July 23, 2008

Mr. Britt T. McKinney
Sr. Vice President and Chief Nuclear Officer
PPL Susquehanna, LLC
769 Salem Blvd., NUCSB3
Berwick, PA 18603-0467

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2, LICENSE RENEWAL APPLICATION

Dear Mr. McKinney:

By letter dated September 13, 2006, PPL Susquehanna, LLC submitted an application pursuant to Title 10 of the *Code of Federal Regulation* Part 54 (10 CFR Part 54), to renew the operating licenses for Susquehanna Steam Electric 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 Duane Filchner, 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 301-415-4029 or by e-mail at evelyn.gettys@nrc.gov.

Sincerely,

/RA by BPham for/

Evelyn Gettys, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosure:
As stated

cc w/encl: See next page

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DATE	7/17/08	7/17/08	7/21/08	7/23/08

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SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2
LICENSE RENEWAL APPLICATION
REQUEST FOR ADDITIONAL INFORMATION (RAI)

RAI B.2.8-1 The boiling water reactor (BWR) Penetrations Program takes an exception to the "scope of program" program element to the generic aging lessons learned (GALL) aging management program (AMP) XI.M8. In this exception, the applicant identifies that, in addition to the Standby liquid control (SLC) penetration and the reactor vessel (RV) instrumentation penetration, the program is credited for managing the effects of aging for the RV flange leakoff penetrations, RV drain penetrations, control rod drive penetrations, and RV incore flux monitoring penetrations. Although the BWR Penetrations Program is based on the recommended augmented inspection and flaw evaluation guideline criteria in Boiling Water Reactor Vessel and Internals Program (BWRVIP) Proprietary Topical Report Nos. BWRVIP-27 and BWRVIP-49, the staff has noted that the scope of BWRVIP-27 is limited to SLC penetration and that the scope of BWRVIP-49 is limited to BWR instrument penetrations. Provide your basis for extending the scope of the GALL AMP XI.M8 to the RV flange leakoff line penetrations, RV drain penetrations, control rod drive penetrations, and incore flux monitor penetrations, and for concluding that either the scope of the Topical Report No. BWRVIP-27 or BWRVIP-49 is applicable to the materials of fabrication, design aspects, and fabrication processes used in the fabrication of these additional penetrations.

RAI B.2.9-3 The staff has noted that the scope of the license renewal application (LRA) AMP B.2.9 includes Topical Report BWRVIP-76, which has been approved by the staff and which provides the BWRVIP's recommended inspection and flaw evaluation guidelines for BWR core shrouds. Appendix C of the BWRVIP-76 report provides guidance to evaluate structural integrity of the core shroud welds that are exposed to neutron radiation during the service, discusses the usage of generic fracture mechanics analyses for establishing inspection intervals for core shroud welds containing cracks, and provides the notch fracture toughness values for irradiated stainless steel materials. The data in the appendix suggest that the fracture toughness values for stainless steel materials tend to decrease with increasing exposure to neutron fluences greater than $1x10^{21}$ n/cm^2 (E>1 MeV). In August 2006, the BWRVIP issued staff-approved Topical Report No. BWRVIP-100-A, "Updated Assessment of the Fracture Toughness of Irradiated Stainless Steel for BWR Core Shrouds," which discussed and provided updated fracture toughness results for the irradiated stainless steel materials. The BWRVIP-100-A report identified that the fracture toughness values for irradiated stainless steel material may actually be lower than those previously in the NRC-approved version of BWRVIP-76. Clarify whether the results and recommendations in the staff-approved BWRVIP-100-A are within the scope of AMP B.2.9 BWRVIP. If the recommendations in BWRVIP-100-A are within the scope of AMP B.2.9, clarify how the recommendations in BWRVIP-100-A will be used in conjunction with the recommendations in BWRVIP-76 for evaluations of cracking in core shroud welds. If the recommendations in BWRVIP-100-A are not currently within the scope of AMP B.2.9 but are being relied upon for aging management during the period of extended operation, clarify whether or not the LRA will be amended to include BWRVIP-100-A within the scope of AMP B.2.9, and clarify how the recommendations in BWRVIP-100-A will be used in conjunction with the recommendations in the staff-approved version of BWRVIP-76. If the

recommendations in BWRVIP-100-A are not currently within the scope of AMP B.2.9 and are not being relied upon for aging management during the period of extended operation, justify why it is acceptable to use the recommendations in BWRVIP-76 for evaluation of postulated core shroud cracks without taking into account the updated fracture toughness assessment and values for irradiated stainless steel materials in BWRVIP-100-A.

RAI B.2.9-4 The staff has determined that Susquehanna Steam Electric Station (SSES) credits its BWRVIP to manage reduction in fracture toughness in the following stainless steel RV internal components:

- Core shroud (including upper, intermediate, and lower shroud shells and welds – within the scope of BWRVIP-76)
- Core plate (including plate, beams, rim hold-down bolts and nuts, alignment assembly bolts and nuts and alignment pins – within the scope of BWRVIP-76)
- Top guide components (including beams and rim, alignment pins, bolts, nuts, and hold-down clamps)
- Orificed and peripheral fuel support pieces
- Control Rod Drive tubes
- Jet pump assemblies and their subcomponents
- Incore dry tubes from the source range and intermediate range monitors

The staff has determined (verified) that this AMP program is credited with limited aging management of reduction of fracture toughness in the RV internal components and that the program credits the augmented inspection and flaw evaluation criteria in NRC approved BWRVIP topical reports as the basis for managing the aging effects that are applicable to SSES RV and RV internal components. Loss (reduction) of fracture toughness is not an aging effect "per se" but instead refers to a change that may occur in the fracture toughness material property over time. Thus, the staff seeks additional information on how the recommended BWRVIP report guidelines within the scope of AMP B.2.9, BWRVIP, would accomplish adequate management of reduction of fracture toughness in these RV internal components. Provide your basis why the applicable BWRVIP inspection and flaw evaluation guidelines for these RV internal components are considered to be capable of managing reduction of fracture toughness in the components and clarify the methodology or methodologies in these reports that are credited for management of this aging effect.

RAI B.2.9-5 Reduction in ductility and fracture toughness can occur in stainless steel RV internal components when they are exposed to high energy neutrons (E>1 MeV). Appendix C of the BWRVIP-76 report provides guidance to evaluate structural integrity of the core shroud welds which is affected by the exposure to neutron radiation during the service. In this appendix, the BWRVIP discusses the usage of generic fracture mechanics analyses for establishing inspection intervals for the core shroud welds with cracks. Previous data suggests that the fracture toughness values tend to decrease when stainless steel materials are exposed to neutron fluence. Appendix C of the BWRVIP-76 report provides notch toughness values which can be used for irradiated stainless steel materials. In August 2006, the BWRVIP issued a staff-approved BWRVIP-100-A report, "Updated Assessment of the Fracture Toughness of Irradiated Stainless Steel for BWR Core Shrouds," which discussed and updated the fracture toughness results for the irradiated stainless steel materials. Clarify whether the results and

recommendations in the staff-approved BWRVIP-100-A are within the scope of AMP B.2.9, BWRVIP. If the recommendations in BWRVIP-100-A are within the scope of AMP B.2.9, clarify how the recommendations in BWRVIP-100-A will be used in conjunction with the recommendations in BWRVIP-76 for evaluations of cracking in core shroud welds. If the recommendations in BWRVIP-100-A are not currently within the scope of AMP B.2.9 but are being relied upon for aging management during the period of extended operation, clarify whether or not the LRA will be amended to include BWRVIP-100-A within the scope of AMP B.2.9, and clarify how the recommendations in BWRVIP-100-A will be used in conjunction with the recommendations in the staff-approved version of BWRVIP-76. If the recommendations in BWRVIP-100-A are not currently within the scope of AMP B.2.9 and are not being relied upon for aging management during the period of extended operation, justify why it is acceptable to use the recommendations in BWRVIP-76 for evaluation of postulated core shroud cracks without taking into account the updated fracture toughness assessment and values for stainless steel internals in BWRVIP-100-A.

RAI 3.1.2.2.2.3-1 The staff noted that, in order to verify the effectiveness of the Water Chemistry Program in managing loss of material in the internal surfaces of the RV upper head and shell flanges, the applicant has credited its Inservice Inspection (ISI) Program to verify the effectiveness of the Water Chemistry Program in manage loss of material in the internal component surfaces that are exposed to the reactor coolant treated water environment. The staff verified that the current American Society of Mechanical Engineers (ASME) Code Section XI ISI requirements mandate, in part, a volumetric examination of the upper RV head-to-flange circumferential weld and RV shell-to-flange circumferential weld once every 10-Year ISI interval. Although Section IWA-2230 of the ASME Code Section XI identifies that volumetric examination techniques are capable of indicating the presence of discontinuities (including flaws) throughout the volume of material being inspected, the staff seeks information on the volumetric inspection technique that is credited for these components and requests identification of the volumetric examination technique that is credited and will be used to verify the effectiveness of the Chemistry Program in managing loss of material in the RV shell-to-flange welds and RV upper head-to-flange welds.

RAI 3.1.2.2.2.3-2 The staff noted that SSES credits a combination of its BWR Chemistry Program and its BWRVIP to manage loss of material in the following stainless steel (including cast austenitic stainless steel) or nickel alloy RV internal components whose surfaces that are exposed to the treated water environment of the reactor coolant, and for those RV internals in a high neutron flux field, to an integrated neutron flux:

- RV recirculation nozzle and core spray nozzle thermal sleeves
- Shroud support access hole covers and adapter rings
- Core shroud (including upper, intermediate, and lower shroud shells and welds)
- Core plate (including plate, beams, rim hold-down bolts and nuts, alignment assembly bolts and nuts and alignment pins)
- Top guide components (including beams and rim, alignment pins, bolts, nuts, and hold-down clamps)
- Orificed and peripheral fuel support pieces
- Control Rod Drive tubes and tube bases
- Jet pump assemblies and their subcomponents
- SLC/core ΔP lines

- Incore guide tubes and incore dry tubes from the source range and intermediate range monitors
- Core spray line components (including piping, T-boxes, spargers, sparger nozzles, sparger elbows, and brackets)
- Steam dryer

The staff noted that SSES has aligned these aging management reviews (AMRs) for these components to the GALL AMR IV.A1-8. The GALL AMR IV.A1-8 recommends that the Water Chemistry Program be credited for aging management loss of material in RV shells, flanges, nozzles, penetrations, heads, and welds that are made from stainless steel, nickel alloy, or steel with internal stainless steel or nickel alloy cladding under internal exposure to the reactor coolant, and that an inspection program be credited to verify the effectiveness of the Water Chemistry Program in managing this aging effect. The staff is concerned that the AMP B.2.9 BWRVIP, which is based on implementation of NRC-approved BWRVIP guideline documents, may not actually be crediting actual inspections of all of these RV internal components. Justify why the AMRs on loss of material in these RV internal components have not been addressed in your discussion that is provided in LRA Section 3.1.2.2.2.3. In your justification, provide your basis for aligning these AMRs to the GALL AMR IV.A1-8 and for each stainless steel or nickel alloy RV internal component for which the BWRVIP is credited for management of loss of material, provide your technical basis why the BWRVIP is considered to be capable verifying the effectiveness of the Water Chemistry Program in managing loss of material in the components, or alternatively, providing for adequate management of loss of material in the component if the applicable NRC-approved BWRVIP guideline document does not actually credit an augmented inspection or inspections of the component.

RAI 3.1.2.2.2.3-3 The staff has noted that the applicant has aligned its AMR on loss of material in the external surfaces of the reactor recirculation pump thermal barrier to the GALL AMR IV.C1-14 and that in this AMR, the applicant credits both its Water Chemistry Program and ISI Program to manage loss of material in the external surfaces that are exposed to the treated water environment of the reactor coolant. The staff determined that the crediting of the Water Chemistry Program for mitigation of loss of material/pitting and crevice corrosion is acceptable because the AMP is designed to prevent or mitigate loss of material that may be induced by corrosive aging mechanisms (e.g., such as pitting or crevice corrosion). However, the staff is concerned that it might not be appropriate to credit the ISI Program for aging management of loss of material in the external thermal barrier surfaces because they may be inaccessible for examination. Identify the type of ISI examination methods and requirements that will be used to monitor for and detect loss of material in the external surfaces of the recirculation pump thermal barriers and whether the external surfaces of the reactor recirculation pump thermal barriers are accessible for ISI examination method that is credited for aging management. Clarify which alternative aging management approach (if any) will be credited in addition to the Water Chemistry Program if it is determined that the external surfaces of the reactor recirculation pump thermal barrier are inaccessible for inspection.

RAI 3.1.2.2.11-1 The staff has determined that, in the LRA Section 3.1.2.2.11 and in the AMR in LRA Table 3.1.2-2 on cracking of the steam dryers, the applicant credits a combination of AMP B.2.2, Water Chemistry Program, and AMP B.2.9, BWRVIP, for aging management of cracking in the steam dryers as a result of flow-induced vibrations. The staff is of the opinion that the applicant's crediting of the Water Chemistry Program does not provide a valid basis for aging management of cracking due to flow-induced vibrations in the steam dryers because flow-induced vibrations are a high-cycle fatigue phenomenon and are not dependent on the control of water chemistry impurity concentrations. The staff is also of the opinion that the applicant's BWRVIP, in its current form, does not provide a valid basis for managing cracking due to flow-induced vibrations in the steam dryers because: (1) the applicant's program does not currently include any enhancements and commitments to perform flow-induced vibration high cycle fatigue flaw growth calculations of the steam dryers, establish the flaw evaluation and corrective action recommendations on postulated steam dryer cracking, and establish the augmented inspection recommendations for the steam dryers (including establishing the inspection methods, sample size and frequency for the examinations to be performed), and (2) the BWRVIP reports on steam dryer flow-induced vibrations and cracking, as provided in BWRVIP Topical Report Nos. BWRVIP-139, BWRVIP-180, and BWRVIP-182, have yet to be approved by the staff or endorsed for use in the GALL AMP XI.M9, BWRVIP. Provide your technical and regulatory basis why the crediting of the Water Chemistry Program and the BWRVIP is considered to be valid management of cracking due to flow-induced vibrations in the steam dryers during the period of extended operation. Include in your response an explanation on whether any BWRVIP topical reports are being relied on for aging management of cracking in the steam dryers and whether or not AMP B.2.9, BWRVIP, needs to enhanced for adequate aging management of cracking due to flow-induced vibrations in the steam dryers.

RAI 3.1.2.3.3.2-1 The staff has noted that the applicant has a plant-specific AMR on loss of material in the internal surfaces of the reactor recirculation pump thermal barrier that are exposed to closed-cycle cooling water, and that in this AMR, the applicant credits both its Water Chemistry Program and ISI Program to manage loss of material in the internal surfaces that are exposed to closed-cycle cooling water. The staff determined that the crediting of the Water Chemistry Program for mitigation of loss of material/pitting and crevice corrosion is acceptable because the AMP is designed to prevent or mitigate loss of material that may be induced by corrosive aging mechanisms (e.g., such as pitting or crevice corrosion). However, the staff is concerned that it might not be appropriate to credit the ISI Program for aging management of loss of material in the internal thermal barrier surfaces because they may be inaccessible for examination. Identify the type of ISI examination methods and requirements that will be used to monitor for and detect loss of material in the internal surfaces of the recirculation pump thermal barriers that are exposed to closed-cycle cooling water and clarify whether the internal surfaces of the reactor recirculation pump thermal barriers are accessible for ISI examination method that is credited for aging management. Clarify which alternative aging management approach (if any) will be credited in addition to the Water Chemistry Program if it is determined that the internal surfaces of the reactor recirculation pump thermal barrier are inaccessible for inspection.

RAI 3.1.2.3.3.3-1 The staff has verified that the applicant includes a plant-specific AMR on cracking and flaw growth in the internal surfaces of the reactor recirculation pump thermal barrier that are exposed to the treated, closed-cycle cooling water environment, and in this AMR, the applicant credited both its Closed Cooling Water Chemistry Program and BWR Stress Corrosion Cracking Program to manage cracking and flaw growth in the internal component surfaces that are exposed to closed-cycle cooling water. The staff is of the opinion that it may not be appropriate to credit the BWR Stress Corrosion Cracking Program for aging management of cracking and flaw growth if the internal surfaces of the thermal barriers are located in areas that are inaccessible for examination. The staff is also of the opinion that it may not be appropriate to credit the Closed Cooling Water Chemistry Program for aging management if the cracking is induced by a mechanism other than an applicable chemistry-related or corrosion-related cracking mechanism.

Part A. Identify the type of examination(s) that will be credited and used under the BWR Stress Corrosion Cracking Program to monitor for and detect cracking and flaw growth in the internal surfaces of the recirculation pump thermal barriers that are exposed to closed-cycle cooling water, and clarify whether the internal surfaces of the reactor recirculation pump thermal barriers are accessible for the examination method(s) that is (are) credited for aging management. Clarify which alternative aging management approach (if any) will be credited in addition to the Closed Cooling Water Chemistry Program if it is determined that the internal surfaces of the reactor recirculation pump thermal barrier are inaccessible for inspection.

Part B. Clarify the aging mechanisms that are considered to be capable of inducing cracking and flaw growth in the internal surfaces of the reactor recirculation pump thermal barriers, and based on these mechanisms, provide your basis why the Closed Cooling Water Chemistry is considered to be a valid AMP for managing cracking and flaw growth in the internal surfaces of the reactor recirculation pump thermal barriers.

RAI 3.1.2.3.3.4-1 The staff noted that the N15 RV drain nozzles are designated as alloy steel nozzles without stainless steel or nickel-alloy cladding. The staff noted that the applicant credits its BWR Water Chemistry Program (in part) to manage cracking and flaw growth in these components. BWR Water Chemistry Programs are valid programs for management of cracking/flaw growth if the mechanisms inducing cracking and flaw growth are chemistry-related or corrosion-related cracking/flaw growth mechanisms. These mechanisms include mechanisms such as stress corrosion cracking (SCC), primary water stress corrosion cracking (PWSCC), intergranular stress corrosion cracking (IGSCC), or intergranular attack (IGA). To date, SCC, PWSCC, IGSCC or IGA have not been identified as aging mechanisms of concern for steel materials (including carbon steels and alloy steels). Thus, the staff is of the opinion that the BWR Water Chemistry Program will only be a valid program to credit if cracking/flaw growth in the drain nozzles is induced by either SCC, PWSCC, IGSCC or IGA.

Part A. Identify the weld material that was used to fabricate the N15 RV drain nozzle-to-vessel welds.

Part B. Identify the aging mechanisms that are capable of inducing cracking and flaw growth in the N15 RV drain nozzles and their associated nozzle-to-vessel welds, and based on these mechanisms, to provide your basis why the BWR Water Chemistry is considered to be a valid AMP for managing cracking and flaw growth in these components.

Additional RAIs on AMRs for Polymer/Elastomers

RAI 3.2.2.2.5-1 In LRA AMP B.2.32, Systems Walkdown Program, the applicant credits the program, in part, for aging management of both cracking and changes in material properties for elastomers (i.e., neoprene or rubber) and plastic (polymer) components that are exposed to uncontrolled indoor air or ventilation environments. The applicant indicates that cracking is an applicable aging effect for neopreme flexible connections (ductwork) in the primary containment atmosphere circulation. However, in LRA Table 3.2.2-7, the applicant does not include cracking as an applicable aging effect requiring management (AERM) for the flexible neoprene standby gas treatment system (SGTS) connections that are exposed internally to the ventilation environment or externally to the uncontrolled indoor air environment. Provide your basis why LRA Table 3.2.2-7 does not include any AMRs on cracking of the neoprene flexible SGTS connections that are exposed internally to the ventilation environment or externally to the uncontrolled indoor air environment, when in contrast, LRA AMP B.2.32 implies that cracking could occur in neoprene components. If cracking is determined to be an applicable AERM for the internal and external surfaces of these flexible SGTS connections, the staff requests that PPL amend the LRA Table 3.3.2-7 to include AMR's that identify cracking as an AERM for the internal and external surfaces of the components, and clarify the AMP or AMPs that will be credited for management of cracking in the neoprene flexible SGTS connection surfaces that are exposed to the uncontrolled indoor air and ventilation environments.

RAI 3.2.2.3-1 The staff has noted that, in the LRA, the applicant appears to take an inconsistent approach to aging management of elastomeric, rubber, polymeric, and glass components in the application because in some AMRs for these types of materials the applicant has identified that cracking and changes in material properties as applicable AERMs, whereas in other AMRs for these types of materials, the applicant has concluded that AERMs are not applicable to the components. The staff seeks consolidation of PPL's approach to management of aging in the elastomeric, rubber, and polymeric engineered safety features system components with the aging management approach that the applicant had taken for these types of components in the auxiliary systems.

Part A. Provide your basis why PPL has not identified any AERMs for high-pressure coolant injection (HPCI) synthetic rubber component surfaces that are exposed to lubricating oil and to indoor air environments when cracking and changes in materials had been identified as applicable aging effects for: (1) neoprene and rubber components in the primary containment atmosphere circulation system under exposure to indoor air and to ventilation air, (2) neoprene/fiberglass components in the reactor building heating, ventilating, and air conditioning (HVAC) system under exposure to indoor air and to ventilation air, and (3) for Teflon piping in the sampling system (changes in material properties only) under exposure to indoor air.

Part B. Identify those material properties and aging effects that could be impacted by exposure of these synthetic rubber materials to the lubricating oil and indoor air environments.

RAI 3.3.2.2.5.1-1 Part A. For those elastomeric or polymeric components that are exposed to either the ventilation environment or indoor air environment and are identified as being subject to the aging effect of "changes in material properties," identify the specific material properties

that could be impacted by exposure to either the ventilation environment or uncontrolled indoor air environment.

Part B. Justify, using a valid technical basis, why cracking and changes in material properties was not identified as an applicable AERM for the neoprene or fiberglass flexible connection (expansion joint) surfaces in the reactor building HVAC system that are exposed internally to the ventilation environment when these aging effects had been identified as AERMs for the analogous neoprene expansion joint surfaces in the primary containment air processing system that are exposed internally to the ventilation environment.

RAI 3.3.2.2.5.1-2 The staff has noted that the applicant's "ventilation" environmental grouping and "indoor air/protected from weather" environmental grouping, as given in LRA Tables 3.0-1 or 3.0-2, cover a wide range of specific environments and environmental conditions. The staff also noted that the environmental tables did not provide sufficient evidence that the environmental conditions imposed under the ventilation environmental grouping (or the environments within the scope of this grouping) are the equivalent to those that would be imparted by exposure to an uncontrolled indoor air environment or the environment in the indoor air grouping, nor do the environmental descriptions for these groupings establish what the radiologically-induced aging thresholds and thermally-induced aging thresholds are for the specific environments that make up the ventilation environment and indoor air environment groupings or what the maximum and minimum temperatures and maximum radiation levels will be for each of the various environments that are within the scope of the ventilation and indoor air groupings.

Part A. Clarify, using a valid technical basis, why the environmental conditions for an internal ventilation environment are considered to be equivalent to the environmental conditions that are applicable to an external uncontrolled indoor air environment.

Part B, For each environment that is within the scope the "ventilation" environmental grouping or "indoor air/protected from weather" environmental grouping in the LRA, identify (and justify the basis) the radiological-induced (gamma ray) aging threshold and threshold that is used to screen polymer/elastomer components in these environments for age related degradation (including cracking, hardening, loss of strength, or other material property changes), and identify what the maximum-to-minimum temperature ranges and maximum gamma radiation levels are for these specific environments.

RAI 3.3.2.2.5.1-3 Part A. Provide your basis why PPL has not identified any applicable AERM for the following auxiliary system AMR component/material/environmental grouping combinations that were identified in the application as being aligned either to the GALL AMR VII.F1-7, VII.F2-7, VII.F3-7, or VII.F4-6:

(1) Silicone rubber heat exchanger tube plugs in the diesel generator intake exhaust systems under exposure to the ventilation environment,

(2) elastomeric (synthetic rubber) flexible connections (hoses) in the diesel generator system, HPCI system, and fire protection system under external exposure to uncontrolled indoor air,

(3) neoprene flexible connections in the diesel generator buildings HVAC system that are exposed internally to the ventilation environment and externally to the uncontrolled indoor air environment,

(4) neoprene/asbestos flexible connections in the diesel generator buildings HVAC system and the control structure HVAC system that are exposed internally to the ventilation environment and externally to the uncontrolled indoor air environment, and

(5) neoprene/fiberglass flexible connections in the diesel generator buildings HVAC system and the control structure HVAC system that are exposed internally to the ventilation environment and externally to the uncontrolled indoor air environment.

Part B. In RAI 3.3.2.2.5.1-2, the staff asked the applicant to provide supplemental information on the radiological conditions and temperature ranges for each of the environments that are within the scope PPL's "ventilation" and "indoor air/protected from weather" environmental groupings. Taking into account your response to RAI 3.3.2.2.5.1-2, Parts A and B, for each component/material/environmental grouping combination mentioned in Part A of this RAI, identify the specific environment that the components are exposed to (for example, the "ventilation" and "indoor air/protected from weather" environmental grouping each appear to be made up and bound various environments and environmental conditions).

RAI 3.3.2.2.5.2-1 Provide your basis for concluding that there are not any AERM for the silicone tube plugs in the diesel generator intake/exhaust system that are exposed to treated water. In particular, provide your basis why these heat exchanger tube plugs are not expected to degrade (i.e., harden or lose strength) under prolonged exposure to the treated water environment over the course of the period of extend operation.

RAI 3.3.2.2.13-1 The staff has noted that in LRA Section 3.1.2.2.13, PPL uses the following basis to establish that loss of material due to wear is not considered to be an AERM for elastomeric seals and components in the control structure, diesel generator building, Engineered Safeguards Service Water (ESSW) pumphouse, and reactor building HVAC systems and in primary containment atmosphere circulation system:

> "Loss of material due to wear is the result of relative motion between two surfaces in contact. However, wear occurs during the performance of an active function; as a result of improper design, application or operation; or to a very small degree with insignificant consequences. Therefore, loss of material due to wear is not an aging effect requiring management for elastomers exposed to air indoor uncontrolled at SSES."

The fact that wear is an active aging mechanism does not provide a valid reason to conclude that passive long-lived elastomeric HVAC seals or components in these auxiliary HVAC systems would not be subject to potential loss of material due to wear. In the RAI, the staff asked the applicant to provide a valid basis why loss of material due to wear is not considered to be an AERM for the elastomeric seals and components in the control structure HVAC systems, diesel generator building HVAC systems, ESSW pumphouse HVAC system, primary containment atmosphere circulation system, or reactor building HVAC system.

RAI 3.3.2.3-1 The staff verified that the LRA Section 3.3 includes plant-specific AMR items refer to the following system-elastomeric material-environment combinations:

- silicone plugs in diesel fuel intake and exhaust system heat exchangers under exposure to externally to a ventilation environment and internally to either a treated water environment or a raw water environment

- elastomeric flexible connection (synthetic rubber hoses) in the diesel fuel oil and diesel generator lubricating oil systems under internal exposure to either diesel fuel oil or lubricating oil and external exposure to indoor air

- sight glasses in the reactor building HVAC system and the control structure chilled water system under exposure to the air gas environment (including Freon)

- glass lining in the domestic water system tank under exposure to the raw water environment

- flexible connections (ductwork) made of neoprene, neoprene/asbestos, or neoprene/ fiberglass in the reactor building HVAC, control structure HVAC or diesel generator building HVAC systems under internal exposure to the ventilation environment and external exposure to the indoor air environment

- plastic (Lucite) level gauges in the diesel generator lubricating oil system under internal exposure to the ventilation environment and external exposure to the indoor air environment

- plastic (polycarbonate) filters in the diesel generator starting system under internal exposure to the air-gas environment and external exposure to the indoor air environment

- synthetic rubber flexible connections (hoses) in the fire protection system under internal exposure to either raw water or fuel oil and external exposure to indoor air

- Teflon components (i.e. piping or flexible connections) in the fire protection system and sampling system under internal exposure to either raw water or treated water and external exposure to indoor air

- butyl rubber accumulators in the SLC systems that are exposed internally to a nitrogen air gas environment and externally to treated water.

Part A. Taking into account information that you have provided in response to RAI 3.3.2.2.5.1-1, RAI 3.3.2.2.5.1-2, and RAI 3.3.2.2.5.1-3, and in RAI 3.3.2.2.5.2-1, and in RAI 3.3.2.2.13-1, provide your basis why PPL has not identified any AERMs for these system-material-environment combinations when cracking and changes in materials had been identified as applicable aging effects for: (1) neoprene and rubber components in the primary containment atmosphere circulation system under exposure to indoor air and to ventilation air,

(2) neoprene/fiberglass components in the reactor building HVAC system under exposure to indoor air and to ventilation air, and (3) for Teflon piping in the sampling system (changes in material properties only) under exposure to indoor air.

Part B. Identify those material properties and aging effects that could be impacted by exposure of these materials to treated water, raw water, fuel oil, lubricating oil, ventilation air, indoor air, and air-gas (including Freon) environments.

Part C. Identify the AMP or AMPs that will be credited for aging management if PPL does identify that are applicable AERMs for any of these system-material-environmental combinations (as listed in bullets for this RAI).

RAI 3.3.2.3-2 The staff is concerned that the Freon environment for the glass sight gauges in the reactor building HVAC system might create sufficiently cold environments for the glass material, and that as a result of this environment, fracture toughness of the material may be impacted. Thus, the staff was concerned that the Freon environment might impact the flaw tolerance of the glass material used to fabricate these sight gauges and the crack size that material may tolerate may be reduced. Provide your basis why reduction of fracture toughness and cracking are not be applicable AERMs for the surfaces of glass sight gauges in the reactor building HVAC system under exposure to an air – gas (Freon) environment.

RAI 3.4.2.3-1 The staff has noted that in the LRA, appears take in inconsistent approach to aging management of elastomeric, rubber, and polymeric components in the application, because in some AMRs for these types of materials the applicant had identified that cracking and changes in material properties were applicable AERMs, whereas in other AMRs the applicant concluded that AERMs were not applicable to the components. The staff seeks consolidation of PPL's approach to management of aging in the elastomeric, rubber, and polymeric steam and power conversion system components with the aging management approach taken for these type of components in the auxiliary systems.

Part A. Provide your basis why PPL has not identified any AERMs for rubber component surfaces in the containment and air removal (CAR) system that are exposed to the treated water and the indoor air environments when cracking and changes in materials had been identified as applicable aging effects for: (1) neoprene and rubber components in the primary containment atmosphere circulation system under exposure to indoor air and to ventilation air, (2) neoprene/fiberglass components in the reactor building HVAC system under exposure to indoor air and to ventilation air, and (3) for Teflon piping in the sampling system (changes in material properties only) under exposure to indoor air.

Part B. Identify the rubber material that is used to fabricate the flexible expansion joints in the CAR systems and identify those material properties and aging effects that could be impacted by exposure of these rubber materials to the treated water and indoor air environments.

Letter to B. McKinney from E. Gettys, dated July 23, 2008

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