

April 30, 2001

Mr. Robert G. Byram
Senior Vice President
and Chief Nuclear Officer
PPL Susquehanna, LLC
2 North Ninth Street
Allentown, PA 18101

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 - REQUEST
FOR ADDITIONAL INFORMATION REGARDING 1.4-PERCENT POWER
UPRATE (TAC NOS. MB0444 AND MB0445)

Dear Mr. Byram:

By letter dated October 30, 2000, as supplemented by letter dated February 5, 2001, PPL Susquehanna, LLC, requested changes to the Facility Operating Licenses and Technical Specifications for the Susquehanna Steam Electric Station, Units 1 and 2, to implement a 1.4-percent power uprate. The power uprate would be achieved through plant modifications resulting in improved feedwater flow measurement accuracy. The staff requires additional information to complete our review of the proposed amendment. The enclosed questions were discussed with members of your staff via teleconference on March 22, March 29, and April 23, 2001. A schedule for your response was discussed with Mr. Michael Crowthers of your staff, and it was determined that May 21, 2001, would be a mutually agreeable target date for your response. Please feel free to contact me to discuss changes to this target date, or if you need further clarification regarding the enclosed questions.

Sincerely,

/RA/

Robert G. Schaaf, Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosure: Request for Additional Information

cc w/encl: See next page

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Units 1 & 2

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REQUEST FOR ADDITIONAL INFORMATION

RELATED TO PROPOSED POWER UPRATE

PPL SUSQUEHANNA, LLC

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

DOCKET NOS. 50-387 AND 50-388

1. You stated in your application that the approach, scope and detail of your power uprate evaluation are based on the General Electric (GE) generic boiling-water reactor power uprate guidelines presented in Licensing Topical Reports LTR1¹ and LTR2², and the specific design features of the SSES units. You also stated that the cores for both units in the upcoming cycles would consist exclusively of Siemens Power Corporation (SPC) Atrium-10™ fuel bundles. Please explain the impact the 1.4-percent power increase and the SPC Atrium 10™ core have on the minimum critical power ratio safety limit values for both units. Please provide the cycle-specific reload safety analyses supporting operation at the uprated conditions (e.g., Final Safety Analysis Report, Appendix 15D). Also, identify any operating flexibility options for which SSES Units 1 and 2 may be licensed and discuss the impact, if any, the power uprate may have on operation under these conditions.
2. In your previous power uprate submittal (Reference 1.6³ of NE-2000-001P), you stated that “SLCS [standby liquid control system] shutdown capability is evaluated for each fuel reload.... A small increase in the SRV [safety/relief valve] setpoint has no effect on the rated injection flow to the reactor, and the resulting increased system operating pressure has not reduced the SLC pump relief valve pressure margin below the recommended levels. Therefore, the capability of the SLCS to provide its backup shutdown function is not affected by the power uprate.... A similar evaluation confirmed that the SLC will continue to meet the requirements of 10 CFR 50.62 for ATWS [anticipated transient without scram].” For the currently proposed power uprate, you stated that “an evaluation is performed to assure that the SLCS continues to meet the requirements of 10 CFR 50.62 for ATWS.”
 - What are, (1) the limiting ATWS transients, (2) the peak steam dome pressure, and (3) the required discharge pressure for the SLC pumps? Submit actual analyses that evaluate the response and the injection capabilities of the SLC and reactor core isolation cooling systems during the limiting ATWS transient at the uprated condition.

¹GE Licensing Topical Report NEDC-31897P-A, "Generic Guidelines for General Electric Boiling Water Reactor Power Uprate," May 1992

²GE Licensing Topical Report NEDC-31984P, "Generic Guidelines for General Electric Boiling Water Reactor Power Uprate," July 1991

³PPL Susquehanna, LLC, Licensing Topical Report NE-092-001 Rev. 0, "Susquehanna Steam Electric Station Units 1 and 2, Power Uprate With Increased Core Flow," June 1992.

3. You stated in your submittal that because the uprated power does not entail an increase in the operating pressure used for evaluation, the SRV pressure setpoints do not have to be changed. Please verify that the SRVs can provide the necessary overpressure protection during limiting anticipated operational occurrence transients, ATWS transients, and American Society of Mechanical Engineers (ASME) overpressure transients.
4. Section 3.3.1 of PPL Susquehanna, LLC, Report NE-2000-001P states that "...based on the expected increase and the conservative evaluations...the pressure versus temperature (PT) curves ...are unchanged and remain bounding."
 - NE-2000-001P and References 1.6 and 3.1⁴ of NE-2000-001P do not discuss any sources of conservatism in the evaluations. Please clarify and support the argument that there is sufficient conservatism to justify that the PT curves remain unchanged.
 - The fluence values were based on a dosimetry report⁵ by the Southwest Research Institute (SwRI) published in 1986. There have been many changes in cross sections and analytical techniques since that time. Please provide information to support the assertion that the original values are conservative for the proposed application.
 - There is no dosimetry referenced for Unit 2, thus, the evaluations for both units are based on a single capsule measurement for Unit 1. Please address the adequacy of only one dosimetry measurement.
5. The Nuclear Regulatory Commission (NRC) staff's safety evaluation dated March 8, 1999, regarding Topical Report ER-80P, "Improving Thermal Power Accuracy and Plant Safety While Increasing Operating Power Level Using the LEFM [leading edge flow meter] System," included 4 criteria that licensees need to address when referencing the topical report. Criteria 3 states:

The licensee should confirm that the methodology used to calculate the uncertainty of the LEFM in comparison to the current feedwater instrumentation is based on accepted plant setpoint methodology (with regard to the development of instrument uncertainty). If an alternative methodology is used, the application should be justified and applied to both venturi and ultrasonic flow measurement instrumentation installations for comparison.

Please provide a copy of your comparison of the uncertainty for the LEFM system to the current feedwater instrumentation for NRC staff review.

⁴GE Report SASR 89-11, "Implementation of Regulatory Guide 1.99, Revision 2 for Susquehanna Steam Electric Station Units 1 and 2," May 1989.

⁵SwRI Report 06-8658, "Susquehanna Unit 1 Dosimeter Testing," September 1986.

6. Nuclear power plants are licensed to operate at a specified power, which, at operating power levels, is indicated in the control room by neutron flux instrumentation that has been calibrated to correspond to core thermal power. Core thermal power is determined by a calculation of the energy balance of the plant nuclear steam supply system. The accuracy of this calculation depends primarily upon the accuracy of feedwater flow, feedwater enthalpy, and main steam enthalpy measurements, which are not safety grade and are not included in the plant technical specifications.

The uncertainty of calculating values of core thermal power determines the probability of exceeding the power levels assumed in the design-basis transient and accident analyses. In this regard, to allow for uncertainties in determining thermal power (e.g., instrument measurement uncertainties), Appendix K to Part 50 of Title 10 of the *Code of Federal Regulations* (10 CFR Part 50) requires loss-of-coolant accident and emergency core cooling system (ECCS) analyses to assume that the reactor had operated continuously at a power level at least 102 percent of the licensed thermal power. The 2-percent power margin uncertainty value was intended to address uncertainties related to heat sources in addition to instrument measurement uncertainties. Later, the NRC concluded that, at the time of the original ECCS rulemaking, the 2-percent power margin requirement appeared to be based solely on considerations associated with power measurement uncertainty.

Appendix K to 10 CFR Part 50 did not require demonstration of the power measurement uncertainty and mandated a 2-percent margin, notwithstanding that the instruments used to calibrate the neutron flux instrumentation may be more accurate than originally assumed in the ECCS rulemaking. In the June 1, 2000, *Federal Register*, (Volume 65, pages 34913-34921), the Commission published a final rule to reduce an unnecessarily burdensome regulatory requirement by allowing licensees to justify a smaller margin for power measurement uncertainty by using more accurate instrumentation to calculate the reactor thermal power and thereby calibrate the neutron flux instrumentation.

Your application proposed changes to the SSES Unit 1 and 2 licenses and technical specifications to obtain a power uprate on the basis of plant modifications that would result in improved accuracy of the feedwater flow rate and feedwater temperature measurements used to calculate reactor thermal power. The improved instrumentation will allow operation of the SSES units with a reduced margin between the actual power level and the 102-percent margin used in the licensing basis ECCS analyses.

To complete its review of the proposed changes, the NRC staff requests a description of the programs and procedures that will control calibration of the Caldon LEFM and associated instrumentation that affect the total power uncertainty described in your power uprate application. Include in this discussion the procedures for:

1. Maintaining calibration,
2. Controlling software and hardware configuration,
3. Performing corrective actions,
4. Reporting deficiencies to the manufacturer, and
5. Receiving and addressing manufacturer deficiency reports.

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