

March 20, 2006

Mr. Britt T. McKinney  
Sr. Vice President and  
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SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 1 - ISSUANCE OF  
AMENDMENT REGARDING MINIMUM CRITICAL POWER RATIO SAFETY  
LIMIT AND REFERENCE CHANGES (TAC NO. MC9187)

Dear Mr. McKinney:

The Commission has issued the enclosed Amendment No. 231 to Facility Operating License No. NPF-14 for the Susquehanna Steam Electric Station, Unit 1 (SSES 1). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated December 1, 2005, as supplemented by letter dated February 17, 2006.

This amendment changes the SSES 1 TSs by revising the SSES 1 Cycle 15 Minimum Critical Power Ratio Safety Limit in Section 2.1.1.2. for single-loop operation and the references listed in Section 5.6.5.b.

A copy of our safety evaluation is also enclosed. Notice of Issuance will be included in the Commission's Biweekly *Federal Register* Notice.

Sincerely,

**/RA/**

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

Docket No. 50-387

Enclosures:

1. Amendment No. 231 to  
License No. NPF-14
2. Safety Evaluation

cc w/encls: See next page

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\* SE provided. No major changes made.  
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DATE	3/15/06	3/15/06	3/6/06 SE DTD	3/20/06	3/20/06

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Susquehanna Steam Electric Station, Units 1 and 2

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PPL SUSQUEHANNA, LLC

ALLEGHENY ELECTRIC COOPERATIVE, INC.

DOCKET NO. 50-387

SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 231

License No. NPF-14

1. The Nuclear Regulatory Commission (the Commission or the NRC) having found that:
  - A. The application for the amendment filed by PPL Susquehanna, LLC, dated December 1, 2005, as supplemented on February 17, 2006, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;
  - B. The facility will operate in conformity with the application, the provisions of the Act, and the regulations of the Commission;
  - C. There is reasonable assurance: (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;
  - D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and
  - E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment and paragraph 2.C.(2) of the Facility Operating License No. NPF-14 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 231 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. PPL Susquehanna, LLC shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Richard J. Laufer, Chief  
Plant Licensing Branch I-1  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: March 20, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 231

FACILITY OPERATING LICENSE NO. NPF-14

DOCKET NO. 50-387

Replace the following pages of the Appendix A Technical Specification with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

REMOVE

TS/2.0-1  
TS/5.0-22  
TS/5.0-23

INSERT

TS/2.0-1  
TS/5.0-22  
TS/5.0-23

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 231 TO FACILITY OPERATING LICENSE NO. NPF-14

PPL SUSQUEHANNA, LLC

ALLEGHENY ELECTRIC COOPERATIVE, INC.

SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 1

DOCKET NO. 50-387

## 1.0 INTRODUCTION

By application dated December 1, 2005, Agencywide Documents Access and Management System Accession No. ML053470314, as supplemented by letter dated February 17, 2006 (ML060530614), PPL Susquehanna, LLC, (PPL, the licensee), requested changes to the Technical Specifications (TSs) for Susquehanna Steam Electric Station, Unit 1 (SSES 1). The supplement dated February 17, 2006, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination.

The proposed amendment revises the SSES 1 Cycle 15 (U1C15) Minimum Critical Power Ratio (MCPR) Safety Limit in Section 2.1.1.2 for single-loop operation and the references listed in Section 5.6.5.b.

## 2.0 REGULATORY EVALUATION

### 2.1 Regulatory Requirements

The regulatory requirements and guidance which the Nuclear Regulatory Commission (NRC) staff considered in its review of the application are as follows:

1. Title 10 of the *Code of Federal Regulations* (10 CFR) establishes the fundamental regulatory requirements with respect to the reactivity control systems. Specifically, General Design Criterion 10 (GDC-10), "Reactor design," in Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 states, in part, that the reactor core and associated coolant, control, and protection systems shall be designed with appropriate margin to assure that specified acceptable fuel design limits are not exceeded.
2. NRC Generic Letter 88-16 (GL 88-16), "Removal of Cycle-Specific Parameter Limits from Technical Specifications," provides guidance on modifying cycle-specific parameter limits in the TSs.



3. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," provides guidance on the acceptability of the reactivity control systems, the reactor core, and fuel-system design. Specifically, Section 4.2, "Fuel System Design," specifies the criteria for evaluation of fuel-design limits such that there be at least 95% probability at a 95% confidence level that the hot fuel rod in the core does not experience a departure from nucleate boiling or a transition condition during normal operation or anticipated operational occurrences. Section 4.4, "Thermal Hydraulic Design," provides guidance on the review of thermal-hydraulic design in meeting the requirement of GDC-10 and the fuel-design criteria established in Section 4.2.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Proposed Changes to MCPR Safety Limit and Reference Changes

PPL proposed to change the MCPR safety limit value in TS 2.1.1.2 for U1C15 operation from 1.10 to 1.12 for single-loop operation to reflect the cycle specific MCPR Safety Limit analysis for U1C15 with the reactor steam dome pressure 785 pounds-per-square inch (psig) and core flow 10 million pound-mass-per hour (lb<sub>m</sub>/hr).

PPL described the approved methodologies used to calculate the MCPR safety limit value for the proposed TS change in its submittal dated December 1, 2005. The U1C15 MCPR safety limit analysis was performed by Framatone Advanced Nuclear Power (FANP) using SSES 1, plant-and cycle-specific fuel and core parameters including power profiles provided by PPL, and the NRC-approved methods including (1) ANF-524(P)(A), Revision 2, "Critical Power Methodology for Boiling Water Reactors," Supplement 1, Revision 2 and Supplement 2, (2) EMF-1997(P)(A), Revision 0 and Supplement 1, Revision 0, (3) EMF-2158(P)(A), Revision 0, "Siemens Power Corporation Methodology for Boiling Water Reactors: Evaluation and Validation of CASMO-4/MICROBURN-B2."

In its submittal, PPL stated that the current two-loop MCPR safety limit value (1.09) did not change as a result of the U1C15 analysis. However, the single-loop MCPR safety limit value increased by 0.02 (1.10 to 1.12). PPL stated that the 0.02 increase is due to (1) cycle-to-cycle variation and (2) the change from the ANFB-10 to the SPCB Critical Power Correlation.

As PPL previously described in its letter dated December 22, 2003 (ML040020346), changes in both the two-loop and single-loop MCPR safety limits are due solely to cycle-to-cycle variation and estimated to range from -0.01 to +0.01. PPL clarified with further justification in its supplemental letter dated February 17, 2006, that (1) the U1C15 preliminary core loading provided in its submittal was revised to mitigate the potential for excessive friction in peripheral control cells, (2) no changes were made to the loading of the interior control cells, (3) the changes to the U1C15 core loading do not change the proposed two-loop and single-loop MCPR safety limits, and (4) the core composition provided in its submittal remains unchanged.

In its submittal, PPL stated that beginning with U1C15, FANP's NRC-approved EMF-2209(P)(A), "SPCB Critical Power Correlation," is applied for MCPR safety limit calculation, reload licensing analyses, and MCPR monitoring.

PPL provided the following justification for the increase in MCPR safety limit for single-loop operation in terms of the SPCB Critical Power Correlation:

Single-loop safety analyses including the MCPR Safety Limit are performed at the highest rod-line that is within the analyzed operating domain for single-loop operation; 76% of rated thermal power and 52 Mlbm/hr core flow. The core flow value of 52 Mlbm/hr is the maximum that can be achieved due to recirculation pump speed limitations in single-loop operation specified in TS 3.4.1. Due to a flow discontinuity in the ANFB-10 Critical Power Correlation near 52 Mlbm/hr core flow, the previous Unit 1 MCPR Safety Limit calculation was performed at a core flow of 55 Mlbm/hr. [...]The SPCB Critical Power Correlation does not have a flow discontinuity at 52 Mlbm/hr. Therefore, FANP performed the U1C15 single-loop MCPR Safety Limit at 52 Mlbm/hr core flow and also at 55 Mlbm/hr core flow. The results of the analyses are provided in the following table:

Percentage of Pins in Boiling Transition  
at Single-Loop Conditions for SPCB

	% of Pins in Boiling Transition 52 Mlbm/hr Core Flow	% of Pins in Boiling Transition 55 Mlbm/hr Core Flow
1.10 MCPR SL	0.198	Calculation Not Performed
1.11 MCPR SL	0.131	0.095
1.12 MCPR SL	0.087	Calculation Not Performed

The preceding table shows that changing the core flow from 55 to 52 Mlbm/hr increases the MCPR Safety Limit by 0.01 for the SPCB Critical Power Correlation.

PPL stated that the channel bow assumptions used in the U1C15 MCPR safety limit calculation did not contribute to the increase in the single-loop MCPR safety limit. PPL provided the following justification for this statement and follow-up actions for continued validation of its safety analyses assumptions:

The impact of the channel bow on the MCPR Safety Limit is included due to recent fuel channel/control rod interference observed during previous Unit 1 operating cycles. The channel bow assumptions used for Unit 1 Cycle 15 are consistent with the current Unit 1 assumptions. Therefore, the change in the single-loop MCPR Safety Limit is not the result of a change in channel bow assumptions...

[...]Based on fuel channel/control rod interference observed during previous Unit operating cycles which may indicate that fuel channel bow is larger than the FANP nominal database, PPL requested FANP to increase the amount of channel bow assumed in the Unit 1 Cycle 15 MCPR Safety Limit calculation. PPL requested that FANP use a mean channel bow for the highly exposed Unit 1 Cycle 15 fuel assemblies of 122.6 mils (from an initial value of 61.3 mils) which is consistent with mean channel bow assumed for the current Unit 1 operating cycle following the recently completed

Unit 1 maintenance outage. As part of the continuous validation of safety analyses assumptions, PPL will confirm that the actual Unit 1 Cycle 15 mean channel bow is less than or equal to the mean channel bow assumed. The confirmation will rely on performance data from previously measured fuel channels that were operated in a manner consistent with projected Unit 1 Cycle 15 operation and a potential channel measurement and re-channeling campaign during the refueling and inspection outage preceding Unit 1 Cycle 15 operation. PPL will continue to monitor fuel channel performance in conformance with PPL's fuel channel monitoring program.

PPL also proposed to delete four PPL analytical methods and to add 7 NRC-approved, FANP analytical methods that were not previously contained in TS 5.6.5.b.

### 3.2 NRC Staff Evaluation

The NRC staff has reviewed the justification contained in the application and the supplemental letter for the proposed MCPR safety limit value of 1.12 for single-loop recirculation loop operation using NRC-approved methodologies. Based on the review of the proposed changes, the NRC staff concludes that PPL has provided adequate justification for the 0.02 increase of the MCPR safety limit value for the U1C15 single-loop operation in terms of cycle-specific core loading and the change from the ANFB-10 to the SPCB Critical Power Correlation methodology. Therefore, the proposed MCPR safety limit and its analysis for U1C15 operation using the plant- and cycle-specific calculation in conjunction with the approved methods is acceptable. The U1C15 MCPR safety limit will ensure that 99.9 percent of the fuel rods in the core will not experience boiling transition, which satisfies the requirements of GDC-10.

The NRC staff has reviewed the justification for the proposed reference changes in TS 5.6.5.b and finds the changes acceptable since the references that are removed pertain to PPL analytical methods which are no longer in use for the application of the U1C15 MCPR safety limit calculation. Furthermore, the addition of the references to TS 5.6.5.b which contain FANP analysis methodologies is acceptable since it has already been approved by the NRC for the applications requested by PPL (namely, to support calculations of the cycle-specific parameters specified in TS 5.6.5 beginning with U1C15). The NRC staff finds the proposed changes are in compliance with the guidance specified in GL 88-16.

### 4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Pennsylvania State official was notified of the proposed issuance of the amendment. The State official had no comments.

### 5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (71 FR 2595). The amendment also relates to changes in recordkeeping, reporting, or

administrative procedures or requirements. Accordingly, the amendment meets the eligibility criteria for categorical exclusions set forth in 10 CFR 51.22(c)(9) and (c)(10). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

## 6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: T. Huang  
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Date: March 20, 2006