June 12, 2008

Mr. Britt T. McKinney
Sr. Vice President and Chief Nuclear Officer
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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 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 e-mail evelyn.gettys@nrc.gov.

Sincerely,

\RA

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

RAI B.2.1-1
The staff has noted that the "scope of program," "parameters monitored/inspected," or "detection of aging effects" program element discussions in license renewal (LR) basis document (LRPD-05, Attachment 1.9) for aging management program (AMP) B.2.1, Inservice Inspection (ISI) Program, does not identify the parameters or aging effects that the program manages. Identify the parameters, aging effects or aging mechanisms that are within the scope of AMP B.2.1, ISI Program, and for which the AMP is credited.

RAI B.2.1-2
The staff has noted that the LR basis document for AMP B.2.1, ISI Program indicated that the criteria in particular NRC-approved Boiling Water Reactor Vessels and Internals Project (BWRVIP) reports may be used in lieu of applicable ASME Code Section XI ISI requirements for ASME Code Class 1, 2, or 3 components. Clarify whether or not proposals to use NRC-approved BWRVIP guideline criteria in lieu of applicable ASME Code Section XI requirements will be submitted for staff approval.

RAI B.2.1-3
The staff has noted that the "corrective actions" program element discussion in the LR basis document for the ISI Program indicates that the corrective actions for the program will be implemented through implementation of the applicant's 10 CFR Part 50, Appendix B, Quality Assurance Program. Corrective actions for ASME Code Class components are required, through 10 CFR 50.55a, to be implemented in accordance with applicable corrective action provisions in the ASME Code Section XI Article IWB-3000, or its subarticles, paragraphs, or subparagraphs, or in ASME Code Cases that endorsed for use (through reference in 10 CFR 50.55a) in the latest NRC-issued version of Regulatory Guide 1.147. Clarify how the implementation of the Susquehanna Steam Electric Station (SSES) 10 CFR Part 50, Appendix B, Quality Assurance Program will ensure that the corrective actions for ASME Code Class 1, 2, or 3 components will be implemented in accordance with applicable corrective actions in ASME Code Section XI Article IWB-3000, or its subarticles, paragraphs, or subparagraphs; in NRC-approved ASME Code Cases that are endorsed for use in the latest NRC-issued version of Regulatory Guide 1.147; or through the NRC's relief request process that is defined in 10 CFR 50.55a.

RAI B.2.1-4
The staff has noted that the "operating experience" program element discussion in the LR basis document for the ISI Program does not specify any SSES-specific or generic operating experience that the applicant felt was relevant to the AMP. However, the staff has noted that the LR binder for the ISI Program included two (2) condition reports related to the detection of circumferential cracking in the SSES, Unit 1, N2J recirculation outlet nozzle safe end weld and in the SSES, Unit 1, N1B recirculation inlet nozzle safe end weld. Although the staff has verified that applicant has taken appropriate correction actions for these circumferential crack

indications (i.e., implementation of weld overlay repairs of the nozzles), the staff is of the opinion that the operating experience should have been mentioned in as applicable operating experience for the "operating experience" program element because a complete failure of the circumferential weld would have resulted in a loss of coolant accident for the facility. Thus, this is important operating experience for SSES.

Part A. The staff requests that the license renewal application (LRA) be amended to list these circumferential crack safe end nozzle events as relevant operating experience for the "operating experience" program element in AMP B.2.1, "Inservice Inspection (ISI) Program."

Part B. Identify the particular weld overlay methodology (along with its reference basis) that was used for the repairs of these safe end nozzle indications, and clarify whether the overlay methodology required a flaw tolerance evaluation of the flaw indications, and if so, whether the analysis is a time-limited aging analysis (TLAA) for the application. Justify your basis for concluding that the flaw tolerance analysis is or is not a TLAA if the weld overlay methodology required a flaw tolerance analysis.

RAI B.2.1-5

The staff has noted that, in the "detection of aging effects" program element discussion for the ISI Program, the applicant takes exception to the recommended "detection of aging effect" criteria in the generic aging lessons learned (GALL) AMP XI.M1, "ASME Code Section XI, Subsection IWB, IWC, and IWD," and proposes to credit a risk-informed ISI methodology for the required examinations of particular ASME Code Class welds. Chapter 1 of the GALL Report, Revision 1, Volume 2, makes the following statement on the applicability of current Code reliefs for the period of extended operation:

> "The NRC Director of the Office of Nuclear Reactor Regulation may approve licensee proposed alternatives to the ASME Code in accordance with the provisions of 10 CFR 50.55a(a)(3). These NRC approved ASME Code alternative requirements may have an associated applicability time limit. The applicability time limits associated with the approved alternatives do not extend beyond the current license term. If an applicant seeks relief from specific requirements of 10 CFR 50.55a and Section XI of the ASME Code for the period of extended operation, the applicant will need to re-apply for relief through the 10 CFR 50.55a relief request process once the operating license for the facility has been renewed."

The staff noted that the risk-informed ISI (RI-ISI) program for SSES, Units 1 and 2, was approved in an NRC-issued safety evaluation (SE) of dated September 28, 2005 (ML051990330). The staff also noted that the that the RI-ISI program relief request was only approved for the 3rd 10-Year ISI Interval for SSES, Units 1 and 2, and that RI-ISI has yet to be proposed and approved for any of the 10-Year ISI intervals that are within the scope of the periods of extended operation for the SSES units. If you plan to use RI-ISI for the 4th 10-Year ISI Interval and subsequent intervals, the staff requests that you commit to request relief for use of RI-ISI within 12 months before the start of each interval.

RAI B.2.5-1

The staff has noted the LR binder for AMP B.2.5 BWR Feedwater Program, includes SSES Letter No. PLA-6078, "Susquehanna Steam Electric Station Unit 1 Fourteenth Refueling Outage

Owners Activity Report," dated June 21, 2006, and GE Nuclear Energy Ultrasonic Testing (UT) Examination Summary Sheet No. 1-B3.90.0017, "Project Susquehanna Unit 1 – R&IO14, Weld ID No. N4A (NoZ-SC3), Reactor Pressure Vessel Weld," dated March 03, 2006. In these documents, SSES provides the results of augmented examinations that had been performed on the feedwater (FW) nozzles during the last refueling and inspection outages for SSES, Unit 1 and SSES, Unit 2 (i.e., RIO U114RIO for SSES, Unit 1 and RIO U213RIO for SSES, Unit 2). The staff has noted that the augmented UT examinations of the SSES Unit 1 N4A FW nozzle indicated the presence of eight (8) recordable flaw indications in the nozzle that had been dispositioned as being acceptable for further service by the ASME Code Section XI IWB-3000 requirements. However, the staff also noted that these inspection results were not mentioned in the "operating experience" program element for the AMP as relevant operating experience for this AMP.

Since these flaw indications were detected as a result of implementing the BWR Feedwater Nozzle Program and since the indications were recordable under the applicant's ISI implementation and nondestructive examination procedures, the staff requests that SSES amend LRA Section B.2.5 to mention these indications as relevant operating experience for the BWR Feedwater Nozzle Program. The staff also requests that LRA Section B.2.5 be amended to provide a basis for leaving these eight (8) flaw indications in service and the basis for reinspecting these indications in the future in accordance with the BWR Feedwater Nozzle Program, as implemented in accordance with the augmented ISI provisions in AMP B.2.1, ISI Program.

RAI B.2.5-2 SSES provides its updated final safety analysis report (UFSAR) Supplement summary description for the BWR Feedwater Nozzle Program in LRA Section A.1.2.6, which includes Commitment No. 5. The staff has noted an inconsistency in the application. Specifically, the staff has noted that the AMP description for AMP B.2.5, "BWR Feedwater Nozzle Program," states that the UT methodology for the augmented inspections of the FW nozzles will be implemented in accordance with the recommendations of GE Topical Report No. GENE-523-A71-0594. In contrast, the staff has also noted that the UFSAR Supplement summary description for this AMP indicates that the augmented UT inspections of the nozzles will be implemented in accordance with the recommendations in applicable BWRVIP guidelines. Clarify (with justification) which basis and methodology will be used for performing the augmented UT examinations of the SSES FW nozzles during the period of extended operation.

RAI B.2.7-1 The staff requests the following information with respect to the "preventative actions" program element for AMP B.2.7, BWR Stress Corrosion Cracking Program.

Part A. The "preventative actions" program element for the BWR Stress Corrosion Cracking Program indicates that two welds scheduled for stress relief did not receive a post-weld heat treatment consistent with the NRC Generic Letter (GL) 88-01/NUREG-0313 recommendations and that the welds were deemed unacceptable for stress relief credit, as stated in the NRC's SE on the SSES response to GL 88-01. Discuss whether there is any established link between the findings identified in the NRC's SE on the applicant's response to GL 88-01 and the circumferential stress corrosion cracking-induced flaw indications that have been detected in the SSES, Unit 1, N2J recirculation outlet nozzle safe-end weld and in the SSES, Unit 1, N1B recirculation inlet nozzle safe-end weld. Specifically, identify whether these safe end nozzle

welds were among the Class 1 stainless steel piping welds that were scheduled for induction heat stress relief treatments and whether the N2J and N1B nozzle safe end welds were the welds that had not received the recommended post weld heat treatments that are part of this stress relief process.

Part B. Identify the dates for initiation of hydrogen water chemistry at SSES, Unit 1, and SSES, Unit 2.

RAI B.2.7-2 The staff requests the following information with respect to the "detection of aging effects," "monitoring and trending," and "acceptance criteria" program elements for AMP B.2.7, BWR Stress Corrosion Cracking. The basis document for AMP B.2.7, BWR Stress Corrosion Cracking, implies that the guidelines in BWRVIP-75-A will only be used as a basis for sample expansion if flaw indications are detected on ASME Code Class 1 stainless steel welds. However, the guidelines in BWRVIP-75-A are NRC-approved inspection and flaw evaluation guidelines.

Part A. Clarify whether the updated NRC-approved guidelines in Topical Report BWRVIP-75A would be used as an option for performing other aspects of the augmented ISI Program for these ASME Code Class 1 stainless steel pipe welds.

Part B. Clarify whether the flaw acceptance criteria in NRC-approved Topical Report BWRVIP-75A or in NRC-approved Topical Report BWRVIP-14 will be used for the acceptance criteria of any crack indications that might be detected in these ASME Code Class 1 stainless steel pipe welds.

RAI B.2.9-1 AMP B.2.9, BWR Vessel Internals Program includes an enhancement to perform augmented inspections of the top guide grid beam and beam-to-beam crevice slots during the period of extended operation. The enhancement commits to enhanced VT-1 visual examinations of 5% of these top guide locations within 6 years of entering the period of extended operation with an additional 5% of these locations to be completed within 12 years of entering the period of extended operation. The staff has noted that this enhancement is consistent with the recommendations in the "scope of program" program element in GALL AMP XI.M9, "BWR Vessel Internals." However, the GALL recommendation is predicated on the criteria that cracking has not yet been detected in these top guide locations. Clarify whether SSES has performed any inspections of the SSES top guide grid beam and beam-to-beam crevice slot locations to date, and if so, whether SSES has detected and recorded the occurrence of any flaw indications (cracks) in these locations to date.

RAI B.2.9-2 The staff noted that the applicant has not identified any relevant SSES-specific or generic operating experience in "operating experience" program element discussion for AMP B.2.9, BWR Vessel Internals Program. The staff has noted, however, that the LR basis binder for this AMP does include several Condition Reports/Action Requests that reported the occurrence of flaw indications (cracks) in the core spray sparger brackets, core shroud circumferential welds and some of jet pump assembly components (i.e., jet pump restrainers, wedges, and rods). The staff also observed that the applicant has dispositioned these flaw indications as acceptable (i.e. "As-Is") for further service without the need for repair or replacement of the components at this time. Provide your basis why the flaw indications in the

core spray sparger brackets, core shroud welds, and jet pump assembly components have not been identified as relevant operating experience for the AMP B.2.9, BWR Vessel Internals Program, and provide your basis for leaving the flaws in these components in service (i.e., acceptable "As-Is") without repair or replacement of the impacted components. State, with a technical justification, what the inspection frequencies and sample sizes will be for re-inspecting these reactor vessel internal (RVI) components during the period of extended operation.

RAI B.2.10-1 Part A. The "scope of program" program element for AMP B.2.10, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel Program, states that the cast austenitic stainless steel (CASS) RVI components will be screened for their susceptibility to loss of fracture toughness by thermal aging embrittlement and neutron irradiation embrittlement. However, the program element does not establish which NRC-approved guideline(s) or basis document(s) that will be used to screen the CASS RVI components for susceptibility to these aging phenomena. Clarify the NRC-approved guideline(s) or basis document(s) that will be used to screen the CASS RVI components for susceptibility to the aging phenomena of thermal aging embrittlement and neutron irradiation embrittlement.

Part B. The staff have noted an inconsistency in AMP B.2.10 in that the "scope of program" program element for the AMP indicates that SSES will use the material properties such as casting method, molybdenum content, and ferrite content as its basis for screening the susceptibility of the CASS RVI components to both thermal aging embrittlement and neutron irradiation embrittlement, whereas the "parameters monitored/inspected" program element description for the AMP states that the screening would be based on both neutron fluence levels and component material properties (including alloying content criteria). Although screening for thermal aging may be on component material properties (i.e., casting method, δ-ferrite content, and Molybdenum content), screening for neutron irradiation embrittlement must be based on an established NRC-approved integrated neutron flux threshold (i.e, neutron fluence) for CASS materials. The staff requests that the inconsistency between the "scope of program" and the "parameters monitored/inspected" program element descriptions be resolved and that SSES identify the specific parameter criteria that will be used to screen the CASS RVI components for reduction of fracture toughness by both thermal aging embrittlement and neutron irradiation embrittlement.

RAI B.2.10-2 Part A. The "detection of aging effects" program element for AMP B.2.10, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel Program, states that the applicant may use UT as one of the inspection techniques that are used to detect for cracking in these CASS components. Current state of the art UT inspection methods have not yet been qualified as being capable of detecting cracks in CASS materials because the CASS microstructures create significant noise signals (from refraction of the UT beams) that may mask UT signals coming from any relevant flaw indications in the CASS materials. Clarify whether there are any NRC-approved state of the art UT techniques that are capable of detecting cracks in CASS material microstructures, and if not, clarify which alternate NRC-approved inspection technique/method will be implemented to monitor for cracking in these materials.

Part B. The "detection of aging effects' program element in GALL AMP, XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel," (in part) states that

component specific flaw tolerance evaluations meeting specific criteria may be used as an alternative approach for managing reduction of fracture toughness in CASS RVI components. Provide your basis why the "detection of aging effects" or "monitoring or trending" program elements for the AMP B.2.10 did not credit a supplemental flaw tolerance analysis as an alternative basis for managing reduction of fracture toughness in these CASS RVI components.

RAI B.2.10-3 The "scope of program" program element for AMP B.2.9, BWR Vessel Internals Program, states (in part) that the program is credited for limited management of loss of material and reduction of fracture toughness in the RVIs components at SSES. SSES's primary program for managing loss of fracture toughness (the mechanisms are by thermal aging and neutron irradiation embrittlement) in the CASS RVI components is AMP B.2.10, Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel Program. The staff has noted, however, that the applicant's Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel Program does not identify the option to credit AMP B.2.9 for reduction of fracture toughness as an exception to either the "scope of program" or "parameters monitored/inspected" program elements in GALL AMP XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel."

The staff does not take issue with this alternative aging management approach. However, if SSES is crediting the BWRVIP as a option for managing reduction of fracture toughness in CASS RVI components, the staff requests that SSES amend the LRA to: (1) identify this as an exception to the scope of program" program element in GALL AMP XI.M13, "Thermal Aging and Neutron Irradiation Embrittlement of Cast Austenitic Stainless Steel," (2) identify the NRC-approved BWRVIP-based guideline reports that will be credited and used to manage reduction of fracture toughness in the CASS RVI components at SSES, and (3) assess the need to amend FSAR Supplement Section A.1.2.48 and Commitment No. 10 on LRA Table A-1 to reflect that the BWRVIP and applicable NRC-approved BWRVIP inspection and flaw evaluation guidelines may be used as an alternative basis for managing loss of fracture toughness in CASS RVI components.

Letter to B. McKinney from E. Gettys, dated June 12, 2008

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Units 1 and 2

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