June 5, 2008

Mr. Peter P. Sena III
Site Vice President
FirstEnergy Nuclear Operating Company
Mail Stop A-BV-SEB-1
P.O. Box 4, Route 168
Shippingport, PA 15077

SUBJECT: 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)

Dear Mr. Sena:

By letter dated August 27, 2007, FirstEnergy Nuclear Operating Company submitted an application pursuant to 10 *Code of Federal Regulations* Part 54 (10 CFR Part 54), to renew the operating licenses for Beaver Valley Power Station, Units 1 and 2, (BVPS 1 and 2) for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). The staff is reviewing the information contained in the license renewal application (LRA) and has identified, in the enclosure, areas where additional information is needed to complete the review. Further requests for additional information may be issued in the future.

Items in the enclosure were discussed with Mr. Clifford I. Custer of your staff, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-2989 or e-mail kent.howard@nrc.gov.

Sincerely,

\RA

Kent L. Howard, Sr., Project Manager
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-334 and 50-412

Enclosure:
As stated

cc w/encl: See next page

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Site Vice President
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Dear Mr. Sena:

By letter dated August 27, 2007, FirstEnergy Nuclear Operating Company submitted an application pursuant to 10 CFR Part 54, to renew the operating licenses for Beaver Valley Power Station, Units 1 and 2, for review by the U.S. Nuclear Regulatory Commission (NRC or the staff). The staff is reviewing the information contained in the license renewal application and has identified, in the enclosure, areas where additional information is needed to complete the review. Further requests for additional information may be issued in the future.

Items in the enclosure were discussed with Mr. Clifford I. Custer of your staff, and a mutually agreeable date for the response is within 30 days from the date of this letter. If you have any questions, please contact me at 301-415-2989 or e-mail kent.howard@nrc.gov.

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Enclosure:
As stated

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ADAMS Accession No.: ML081540195

OFFICE	LA:DLR	RER1:DLR	PM:RPB2:DLR	BC:RPB2:DLR
NAME	SFigueroa	JMedoff	KHoward	RFranovich
DATE	06/03/08	06/05/08	06/05/08	06/05/08

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BEAVER VALLEY POWER STATION, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION
REQUESTS FOR ADDITIONAL INFORMATION, 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, 3.4.2.3B.2, B.2.28, B.2.33, B.2.40, B.2.41

Section 3.1.2.2

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.

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.*

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.

Section 3.2.2.2.3

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.

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.

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.

Section 3.3.2.2

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.

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.

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.

Sections 3.3.2.3/3.4.2.3

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.*

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.

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.

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 Cooling	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.

Section 3.4.2.2

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 ºC [140 ºF]) 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 ºC [140 ºF]) 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.

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.

Section 3.3.2.1.X

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 ºC [140 ºF]) 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.

Section 3.3.2.3-X

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.

Section B.2

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.

Section B.2.28

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.

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.

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).

Section B.2.33

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.

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)	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.

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.

Section B.2.40/B.2.41

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.

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.

Letter to P. Sena III from K. Howard dated June 5, 2008

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SUBJECT: 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)

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