect for other metals is amenable to the same types of visual inspections.*
  - *In addition to the program scope described in NUREG-1801, Section XI.M36, the External Surfaces Monitoring program will require monitoring of the external surfaces of flexible elastomeric connections in ventilation systems for cracking and for hardening and loss of strength. The program is also credited with managing these aging effects for the internal surfaces of these components, in which both the internal and external surface environments are ambient or dry air. ~~Visual inspection of elastomers for indications of hardening, loss of strength and cracking. The inspection will include physical manipulation of elastomers to visually confirm flexibility.~~*

- *Visual inspection of radiators (fins and tubes) associated with diesel engines and diesel-driven equipment for build-up of dust, dirt and debris. The applicable aging effect is reduction of heat transfer due to build-up of dust, dirt and debris.*

~~*The External Surfaces Monitoring program is credited with managing aging effects of internal surfaces, for situations in which material and environment combinations are the same for internal and external surfaces, such that external surface condition is representative of internal surface condition.*~~

- ***Preventive Actions***

  The External Surfaces Monitoring Program is a visual monitoring program that does not include preventive actions.

- ***Parameters Monitored / Inspected***

  The program will require the use of periodic plant system inspections and walkdowns to monitor for material degradation and leakage. The program requires inspection of components such as piping, piping components, ducting and other components. The inspection parameters will include the following:

  - *Corrosion and material wastage (loss of material);*
  - *Leakage from or onto external surfaces;*
  - *Worn, flaking, or oxide-coated surfaces;*
  - *Corrosion stains on thermal insulation; and,*
  - *Protective coating degradation (cracking and flaking).*

  In addition to the parameters specified by the NUREG-1801, Section XI.M36 program, the External Surfaces Monitoring program will require the use of periodic plant system inspections and walkdowns to monitor for material degradation of elastomeric flexible connections in ventilation systems. These inspections include a visual inspection coupled with physical manipulation of elastomeric components to identify aging parameters such as cracks, hardening and loss of strength.

  The program provides for inspection of bolting used in pressure retaining components (non-safety related) as required by the Bolting Integrity Program.

- ***Detection of Aging Effects***

  The program will require periodic visual inspection of in-scope steel components and other metal components to identify loss of material. ~~The program will require periodic inspection of in-scope elastomer components for hardening, loss of strength or cracking.~~ The program will also require inspection of radiators (fins and tubes) associated with diesel engines and diesel-driven equipment for build-up of dust, dirt and debris.

  For metal surfaces that are painted or coated, the program will inspect these surfaces to confirm integrity of the paint or coating. If no degradation is indicated, then no additional inspection of the subject surface will be required.

  In addition to the detection methods specified by the NUREG-1801, Section XI.M36 program, the External Surfaces Monitoring program will require a periodic visual inspection, coupled with physical manipulation of in-scope elastomeric ventilation components, to identify cracking, hardening and loss of strength.

  Physical manipulation of elastomeric components, such as by pinching or prodding flexible connections in ventilation systems, will aid in identification of elastomer aging effects. Cracking of elastomeric components becomes evident at the outside radius of elastomer deformations as the cracks open. Changes in material properties, such as hardening and loss of strength, can be detected during manipulation of elastomeric components by the relative inflexibility of the component, or by the failure of the component to return to its previous shape or configuration. Additionally, since the external environment of ventilation systems is similar to the internal environment, the condition of the external surface is expected to be representative of the internal surface condition.

  The program is credited with managing aging effects of internal surfaces, for situations in which material and environment combinations are the same for internal and external surfaces, such that external surface condition is representative of internal surface condition.

  The program will require a visual inspection to be conducted for in-scope component surfaces at least once per fuel cycle. This frequency allows inspections of components that may be in locations that are only accessible during outages. As such, component surfaces that are inaccessible or not readily visible during plant operations are inspected during refueling outages.

Component surfaces that are inaccessible or not readily visible during plant operations and refueling outages will be inspected at such intervals that will 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.

Component surfaces that are insulated will be inspected when the external surface is exposed (i.e., maintenance) at such intervals that will 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.

The intervals of inspection may be adjusted as necessary based on BVPS inspection results and industry experience.

- ***Monitoring and Trending***

  The program provides qualification requirements for personnel associated with visual inspection activities in accordance with site controlled procedures and processes.

  In addition to the monitoring and trending specified by the NUREG-1801 Section XI.M36 program, the External Surfaces Monitoring program will require a periodic visual inspection, coupled with physical manipulation of in-scope elastomeric components to identify cracking, hardening and loss of strength. The program provides qualification requirements for personnel associated with visual inspection and physical manipulation of elastomers in accordance with FENOC procedures and processes.

  Formal trending will not be required by the program. However, inspection results will be maintained in accordance with System Engineering Walkdown procedures and as such, the inspection results will be available for review and trending during subsequent walkdown inspections. Also, the program will require that deficiencies are documented in the BVPS Corrective Action Program and allow results to be trended.

- ***Acceptance Criteria***

  The program defines acceptance criteria as no unacceptable visual indication of leakage, loss of material, hardening and loss of strength or cracking, and reduction of heat transfer that would lead to loss of intended function during the period of extended operation. Visual indications with respect to system design standards, procedural requirements, current licensing basis, industry codes or standards, and engineering evaluations shall be evaluated by assigned engineering personnel. Evaluation of

visual indications will determine if the results are acceptable or if corrective action is required.

In addition to the acceptance criteria specified by the NUREG-1801, Section XI.M36 program, the External Surfaces Monitoring program will provide acceptance criteria for elastomer inspections. The proposed program defines acceptance criteria as no unacceptable visual or tactile indication of leakage, hardening, loss of strength, or cracking that would lead to loss of intended function during the period of extended operation. Visual or tactile indications with respect to system design standards, procedural requirements, current licensing basis, industry codes or standards, and engineering evaluations shall be evaluated by assigned engineering personnel. Evaluation of visual and tactile indications will determine whether the results are acceptable or if corrective action is required.

- ***Corrective Actions***

  This element is discussed further in Section B.1.3.

- ***Confirmation Process***

  This element is discussed further in Section B.1.3.

- ***Administrative Controls***

  This element is discussed further in Section B.1.3.

- ***Operating Experience***

  The External Surfaces Monitoring Program is a new program; therefore, there is no plant-specific program operating experience for program effectiveness. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description.

  BVPS has experienced leakage from flexible elastomeric hoses in the cooling water environment associated with diesel engines (both diesel generators and the diesel driven air compressor), and in the lubricating oil environment associated with the turbine oil purifier. Corrective actions for these conditions included hose replacement and administrative changes to ensure leakage does not result in inoperability of important equipment.

  BVPS has also identified a tear in an elastomeric ventilation flexible connection between a control room emergency fan and associated ductwork. The cause of the tear could not be identified. The tear may have been caused by maintenance activities, aging, or it may have been

present during initial installation. An evaluation of the consequences of the 3/8-inch by 1/8-inch slit determined that the consequences to system operation were insignificant.

The available operating experience relative to elastomers provides reasonable assurance that visual inspection, coupled with physical manipulation, is sufficient to identify aging effects in elastomeric components prior to loss of function.

Industry and plant-specific operating experience will be evaluated in the development and implementation of this program. As additional operating experience is obtained, lessons learned will be appropriately incorporated into the program.

Conclusion

The implementation of the External Surfaces Monitoring Program will provide reasonable assurance that the aging effects will be managed so that the systems and components within the scope of this Program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation."

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Section B.2.28	**Page B.2-77**	**Entire Section**

LRA Section B.2.28, "Nickel-Alloy Nozzles and Penetrations," requires deletion. FENOC has committed in the LRA, Appendix A, to develop a plant-specific program for managing the aging of nickel-alloy components and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations). Therefore, the Nickel-Alloy Nozzles and Penetrations Program text is deleted from the section. LRA Section B.2.28 is revised to read:

"B.2.28 *[Deleted]* ~~***NICKEL-ALLOY NOZZLES AND PENETRATIONS***~~

~~*For the Nickel-Alloy Nozzles and Penetrations Program, regarding activities for managing the aging of nickel-alloy and nickel-alloy clad components susceptible to primary water stress corrosion cracking - PWSCC (other than upper reactor vessel closure head nozzles and penetrations), BVPS has provided in Appendix A a commitment to develop a plant-specific aging management program that will implement applicable:*~~

~~*1. NRC Orders, Bulletins and Generic Letters, and,*~~

~~*2. staff-accepted industry guidelines.*~~"

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Section B.2.33	**Page B.2-90**	**Entire Section**

LRA Section B.2.33, "PWR Vessel Internals," requires deletion. FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the PWR Vessel Internals Program text is deleted from the section. LRA Section B.2.33 is revised to read:

"B.2.33 [Deleted] ~~**PWR VESSEL INTERNALS**~~

~~BVPS has provided in Appendix A (UFSAR Supplement),Table A.4-1 (Unit 1 only) and Table A.5-1 (Unit 2 only) commitments to:~~

1. ~~Participate in the industry programs applicable to BVPS for investigating and managing aging effects on reactor internals;~~
2. ~~Evaluate and implement the results of the industry programs as applicable to the BVPS reactor internals; and,~~
3. ~~Upon completion of these programs, but not less than 24 months before entering the period of extended operations, submit an inspection plan for the BVPS reactor internals to the NRC for review and approval.~~"

Affected LRA Section	LRA Page No.	Affected Paragraph and Sentence
Section B.2.40	**Pages B.2-110 through B.2-113**	**Entire Section**

LRA Section B.2.40, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS)," requires deletion. FENOC has committed in the LRA, Appendix A, to develop and implement a plant-specific program for managing the aging of Reactor Vessel internal components and structures. Therefore, the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program text is deleted from the section. LRA Section B.2.40 is revised to read:

"**B.2.40** ***[Deleted]*** ~~***THERMAL AGING AND NEUTRON IRRADIATION EMBRITTLEMENT OF CAST AUSTENITIC STAINLESS STEEL (CASS)***~~

~~***Program Description***~~

~~*The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is a new program that BVPS will implement prior to the period of extended operation.*~~

~~*Reactor Vessel Internals will be inspected in accordance with ASME Code Section XI, Subsection IWB, Category B-N-3. This inspection will be augmented to detect the effects of loss of fracture toughness due to thermal aging and neutron irradiation embrittlement of CASS components. The program will include identification of the limiting susceptible components from the standpoint of thermal aging susceptibility, neutron fluence, and cracking. For each identified component, aging management will be accomplished through either a supplemental examination or a component specific evaluation, including a mechanical loading assessment.*~~

~~*BVPS will participate in the EPRI Materials Reliability Project established to investigate the impacts of aging on PWR vessel internal components. The results of this project will provide additional bases for the inspections and evaluations performed under this program.*~~

~~***NUREG-1801 Consistency***~~

~~*The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is a new aging management program that will be consistent with NUREG-1801, Section XI.M13, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS).*~~

Exceptions to NUREG-1801

None

Enhancements

None

Aging Management Program Elements

The results of an evaluation of each of the 10 aging management program elements described in NUREG-1801, Section XI.M13, are provided as follows:

- ***Scope of Program***

  The CASS components with service conditions above 250°C (482°F) shall be screened for potential susceptibility to thermal aging embrittlement. The screening criteria is set forth in the letter dated May 19, 2000, from Christopher I Grimes, Nuclear Regulatory Commission, to Douglas J. Walters, Nuclear Energy Institute, License Renewal Issue No. 98-0030, Thermal Aging Embrittlement of Cast Stainless Steel Components. The screening criteria is applicable to components constructed from SA-351 Grades CF3, CF3A, CF8, CF8A, CF3M, CF3MA, CF8M, with service conditions above 250°C (482°F). In applying the screening method, ferrite content is calculated by using Hull's equivalent factors described in NUREG/CR-4513, Rev. 1.

  For potentially susceptible components, the program will require evaluation of the synergistic loss of fracture toughness due to neutron embrittlement and thermal aging embrittlement.

  For each such component, aging management will be accomplished through either a supplemental examination of the affected component as part of a 10-year Inservice Inspection program during the license renewal term, or a component specific evaluation to determine the component's susceptibility to loss of fracture toughness.

- ***Preventive Actions***

  The program is a condition monitoring program that detects degradation of components before loss of intended function. Therefore, there are no preventive or mitigating attributes that are associated with these activities.

- ***Parameters Monitored / Inspected***

  The program will identify the Reactor Vessel Internals cast austenitic stainless steel materials that have a projected 60-year neutron fluence of greater than 1.0E+17 n/cm^2 (E>1.0 MeV) or are determined to be susceptible to thermal aging embrittlement. For such materials, the

~~*program will consist of either a supplemental examination of the affected component or a component-specific evaluation to determine the component's susceptibility to loss of fracture toughness.*~~

- ~~***Detection of Aging Effects***~~

  ~~*For Reactor Vessel Internals cast austenitic stainless steel components that have a projected 60-year neutron fluence of greater than 1.0E+17 n/cm^2 (E>1.0 MeV) or are determined to be susceptible to thermal embrittlement, the 10-year Inservice Inspection program in effect during the renewal period will include supplemental inspections covering portions of the susceptible components determined to be limiting from the standpoint of thermal aging susceptibility, neutron fluence, and cracking susceptibility.*~~

  ~~*The program will require an inspection technique capable of detecting the critical flaw size with adequate margin. The critical flaw size will be determined based on the service loading conditions and service-degraded material properties. Examination methods that meet the criteria of the ASME Code Section XI, Appendix VIII are acceptable.*~~

  ~~*As an alternate to supplemental inspections, a component-specific evaluation may be performed, including a mechanical loading assessment to determine the maximum tensile loading on the component during ASME Code Service Level A, B, C, and D conditions. If the loading is compressive or low enough (<5 ksi) to preclude fracture, then supplemental inspection of the component will not be required. Failure to meet this criterion will require continued use of the supplemental inspection program.*~~

  ~~*For each cast austenitic stainless steel component that is projected to have a neutron fluence of less than 1.0E+17 n/cm^2 (E>1.0 MeV) and is susceptible to thermal aging, the supplemental inspection program applies.*~~

  ~~*For each cast austenitic stainless steel component that is projected to have a neutron fluence of less than 1.0E+17 n/cm^2 (E>1.0 MeV) and is not susceptible to thermal aging, the existing ASME Code Section XI inspection requirements are adequate.*~~

- ~~***Monitoring and Trending***~~

  ~~*Inspection schedules will be in accordance with ASME Section XI, Subsection IWB-2400.*~~

- ~~***Acceptance Criteria***~~

  ~~*Flaws detected in cast austenitic stainless steel components are evaluated in accordance with the applicable procedures of ASME Code Section XI IWB-3500. Flaw tolerance evaluation for components with ferrite content up to 25% will be performed according to the principles associated with IWB-3640 procedures for submerged arc welds (SAW), disregarding the code restriction of 20% ferrite in IWB-3641(b)(1). Flaw tolerance evaluations for components with greater than 25% ferrite will be performed on a case-by-case basis using fracture toughness data provided in industry literature.*~~

- ~~***Corrective Actions***~~

  ~~*This element is discussed in Section B.1.3.*~~

- ~~***Confirmation Process***~~

  ~~*This element is discussed in Section B.1.3.*~~

- ~~***Administrative Controls***~~

  ~~*This element is discussed in Section B.1.3.*~~

- ~~***Operating Experience***~~

  ~~*The Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program is a new program; therefore, there is no plant-specific program operating experience for program effectiveness. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description.*~~

  ~~*Industry and plant specific operating experience will be evaluated in the development and implementation of this program. As additional operating experience is obtained, lessons learned will be appropriately incorporated into the program.*~~

~~***Conclusion***~~

~~*The implementation of the Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel (CASS) Program will provide reasonable assurance that the aging effects will be managed so that the systems and components within the scope of this Program will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.*~~"