April 30, 2007

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 (RAI) - SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 (SSES 1 AND 2) - EXTENDED POWER UPRATE APPLICATION RE: MECHANICAL AND CIVIL ENGINEERING TECHNICAL REVIEW (TAC NOS. MD3309 AND MD3310)

Dear Mr. McKinney:

In reviewing your letter dated October 11, 2006, concerning the request to increase the maximum steady-state power level at the SSES 1 and 2 from 3489 megawatts thermal (MWt) to 3952 MWt, the Nuclear Regulatory Commission staff has determined that additional information contained in the enclosure to this letter is needed to complete its review. These questions were discussed with your staff on April 13, 2007. As agreed to by your staff, we request you respond by May 30, 2007.

If you have any questions, please contact me at 301-415-1030.

Sincerely,

/RA/

Richard V. Guzman, Senior Project Manager
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosure:
RAI

cc w/encl: See next page

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Accession Number: ML071090072 * RAI provided by memo. No substantive changes made.

OFFICE	NRR/LPLI-1/PM	NRR/LPLI-1/LA	NRR/EMCB/BC	NRR/LPLI-1/BC
NAME	RGuzman	SLittle	KManoly*	MKowal
DATE	4/23/07	4/23/07	4/3/07	4/30/07

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REQUEST FOR ADDITIONAL INFORMATION (RAI)

RELATING TO THE

APPLICATION FOR EXTENDED POWER UPRATE (EPU)

MECHANICAL AND CIVIL ENGINEERING TECHNICAL REVIEW

SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 (SSES 1 AND 2)

PPL SUSQUEHANNA, LLC

DOCKET NOS. 50-387 AND 50-388

The Nuclear Regulatory Commission (NRC) staff is reviewing the request from PPL Susquehanna, LLC (PPL, the licensee) to support the application of the EPU for SSES 1 and 2. The NRC staff has determined that additional information requested below will be needed to complete its review.

1. Section 5.4 of the General Electric (GE) Report, GE-NE-0000-0061-0595-P-R0, Susquehanna Replacement Steam Dryer Fatigue Analysis," dated December 2006, uses the results from the SSES 1 and 2 plant-specific scale model testing report (GENE-0000- 0054-2552-01-P, "Test Report #1 Susquehanna Steam Electric Station, Unit 1 Scale Model Test," May 2006). Test Report #1 concludes that, to scale the stress results of 113% Original Licensed Thermal Power (OLTP) to the proposed EPU, the scale factor to be used is 1.15. However, during a February 27, 2007, meeting with the NRC staff, PPL informed the NRC staff that it does not plan to use the GE report (GENE-0000-0054-2552-01-P) in the design development of the SSES 1 and 2 replacement dryers. PPL is requested to clarify its use of the mentioned GE report. Considering PPL's determination to not use the 1/17th scale model test data, provide a detailed explanation and technical basis for scaling the resulting stresses from 113% OLTP to the EPU.

2. Section 1 of the Continuum Dynamics Inc. (CDI) Report # 06-22, Rev. 0, "Hydrodynamic Loads at OLTP, CLTP [current licensed thermal power], and 113% OLTP on Susquehanna Unit 1 Steam Dryer to 250 Hz," dated September 2006, states, "This model [acoustic circuit model (ACM)], validated against the Exelon full scale data, is used in this effort." It should be noted that the NRC staff's RAIs related to comparison of the ACM results with the Exelon full scale data were not resolved. The NRC staff has determined that the worst-case combination of the bias error and the random uncertainties in predicting the dryer pressure loads using the ACM model would result in a bias of 75% and an uncertainty of 17%. (This bias error and random uncertainty were used by Vermont Yankee in determining the worst-case stresses in its dryer.) PPL is requested to consider this bias error and random uncertainty in determining the hydrodynamic loads on its dryers using the ACM, and evaluate the resulting fatigue margins.

Enclosure

3. GE-MDE-199-0985-P, Rev. 1, "Susquehanna – 1 Steam Dryer Vibration Steady State and Transient Response – Final Report," dated January 1986, presents the results for different test conditions including the transient response due to main steam isolation valve (MSIV) closure. On page 84 of the summary and conclusion section, item no. 8 provides a numerical factor associated with MSIV operations. PPL is requested to explain how it plans to use this factor during associated testing to bound its dryer stress estimation approach.

4. In Attachment 9 of PPL's submittal dated October 11, 2006 (or PLA-6076), PPL indicated that remote vibration accelerometers, hand-held vibration instrumentation, or visual observation programs will be used to monitor the vibration level of piping and components during EPU operation. PPL also indicated that vibration acceptance criteria have been defined and accelerometer data, to date, indicates that no screening criteria will be exceeded due to EPU conditions. Provide a detailed explanation of vibration acceptance criteria as to how the acceptance criteria were established. Also, describe the vibration screening allowables. Confirm whether the screening allowables are generic or piping system specific, and how these allowables were defined.

5. In Section 10 of Attachment 9 to PLA-6076, amendment request, PPL indicated that modifications are needed to address the increased effects of flow induced vibration at EPU conditions. PPL is requested to explain in detail the following modification aspects:

   (a) the number and types of supports added in the feedwater heater drain lines and reason for the modification,

   (b) the upgraded criteria that are used for the repair and replacement of socket welds for EPU operation, and

   (c) technical basis in determining the expected frequency of replacement for valves listed in Section 10, Table 5 for the EPU operation.

6. Attachment 9 to PLA-6076, describes an assessment of flow induced vibration of systems and components in support of the EPU request for SSES 1 and 2. Attachment 9 indicates that some analyses remain underway for vibration susceptibility such as accelerometers on the extraction steam 4th stage and the vibration data for feedwater and extraction steam systems for Unit 2. PPL is requested to provide the results of those analyses and explain the resulting modifications or procedure changes.

7. Section 5 of Attachment 10 to PLA-6076, provides an overview of the Susquehanna EPU Power Ascension Test Plan. PPL stated in a February 27, 2007, meeting that it will provide the detailed Power Ascension Test Plan to the NRC before increasing power above CLTP. PPL is requested to provide the test and instrumentation plan, and configuration of the new dryer as soon as it is available. PPL is also requested to provide its limit curves for power ascension, including the margin available from the fatigue stress limit if the curve is reached during power ascension.

8. In reference to Attachment 9 to PLA-6076, provide: (a) applicable types of accelerometers/instruments for each of Vibration Monitoring Groups, and (b) locations of instruments and technical basis for selection of the monitoring locations.

9. In Attachment 8 PLA-6076, PPL indicated that the SSES acceptance criteria for vibration level of the main steam, feedwater, and other piping systems are based on the guidance of American Society of Mechanical Engineers (ASME) OM S/G Part 3 Code where it requires that the calculated stresses due to steady state vibration shall not exceed the allowable stress limit as specified by the Code. However, Tables 3 through 5 show that the acceptance criteria are based on the root-mean-square (RMS) of acceleration for each piping. PPL is requested to demonstrate how the piping vibration level will be within the OM Code stress limit using the RMS acceleration value in place of the peak response spectrum used in the classical piping analysis.

10. Attachment 7 to PLA-6076, lists and describes modifications of systems and components in support of the EPU request for Susquehanna. Attachment 7 indicates that feedwater heaters require modification to reduce the velocity and tube vibrations at the EPU conditions. Attachment 7 also indicates that piping supports will be modified as necessary in the main steam, feedwater, and extraction steam lines for EPU conditions. PPL is requested to confirm whether, and how those modifications are completed. If there are modifications for pipe supports, explain the modifications and the reason for the modification.

11. Explain in detail how the verification and validation of the ACM computer code was performed to satisfy the provisions of ASME NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications," Subpart 2.7, "Quality Assurance Requirements for Computer Software for Nuclear Facility Applications," which has been accepted by the NRC in satisfying the requirements in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants." Your explanation should include how the bench-marking of the ACM computer code was accomplished.

12. Section 3.2.2 of Attachment 4 to PLA-6076, indicates that, "Typically, new stresses are determined by scaling the "original" stresses based on the EPU/CPPU (constant pressure power uprate) conditions (pressure, temperature, and flow)." Explain how the scaling factor(s) are derived. Confirm whether more than one scaling factor was used. If yes, provide a list of these factors. Are the dead weight and seismic stresses (which should not change) also scaled up?

13. Provide tabular data similar to Table 3-7 of Attachment 4 to PLA-6076 to document the maximum reactor recirculation system (RRS) pipe stresses and cumulative usage factors for the RRS piping during CPPU operation.

14. Section 8 of Attachment 9 to PLA-6076 notes that recorded accelerations for the recirculation/RHR piping are about 60% of the screening criteria, because: "These vibration levels reflect the system response to recirculation pump vane passing frequencies." Explain the predicted vibratory response of the recirculation pump and piping for the increased system flow rate due to CPPU.

15. PPL is requested to augment Attachment 4 to PLA-6076 to explain: (1) the code of record for the recirculation pumps and supports; (2) the design basis loads for the

recirculation pumps and supports, and any changes to these loads, including flow rate, due to CPPU; (3) the adequacy of the original analyses (stress and fatigue)/tests to qualify the recirculation pumps and supports, or any changes to these analyses/tests for CPPU, and (4) the potential for higher pump vibration levels due to greater flow rate for CPPU.

16. Provide results of the piping analyses of the main steam and feed water lines inside and outside containment for the increased flow rates during CPPU operation for SSES 2.

17. Provide the evaluation of the turbine stop valve closure transient at CPPU conditions for SSES 2.

18. Table 3-14 of Attachment 4 to PLA-6076 lists allowable reactor feed pump turbine nozzle forces and moments. Provide the basis for these allowables and the interaction formula.

19. Tables 3-11 through 3-14 of Attachment 4 to PLA-6076 list piping and supports that will be modified for CPPU. Provide a summary list which identifies the nature of these modifications for the affected components.

20. Note 6 of Table 3-8 of Attachment 4 to PLA-6076 indicates that, "In order to reduce conservatism, credit was taken for the seismic pins to resist lateral loads, which results in the elimination of bending stress in the shroud head bolts." Provide a description of the evaluation of the seismic pins for CPPU.

21. Section 3.4.2 of Attachment 4 to PLA-6076 indicates that the steam separator is "significantly affected by CPPU conditions." Provide a summary of the evaluation of the steam separator for CPPU.

22. Section 10.3.3 of Attachment 4 to PLA-6076 indicates that some mechanical equipment, such as pumps and heat exchangers, were reviewed for increased nozzle loads and component support loads for CPPU. Confirm that these reviews addressed the upset, emergency and faulted design conditions, which incorporate operating Basis Earthquake or Safe Shutdown earthquake loads.

23. Section 10.5.5 of Attachment 4 to PLA-6076 indicates that PPL performed a seismic margins assessment (SMA) following the guidance of EPRI NP-6041. Briefly explain the referenced SMA performed and summarize any open seismic items from the SMA.

Susquehanna Steam Electric Station, Unit Nos. 1 and 2

cc:

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