

November 9, 2004

Mr. Bryce L. Shriver  
President, PPL Generation, LLC, and  
Chief Nuclear Officer  
PPL Generation, LLC  
2 North Ninth Street  
Allentown, PA 18101

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 - ISSUANCE  
OF AMENDMENTS RE: REVISED RESPONSE TO GENERIC LETTER 94-02,  
LONG-TERM STABILITY SOLUTION (TAC NOS. MC1659 AND MC1660)

Dear Mr. Shriver:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 217 to Facility Operating License No. NPF-14 and Amendment No. 192 to Facility Operating License No. NPF-22 for the Susquehanna Steam Electric Station, Units 1 and 2. These amendments are in response to your application dated December 22, 2003, as supplemented by letters dated June 18, July 15, and September 8, 2004.

The amendments revise the Unit 1 and Unit 2 Technical Specifications (TSs) by adding TS 3.3.1.3, "Oscillation Power Range Monitor (ORPM) Instrumentation," and changing TS 3.4.1, "Recirculation Loops Operating," and TS 5.6.5, "Core Operating Limits Report," to remove specifications and information related to current stability specifications which will no longer be needed with the operation of the OPRM system.

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

Sincerely,

/RA/

Richard V. Guzman, Project Manager, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosures: 1. Amendment No. 217 to  
License No. NPF-14  
2. Amendment No. 192 to  
License No. NPF-22  
3. Safety Evaluation

cc w/encls: See next page

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Docket Nos. 50-387 and 50-388

Enclosures: 1. Amendment No. to  
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License No. NPF-22  
3. Safety Evaluation

DISTRIBUTION:  
PDI-1 R/F GMatakas, RGN-1  
ACRS RGuzman OGC  
PUBLIC M'OBrien GHill (4)  
HLi RLaufer THuang  
TBoyce FAKstulewicz DLPM DPR  
EMarinos

cc w/encls: See next page

\*Provided SE input by memo. No substantive changes made. \*\* See previous concurrence.

Accession No.: ML043140420

Package No.: ML043200193

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OFFICE	PDI-1/PM	PDI-2/LA	EEIB*	SRXB*	OGC**	PDI-1/SC
NAME	RGuzman	MO'Brien	EMarinos	FAkstulewicz	HMcGurren	RLaufer
DATE	11/4/04	11/8/04	07/14/04	10/06/04	11/01/04	11/9/04

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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. 217  
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 22, 2003, as supplemented by letters dated June 18, July 15, and September 8, 2004, 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. 217 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 90 days.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Richard J. Laufer, Chief, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: November 9, 2004

ATTACHMENT TO LICENSE AMENDMENT NO. 217

FACILITY OPERATING LICENSE NO. NPF-14

DOCKET NO. 50-387

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

REMOVE

i  
ii  
iii  
iv  
-  
-  
-  
TS / 3.4-1  
TS / 3.4-2  
TS / 3.4-3  
TS / 3.4-4  
TS / 3.4-5  
TS / 5.0-21  
TS / 5.0-23

INSERT

TS / TOC-1  
TS / TOC-2  
TS / TOC-3  
TS / TOC-4  
TS / 3.3-15a  
TS / 3.3-15b  
TS / 3.3-15c  
TS / 3.4-1  
TS / 3.4-2  
TS / 3.4-3  
TS / 3.4-4  
TS / 3.4-5  
TS / 5.0-21  
TS / 5.0-23

PPL SUSQUEHANNA, LLC

ALLEGHENY ELECTRIC COOPERATIVE, INC.

DOCKET NO. 50-388

SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 192  
License No. NPF-22

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 22, 2003, as supplemented by letters dated June 18, July 15, and September 8, 2004, 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-22 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. 192 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 90 days.

FOR THE NUCLEAR REGULATORY COMMISSION

*/RA/*

Richard J. Laufer, Chief, Section 1  
Project Directorate I  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical  
Specifications

Date of Issuance: November 9, 2004

ATTACHMENT TO LICENSE AMENDMENT NO. 192

FACILITY OPERATING LICENSE NO. NPF-22

DOCKET NO. 50-388

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

REMOVE

i  
ii  
iii  
iv  
-  
-  
-  
TS / 3.4-1  
TS / 3.4-2  
TS / 3.4-3  
TS / 3.4-4  
TS / 3.4-5  
TS / 5.0-21  
TS / 5.0-23  
-

INSERT

TS / TOC-1  
TS / TOC-2  
TS / TOC-3  
TS / TOC-4  
TS / 3.3-15a  
TS / 3.3-15b  
TS / 3.3-15c  
TS / 3.4-1  
TS / 3.4-2  
TS / 3.4-3  
TS / 3.4-4  
TS / 3.4-5  
TS / 5.0-21  
TS / 5.0-23  
TS / 5.0-23a

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 217 TO FACILITY OPERATING LICENSE NO. NPF-14  
AND AMENDMENT NO. 192 TO FACILITY OPERATING LICENSE NO. NPF-22  
PPL SUSQUEHANNA, LLC  
ALLEGHENY ELECTRIC COOPERATIVE, INC.  
SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2  
DOCKET NOS. 50-387 AND 388

## 1.0 INTRODUCTION

By application dated December 22, 2003, as supplemented by letters dated June 18, July 15, and September 8, 2004, PPL Susquehanna, LLC (PPL, the licensee), requested changes to the Technical Specifications (TSs) for Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2).

The proposed changes would revise the SSES 1 and 2 TSs by adding TS 3.3.1.3, "Oscillation Power Range Monitor (OPRM) Instrumentation," and revising TS 3.4.1, "Recirculation Loops Operating," and TS 5.6.5, "Core Operating Limits Report," to remove specifications and information related to current stability specifications which will no longer be needed. The supplements dated June 18, July 15, and September 8, 2004, 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 as published in the *Federal Register* on January 20, 2004 (69 FR 2745).

## 2.0 REGULATORY EVALUATION

The NRC finds that PPL, in its December 22, 2003, submittal, identified the applicable regulatory requirements. The regulatory requirements and guidance which the 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. GDC-12, "Suppression of reactor power oscillations," requires that the reactor core and associated coolant, control, and protection systems shall be designed to assure that

power oscillations which can result in conditions exceeding specified acceptable fuel design limits are not possible or can be reliably and readily detected and suppressed.

3. GDC-13, "Instrumentation and control," states, in part, that instrumentation shall be provided to monitor variables and systems over their anticipated ranges for normal operation, for anticipated operational occurrences, and for accident conditions as appropriate to assure adequate safety.
4. Section 50.36, "Technical specifications," provides the regulatory requirements for the content required in a licensee's TSs. Section 50.36 states, in part, that the TSs will include surveillance requirements to assure that the quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation (LCO) will be met.

### 3.0 TECHNICAL EVALUATION

#### 3.1 Background

The OPRM System is a microprocessor-based monitoring and protection system that is designed to detect power oscillations due to thermal hydraulic instabilities in boiling water reactors (BWRs). It provides compliance with GDC-10, -12, and -13, thereby, providing protection from exceeding the fuel minimum critical power ratio (MCPR) safety limit.

The OPRM system consists of four independent channels, one per reactor protection system (RPS) channel. Each OPRM channel consists of two modules, either of which can generate a channel trip signal. This configuration provides redundancy between OPRM channels as well as within each OPRM channel. Each OPRM module receives signals from dedicated local power range monitors (LPRMs), and provides LPRM signals to the other module in its channel through a fiber optic data link. The OPRM module combines the locally wired LPRM signals with the shared LPRM signals to create LPRM cells that represent the neutron flux distribution in the reactor core. A microprocessor in each module uses these cells of LPRM signals to calculate the trip function values with the oscillation detection algorithm (ODA) as described in NEDO-31960, "BWR Owners' Group Long-Term Solutions Licensing Methodology," dated June 1991, and NEDO-31960, Supplement 1, "BWR Owners' Group Long-Term Solutions Licensing Methodology," dated March 1992. The NRC staff approved Topical Report CENPD-400-P, Revision 1, "Generic Topical Report for the ABB Option II Oscillation Power Range Monitor," on August 16, 1995.

In a letter dated July 30, 1999 (ADAMS accession no. ML010160278), the NRC staff approved changes to the SSES 1 and 2 TSs that incorporated TS 3.3.1.3, "OPRM Instrumentation," and revised TS 3.4.1, "Recirculation Loops Operating," to address thermal hydraulic instabilities in BWRs. TS 3.3.1.3 was originally approved by the NRC for implementation at SSES 1 and 2 by Amendment Nos. 184 and 158, respectively. However, these changes were not implemented and subsequently were deleted for SSES 1 and 2 by Amendments Nos. 215 and 190, respectively, dated October 29, 2003. In addition, extension of the implementation date was needed to provide time to address continuing hardware and software deficiencies with the OPRM system. The extension of the implementation date until November 1, 2001, was approved by the NRC staff on June 2, 2000 (ADAMS accession no. ML003720249). A second extension of the implementation date until November 1, 2003, was approved by the NRC staff

on October 29, 2001 (ADAMS accession no. ML012690318). This deferral was based on a 10 CFR Part 21 report issued by General Electric (GE) Company on June 29, 2001, titled "Stability Reload Licensing Calculations Using Generic DIVOM Curve," which identified a nonconservative deficiency in the OPRM trip setpoint methodology. PPL stated that the OPRM system could not be declared OPERABLE until a revised NRC-approved methodology and a valid basis for the trip setpoints was available and adopted for the SSES 1 and 2 OPRM system.

PPL submitted its proposed TS changes on December 22, 2003, to revise TS 3.4.1, "Recirculation Loops Operating" and TS 5.6.5, "Core Operating Limits Report (COLR)." The intent of this proposed change is identical to Amendment Nos. 184 and 158 with the single exception that the OPRM period based algorithm allowable value and confirmation counts have been relocated from the LCO to the COLR.

In response to GL 94-02, "Long-Term Solutions and Upgrade of Interim Operating Recommendations for Thermal-Hydraulic Instabilities in Boiling Water Reactors," PPL committed that an OPRM system will be installed at SSES 1 and 2 consistent with the Asea Brown Boveri Combustion Engineering (ABB-CE) Option III long-term solution for the thermal hydraulic instability issue. The digital-based OPRM system described in ABB-CE Topical Report CENPD-400-P, "Generic Topical Report for the ABB Option III Oscillation Power Range Monitor," detects and suppresses reactor core power instabilities using the Option III approach described in NEDO-31960 and NEDO-31960, Supplement 1, which were approved by the staff. Using existing LPRMs and reactor core recirculation flow instrumentation, the OPRM system provides independent ODA trip function outputs to the original RPS interface relays.

### 3.2 TS 3.3.1.3 Oscillation Power Range Monitor Instrumentation

The proposed TS Section, 3.3.1.3, delineates the OPRM system LCOs, applicability, action statements, completion times for actions, and system surveillance requirements (SRs). As stated in LCO 3.3.1.3 of the new TS, four channels of the OPRM instrumentation shall be Operable within the limits as specified in the COLR. Applicability of thermal power shall be  $\leq 25\%$  rated thermal power (RTP), actions shall be taken in three conditions with required action and completion time, and six SRs shall be taken with required surveillance and frequency.

The four OPRM channels provide inputs to their associated RPS channels via the eight OPRM modules. Each OPRM channel takes amplified LPRM signals from each APRM and unassigned LPRM group. The OPRM modules are installed in available locations in the associated LPRM pages in the power range neutron monitoring system panels. The LPRM signals are grouped together such that the resulting OPRM response provides adequate coverage of expected oscillation modes. Each OPRM channel (consisting of two modules) contains more than 30 OPRM cells, where an OPRM cell represents a combination of four LPRMs in geometrically adjacent areas of the core.

The staff has reviewed the proposed new TS 3.3.1.3, "OPRM Instrumentation," and finds it acceptable because the OPRM system provides an increase in the reliability of the protection of the margin of safety for the MCPR safety limit for any expected thermal-hydraulic instability transient and operator burden is eased with the elimination of the current operating restriction.

No cycle-specific parameters such as period based algorithm ( $S_p$ ) allowable value and permissive confirmation count are specified in LCO 3.3.1.3 and in a sample COLR report; therefore, this approval is also subject to PPL adding these parameters for LCO 3.3.1.3 in the COLR report with the values of the limits.

PPL stated that the proposed changes are identical to the original TS changes approved by NRC letter dated July 30, 1999, for implementation at SSES 1 and 2, with the single exception that the OPRM period based algorithm allowable value and confirmation counts have been relocated from the LCO statement to the COLR. By letter dated June 18, 2004, in response to the NRC staff's request for additional information (RAI), PPL stated that TS 5.6.5, "COLR", requires the core operating limits to be prepared prior to each reload cycle and documented in a unit-specific COLR for each Susquehanna unit. PPL proposed to include the setpoints for the new OPRM TS 3.3.1.3 in the COLR because these setpoints are developed for each reload cycle, utilizing NRC-approved methods and established such that all applicable limits of the plant safety analysis are met. The OPRM period based algorithm setpoints become integral to the operability basis for the OPRM protective function. The NRC staff finds this acceptable.

In addition, PPL revised SR 3.3.1.3.5, as follows:

Verify OPRM is not bypassed when THERMAL POWER is > 30% RTP and core flow # 65 Mlb/Hr [million-pound-mass per hour].

In its September 8, 2004, submittal, PPL indicated that cycle-specific calculations for both SSES 1 and 2 demonstrated that the OPRM should be enabled at 65 Mlb/Hr for both units to assure that the plant is not operated in regions where instabilities could occur. The value used by PPL is consistent with the approved NRC methodology described in EMF-CC-074(P)(A), Volume 4, "BWR Stability Analysis: Assessment of STAIF with Input from MICROBURN-B2." The proposed change and the remaining SRs associated with TS 3.3.1.3 are consistent with the approved methodology; therefore, the NRC staff finds them acceptable.

### 3.3 TS 3.4.1 Recirculation Loops Operating

PPL proposes a revision to TS 3.4.1 to eliminate all current references to conditions and surveillances involving power/flow map Regions I and II which will no longer be needed with the implementation of the OPRM system.

The staff has reviewed the proposed TS changes and found them acceptable because the OPRM system will provide an RPS trip function to provide automatic detection and suppression of conditions that might result in a thermal hydraulic instability event. The OPRM system provides an increase in the reliability of the protection of the margin of safety for the MCPR safety limit for any expected thermal-hydraulic instability transient. Additionally, operator burden is eased with the elimination of the manual interim corrective actions (ICAs). The NRC staff finds the proposed changes to TS 3.4.1 acceptable.

### 3.4 TS 5.6.5 COLR

PPL proposes to revise TS 5.6.5.a.6 to be consistent with the addition of TS 3.3.1.3. Also, TS 5.6.5.b is revised to add "NEDO-32465-A, BWROG Reactor Core Stability Detect and Suppress Solutions Licensing Basis Methodology and Reload Applications, August 1996," as an NRC-approved analytical method to determine the OPRM setpoints. In addition, in its September 8, 2004, submittal, PPL proposes to retain EMF-CC-074(P)(A), Volume 4, in the TS 5.6.5.b Section list of COLR references as described in Section 3.2 of this safety evaluation (SE).

The NRC staff has reviewed the proposed changes to TS 5.6.5.a and TS 5.6.5.b and finds them acceptable because the revisions reflect the use of the OPRM instrumentation as described in Section 3.2 of this SE.

### 3.5 Summary

Based on the results of the review from Sections 3.2, 3.3, and 3.4 of this SE, the NRC staff concludes that:

1. The addition of TS 3.3.1.3 is acceptable; however, the parameters associated with the OPRM period based algorithm allowable value and confirmation counts shall be listed in TS 3.3.1.3 and their values specified in the COLR.
2. The revision of TSs 3.4.1, 5.6.5.a, and 5.6.5.b is acceptable because the OPRM system is armed and ICAs are no longer in use.
3. An on-site audit is planned by the NRC to review the plant-specific DIVOM (delta critical power ratio [CPR] to initial CPR vs. oscillation magnitude) curve used to generate the OPRM setpoints.

### 4.0 STATE CONSULTATION

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

### 5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change the surveillance requirements. The NRC staff has determined that the amendments involve 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 amendments involve no significant hazards consideration, and there has been no public comment on such finding (69 FR 2745). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

## 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 amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: T. Huang  
H. Li

Date: November 9, 2004