October 19, 2006

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) - APPLICATION TO IMPLEMENT AVERAGE POWER RANGE MONITOR/ROD BLOCK MONITOR/TECHNICAL SPECIFICATIONS/MAXIMUM EXTENDED LOAD LINE LIMIT ANALYSIS (ARTS/MELLLA) (TAC NOS. MC9040 AND MC9041)

Dear Mr. McKinney:

In reviewing your letter dated November 18, 2005, concerning the request for an amendment to the SSES 1 and 2 Technical Specifications that supports the implementation of ARTS/MELLLA, 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 during a teleconference on October 5, 2006. As agreed to by your staff, we request you respond within 45 days of the date of this letter.

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

Sincerely,

/RA/

Richard V. Guzman, 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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REQUEST FOR ADDITIONAL INFORMATION

RELATING TO THE

APPLICATION FOR IMPLEMENTATION OF AVERAGE POWER RANGE

MONITOR (APRM)/ROD BLOCK MONITOR/TECHNICAL SPECIFICATIONS/MAXIMUM

EXTENDED LOAD LINE LIMIT ANALYSIS (ARTS/MELLLA)

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 implementation application of ARTS/MELLLA for SSES 1 and 2. The NRC staff has determined that additional information requested below will be needed to complete its review.

1. On Page 1-1 of Attachment 3 in your submittal dated November 18, 2005, it states, "The current licensed Extended Load Line Limit Analysis (ELLLA) power-flow region is replaced by the operating region bounded by the rod line which passes through the 100% of current licensed thermal power (CLTP) / 81.9% of Rated Core Flow (RCF) point, the rated thermal power (RTP) line, and the rated load line, which passes through 100% RCF."

    a. It is the NRC staff's understanding that a rod line is not the same as an analytical line in that a rod line changes from cycle to cycle whereas an analytical line does not. Explain the use of the term "rod line" in your above statement, and provide a discussion on the difference between rod line and analytical line as you have used in the text above.

    b. Submit the specific equation used to determine the MELLLA domain for given power and flow conditions.

2. Submit an updated power/flow map that displays and clearly defines the following information:

    a. current ELLLA boundary line

    b. proposed MELLLA boundary line

    c. nominal flow-biased APRM rod block trip and scram setpoints for both current ELLLA and proposed MELLLA conditions

Enclosure

3. During single loop operation (SLO) what is the corresponding percent power and percent flow for MELLLA operation?

4. On Page 1-4 of Attachment 3 in your submittal, it indicates that the APRM Flow-Biased Simulated Thermal Power (STP) Scram and APRM flow-biased rod block setpoints are clamped at 118% and 113.5%, respectively. State whether these values are percent of original licensed thermal power (OLTP) or of CLTP.

5. Was a full-break spectrum analyzed for a loss-of-coolant accident (LOCA)? If so, please submit the results for the full-break spectrum analyses. Provide the limiting small-break and large-break peak cladding temperature. Was the LOCA analysis performed at SLO operating conditions? If so, please submit the results of this analysis.

6. Provide additional discussion on what kind of axial power profiles were assumed in the large-break LOCA analysis.

7. Section 3.0 of Attachment 3 in your submittal states the transient analyses performed are based on SSES-2 Cycle 13. Discuss the similarities and differences between SSES-1 and SSES-2 in terms of transient response, geometry, system performance, and core design.

8. Section 3.1 of Attachment 3 in your submittal lists seven different anticipated operational occurrence (AOO) events that are considered potentially limiting in the ARTS/MELLLA region and were reviewed as part of the ARTS program development. These events are: (1) Generator Load Reject with No Bypass (LRNBP), (2) Turbine Trip with No Bypass (TTNBP), (3) Feedwater Controller Failure Maximum Demand, (4) Loss of Feedwater Heating (LFWH), (5) Fuel Loading Error, (6) Inadvertent High Pressure Coolant Injection Startup, and (7) Recirculation Flow Increase.

    a. In order for the NRC staff to reach its conclusion for the proposed changes submitted in your submittal, it is necessary to review the results for each of the events considered to be potentially limiting in the ARTS/MELLLA region. Analyze each of the seven AOO events above assuming the proposed power/flow conditions and submit the results.

    b. The applicant states the LRNBP and TTNBP events were conservatively combined as one event. Explain how combining the two events into one is more conservative than the two individual events. Discuss how the combined LRNBP/TTNBP event adequately demonstrates core response while operating in the MELLLA region. State the uncertainties, assumptions, and system actuations assumed in the combined LRNBP/TTNBP to make this event more conservative than the individual LRNBP and TTNBP events. Explain if this approach is part of the NRC-approved Framatome licensing methodology.

    c. The amendment request states the LFWH evaluation for SSES-2 Cycle 13 considered the flow range for the MELLLA region and that the results showed the LFWH event is not limiting for SSES 1 and 2. The document also states the effect of MELLLA on the LFWH severity is sufficiently small and the LFWH remains not limiting for MELLLA. Since the LFWH event is a slow event and

higher core flow could potentially have adverse limiting affects, perform an LFWH analysis using increased core flow and provide the results.

9. On Page 1-4 of Attachment 3 in Reference 1 it states “The APRM Flow-Biased Simulated Thermal Power (STP) scram line is conservatively not credited in any SSES licensing analyses. In addition, the APRM Flow-Biased STP rod block line is conservatively not credited in any SSES 1 and 2 safety licensing analyses, although it is part of the SSES design configuration.”

   a. Does this mean that for any transient/accident initiated at less than rated conditions that only the fixed scram of 113.5% is assumed? Provide a table that lists exactly which analyses assumed a scram at the fixed scram setpoint of 113.5% and which analyses did not.

   b. State the Framatome thermal and mechanical overpower limits. Provide technical justification explaining why a scram at the fixed value of 113.5% would not result in exceeding thermal overpower limits for off-rated conditions (conditions under the MELLLA domain or conditions other than normal steady-state conditions).

   c. Provide the thermal and mechanical overpower limits calculated for transients initiated from the rated conditions and along the MELLLA operating domain.

10. Provide the safety relief valve (SRV) setpoints assumed in your LOCA, vessel overpressure, and the Anticipated Transient Without Scram analyses. Demonstrate the continued adequacy of the current SRV setpoints with respect to your recent as-found valve test performance values. Explain why the current SRV setpoints are still applicable for the proposed MELLLA operating domain?

11. Page 6-2 of Attachment 3 in your submittal states, “PPL has committed to review the applicability of the ICA [interim corrective action] regions on a cycle-specific basis, and take appropriate action to revise the ICA regions if needed.” State what the cycle-specific ICA region changes and Option III boundary changes are for MELLLA. State whether the applicability of the ICA and the Option III boundaries was confirmed and provide the updated instability power/flow boundaries.

12. In the GENE [computer code] methodology, the ARTS off-rated limits were developed from series of sensitivity analyses that are subsequently confirmed in new applications. State if the off-rated limits will be performed on cycle-specific bases for the Framatome methodology.

13. Provide the NRC-approved reference document that describes the Framatome off-rated thermal limit methodology (i.e. minimum critical power ratio ($MCPR_p$, $MCPR_f$), linear heat generation rate (LHGR, $LHGRFAC_p$)).

14. Table 1-1 of Attachment 3 in Reference 1 states that the ISCOR computer code is used to calculate the reactor heat balance. Please explain the applicability of the use of this

General Electric code for Framatome analysis or reference the appropriate Framatome reactor heat balance computer code used.

15. In the Framatome safety limit MCPR (SLMCPR) methodology, state whether the SLMCPR is calculated at the minimum core flow statepoint at the current RTP. Justify how it is ensured that the control rod patterns assumed in the SLMCPR calculation at the minimum and RCF statepoints will bound the control rod patterns employed at the plant. Discuss how operating flexibility in terms of planned and actual control rod patterns at the plant is achieved while ensuring that the power distribution assumed in the analyses remains limiting.

16. Reference the specific SLMCPR sections in the NRC-approved licensing topical report that discuss how the limiting control rod patterns are selected.

Susquehanna Steam Electric Station, Unit Nos. 1 and 2

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