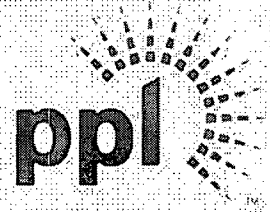


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**SUSQUEHANNA STEAM ELECTRIC STATION
REQUEST FOR ADDITIONAL INFORMATION FOR THE
REVIEW OF THE SUSQUEHANNA STEAM ELECTRIC STATION
UNITS 1 AND 2, LICENSE RENEWAL APPLICATION (LRA)
SECTION B.2.12
PLA-6436**

**Docket Nos. 50-387
and 50-388**

- References:*
- 1) PLA-6110, Mr. B. T. McKinney (PPL) to Document Control Desk (USNRC),
"Application for Renewed Operating License Numbers NPF-14 and NPF-22,"
dated September 13, 2006.
 - 2) Letter from Ms. E. H. Gettys (USNRC) to Mr. B. T. McKinney (PPL),
"Request for Additional Information for the Review of the Susquehanna Steam
Electric Station, Units 1 and 2 License Renewal Application," dated September 23,
2008.

In accordance with the requirements of 10 CFR 50, 51, and 54, PPL requested the renewal of the operating licenses for the Susquehanna Steam Electric Station (SSES) Units 1 and 2 in Reference 1.

Reference 2 is a request for additional information (RAI) related to License Renewal Application (LRA) Section B.2.12. The enclosure to this letter provides the question response and the additional requested information.


There are no new regulatory commitments contained herein as a result of the attached response.

If you have any questions, please contact Mr. Duane L. Filchner at (610) 774-7819.

A120
NRR

I declare, under penalty of perjury, that the foregoing is true and correct.

Executed on: 10/22/05



B. T. McKinney

Enclosure: PPL Response to NRC's Request for Additional Information (RAI)

Copy: NRC Region I

Ms. E. H. Gettys, NRC Project Manager, License Renewal, Safety

Mr. R. Janati, DEP/BRP

Mr. F. W. Jaxheimer, NRC Sr. Resident Inspector

Mr. A. L. Stuyvenberg, NRC Project Manager, License Renewal, Environmental

**Enclosure to PLA-6436
PPL Response to NRC's
Request for Additional Information (RAI)**

RAI B.2.12-5: (Bolting Integrity)

In the Susquehanna Steam Electric Station (SSES) license renewal application, the applicant states that the B.2.12 "Bolting Integrity Program" is consistent with the bolting recommendations identified in generic aging lessons learned (GALL) Section XI.M18, with exceptions. The applicant takes an exception to the GALL Report parameters monitored or inspected program element in regard to loss of preload. The applicant states that loss of preload is not an aging effect requiring management since it does not reach the 700°F threshold at which the thermal effects aging mechanism occurs. However, loss of preload is identified in the GALL Report to include not only thermal effects, but also gasket creep and self loosening as aging mechanisms. The gasket creep and self loosening aging mechanisms are not discussed in the exception, and appears to imply that loss of preload due to gasket creep or self loosening are not accounted for at SSES.

- a. Please provide the technical basis for why SSES does not account for loss of preload due to gasket creep or self loosening and why SSES does not have any aging management review line items which reflect this aging effect.
- b. Please clarify the methods used to identify a loss of preload, or indication of loss of preload, and provide the technical basis for doing so.
- c. Please clarify whether the management of loss of preload for external bolting is included in the scope of the Bolting Integrity Program.

PPL Response:**Part a:**

The SSES LRA Section B.2.12 discusses "loss of preload/loss of pre-stress" as an exception to NUREG-1801 Section XI.M18. Under the program element of "Parameters Monitored/Inspected" on LRA page B-43, the LRA states the following:

"Loss of preload/loss of pre-stress is not an aging effect requiring management for SSES bolting since SSES systems operate below the 700°F threshold where stress relaxation becomes a plausible age-related concern. Improper bolting application or maintenance issues that might result in loss of preload are current plant operational (design) concerns, as supported by site operating experience, and are not related to aging."

This statement provides the technical basis for PPL's conclusion that loss of preload due to stress relaxation (a long-term thermal effect) is not an applicable aging effect at SSES. Gasket creep and self-loosening are included among the "improper bolting application or maintenance issues that might result in loss of preload" that are considered to be current

plant operational (design) concerns, along with other mechanisms such as embedment, differential thermal expansion, and elastic interaction. The various mechanisms that may contribute to a loss of preload are identified in EPRI document NP-5067, "Good Bolting Practices."

EPRI document 1010639, "Non-Class 1 Mechanical Implementation Guideline and Mechanical Tools," Revision 4, provides guidance for the aging management review for bolted closures. Specifically, Section 3.1 of Appendix F, "Bolted Closures," states:

"Pre-load is the tension force developed in a fastener when it is tightened against a joint. The pre-load in a bolt is often less than expected and decrease of the pre-load may be attributed to, but not limited to, one or more of the following effects: embedment, cyclic load embedment, gasket creep, thermal effects (e.g., yield stress effect, modulus of elasticity effect, and stress relaxation), and self-loosening. These effects are typically addressed upon installation and subsequent maintenance of the joint.

In addition to being precluded by design, the loss of pre-load in a mechanical joint can only result in leakage, not failure of that joint. This leakage does not impact the pressure boundary such that the component's intended function is not accomplished. It is noted that in ASME Section III (NX-2121), gaskets, seals, and O-rings are not considered to perform a pressure retaining function and therefore, these parts are typically not considered to support a component intended function. It follows that the loss of pre-load from the above mechanisms does not result in a loss of mechanical closure or loss of pressure boundary integrity. Therefore, loss of pre-load is not an applicable aging effect."

EPRI document 1010639 also discusses the mechanisms of embedment, cyclic load embedment, gasket creep, thermal effects, and self-loosening. The overall conclusion, in the last paragraph of the summary on page 4-3 of EPRI document 1010639, is that none of these aging mechanisms are applicable. The mechanisms of gasket creep and self-loosening are not age-related since the effect (loss of preload and subsequent leakage) would be detected early in the service life of the component. In such instances, the condition would be identified and actions would be taken to prevent recurrence under the corrective action program. The mechanism of stress relaxation (thermal effects) would only be applicable in bolting with operating temperatures above 700°F.

Based on the guidance provided in EPRI documents NP-5067 and 1010639, and since no SSES systems operate above 700°F, no loss of preload in bolted closures at SSES can be attributed to any age-related mechanisms. Also, if a loss of preload would occur, due to inadequate design and/or installation, any resultant leakage would not be considered a loss of pressure boundary integrity by the ASME Code. Therefore, PPL concludes that loss of preload is not an aging effect for in-scope bolted closures at SSES.

Part b:

The Bolting Integrity Program does not specifically monitor the parameter of loss of preload. As discussed in the response to Part a of this RAI, the aging management review for bolted closures in the scope of license renewal at SSES did not identify loss of preload as an applicable aging effect.

As stated in the program description on LRA page B-42, the program does include, through other credited programs, the periodic inspection of bolting for indication of degradation such as leakage, loss of material, and cracking. The Inservice Inspection (ISI) Program inspects Class 1, 2, and 3 safety-related bolting for leakage, loss of material, and cracking. The System Walkdown Program monitors the remainder of the in-scope bolted closures for signs of leakage.

Therefore, since leakage is being monitored for all in-scope bolted closures at SSES, there is reasonable assurance that any age-related degradation, which would result in leakage, will be identified before there is a loss of mechanical closure and pressure boundary integrity.

Part c:

The management of the loss of preload for external bolting is not in the scope of the Bolting Integrity Program. As discussed in the response to Part a of this RAI, the aging management review for bolted closures in the scope of license renewal at SSES did not identify loss of preload as an applicable aging effect.

Loss of preload due to stress relaxation (thermal effects) was evaluated and determined to be not applicable to SSES. Loss of preload due to gasket creep and self-loosening were evaluated and determined to be current plant operational (design) issues and not age-related degradation issues for license renewal.