March 3, 2006

Mr. Britt T. McKinney
Sr. Vice President
and Chief Nuclear Officer
PPL Susquehanna, LLC
769 Salem Blvd., NUCSB3
Berwick, PA 18603-0467

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 - ISSUANCE OF AMENDMENT RE: POWER RANGE NEUTRON MONITOR SYSTEM DIGITAL UPGRADE (TAC NOS. MC7486 AND MC7487)

Dear Mr. McKinney:

The Commission has issued the enclosed Amendment No. 230 to Facility Operating License No. NPF-14 and Amendment No. 207 to Facility Operating License No. NPF-22 for the Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2). These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated June 27, 2005, as supplemented by letters dated December 1, 2005, and February 28, 2006.

These amendments change the SSES 1 and 2 TSs for reactor protection system and control rod block instrumentation, oscillation power range monitor instrumentation, recirculation loops operating, shutdown margin test - refueling, and the core operating limits report. The changes involve the modification of the existing power range neutron monitor system (PRNMS) by installation of the General Electric Nuclear Measurement Analysis and Control PRNMS. The modification of the PRNMS replaces analog technology with a digital upgrade.

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
Plant Licensing Branch I-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

Enclosures: 1. Amendment No. 230 to License No. NPF-14
2. Amendment No. 207 to License No. NPF-22
3. Safety Evaluation

cc w/encls: See next page

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These amendments change the SSES 1 and 2 TSs for reactor protection system and control rod block instrumentation, oscillation power range monitor instrumentation, recirculation loops operating, shutdown margin test - refueling, and the core operating limits report. The changes involve the modification of the existing power range neutron monitor system (PRNMS) by installation of the General Electric Nuclear Measurement Analysis and Control PRNMS. The modification of the PRNMS replaces analog technology with a digital upgrade.

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DATE	3/01/06	3/01/06	3/02/06	1/11/06 (SE DTD)	2/28/06	3/03/06

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cc:

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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. 230
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 June 27, 2005, as supplemented on December 1, 2005, and February 28, 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. 230 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 prior to startup following the Unit 1 Cycle 14 refueling outage.

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 3, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 230

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	INSERT
3.3-1	TS / 3.3-1
3.3-2	TS / 3.3-2
3.3-3	TS / 3.3-3
3.3-5	TS / 3.3-5
3.3-6	TS / 3.3-6
3.3-7	TS / 3.3-7
TS / 3.3-8	TS / 3.3-8
3.3-9	TS / 3.3-9
TS / 3.3-15a	-
TS / 3.3-15b	-
TS / 3.3-15c	-
3.3-18	TS / 3.3-18
3.3-20	TS / 3.3-20
TS / 3.4-1	TS / 3.4-1
3.10-20	TS / 3.10-20
3.10-21	TS / 3.10-21
TS / 5.0-21	TS / 5.0-21

PPL SUSQUEHANNA, LLC

ALLEGHENY ELECTRIC COOPERATIVE, INC.

DOCKET NO. 50-388

SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 207
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 June 27, 2005, as supplemented on December 1, 2005, and February 28, 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-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. 207 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 prior to startup following the Unit 2 Cycle 13 refueling outage.

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 3, 2006

ATTACHMENT TO LICENSE AMENDMENT NO. 207

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	INSERT
3.3-1	TS / 3.3-1
3.3-2	TS / 3.3-2
3.3-3	TS / 3.3-3
3.3-5	TS / 3.3-5
3.3-6	TS / 3.3-6
3.3-7	TS / 3.3-7
TS / 3.3-8	TS / 3.3-8
3.3-9	TS / 3.3-9
TS / 3.3-15a	-
TS / 3.3-15b	-
TS / 3.3-15c	-
3.3-18	TS / 3.3-18
3.3-20	TS / 3.3-20
TS / 3.4-1	TS / 3.4-1
3.10-20	TS / 3.10-20
3.10-21	TS / 3.10-21
TS / 5.0-21	TS / 5.0-21

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 230 TO FACILITY OPERATING LICENSE NO. NPF-14

AND AMENDMENT NO. 207 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 50-388

1.0 INTRODUCTION

By application dated June 27, 2005 (Agencywide Documents Access and Management System Accession No. ML051870394) (Reference 1), as supplemented by letters dated December 1, 2005 (ML053470371) (Reference 2), and February 28, 2006 (Reference 3), 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 supplements dated December 1, 2005, and February 28, 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 amendments change the SSES 1 and 2 TSs for reactor protection system (RPS) and control rod block instrumentation, oscillation power range monitor (OPRM) instrumentation, recirculation loops operating, shutdown margin test - refueling, and the core operating limits report. The proposed changes involve the modification of the existing power range neutron monitor (PRNM) system (PRNMS) by installation of the General Electric (GE) Nuclear Measurement Analysis and Control (NUMAC) PRNMS. The modification of the PRNMS would replace analog technology with a digital upgrade.

2.0 REGULATORY EVALUATION

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 during condition of normal operation, including the effects of anticipated operational occurrences.

2. GDC-4, “Environmental and Dynamic Effects Design Bases,” requires, in part, that structures systems, and components important to safety shall be designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents.

3. 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.

4. 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.

5. 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 will be met.

3.0 TECHNICAL EVALUATION

3.1 Background

The NUMAC PRNMS incorporates the functions of the current SSES 1 and 2 PRNM's Average Power Range Monitor (APRM) system, Rod Block Monitor (RBM) system, Local Power Range Monitor (LPRM) and the current OPRM system. The APRM system averages LPRM signals, processes flow signals from the reactor core recirculation flow instrumentation, and then compares the results to RPS trip setpoints. The OPRM detects and suppresses reactor core power instabilities.

The proposed TS changes would enable PPL to install a design modification to the PRNMS. This modification would upgrade the current analog PRNMS, excluding the associated detectors and cables, with the GE NUMAC PRNMS. The digital upgrade would also include an OPRM function to detect and suppress reactor power instabilities and provide an automatic trip function. The OPRM function is called the Option III stability trip function in the NRC staff-approved Licensing Topical Report (LTR) NEDO-31960-A, Supplement 1, “BWR Owner’s Group Long-Term Stability Solution Licensing Methodology (Supplement 1)," dated November 1995 (Reference 4).

In its submittal (Reference 1), PPL states that the PRNMS modification is in support of its planned extended power uprate. The digital PRNMS modification would replace analog technology with a digital upgrade and would simplify management and maintenance of the

system. Future plant modifications will be addressed by PPL, as applicable, in separate licensing submittals.

Under certain conditions, boiling-water reactors (BWRs) may be susceptible to coupled neutronic/thermal-hydraulic instabilities. These instabilities are characterized by periodic power and flow oscillations. If these power and flow oscillations become large enough, the fuel cladding integrity minimum critical power ratio safety limit requirements may be challenged.

To detect core instabilities automatically and provide a reactor scram signal to the RPS, PPL selected Boiling Water Reactor Owners Group (BWROG) Stability Option III as the long-term stability system solution (LTSSS) for SSES 1 and 2. The OPRM Option III Stability Trip Function is digitally incorporated into the PRNM equipment. The OPRM function continues to satisfy the same NRC-approved requirements as the currently installed OPRM equipment.

The LTSSS Option III approach consists of detecting and suppressing stability-related power oscillations by automatically inserting control rods (scramming) to terminate power oscillations, thereby complying with the requirements of GDC-10 and GDC-12.

PPL is replacing the existing power range portion of the neutron monitoring system with a GE NUMAC PRNMS, including the Option III OPRM function. The planned modification involves replacing the existing six APRM channels of power range monitor electronics with four channels of NUMAC PRNMS hardware. All power range monitoring functions will be maintained in the new system, including the LPRM detector signal processing, LPRM averaging, APRM reactor trips, and RBM logic and interlocks.

PPL's proposed TS amendments applicable to the APRM portion of the SSES 1 and 2 TSs are to be implemented following the installation of the NUMAC PRNMS. The OPRM trip function will be operated immediately following the installation of the NUMAC PRNMS. This is a departure from the NUMAC PRNM LTR recommended guidelines and precedent plant installations. The NRC staff has considered this as discussed in Section 3.4 below.

The NRC staff approved the use of the NUMAC PRNMS with the OPRM functions in BWR design plants subject to the NRC staff conditions described in its safety evaluation (SE), dated August 15, 1997 (Reference 10), approving the NUMAC PRNM LTR. The NUMAC PRNMS with the Option III LTSSS function, when installed and operated in accordance with the approved guidance provided in the above referenced licensing topical reports, addresses the requirements of GDC-10 and GDC-12.

GE LTR NEDC-32410P-A, Volumes 1 & 2 and NEDC-32410P-A, Supplement 1 (References 5 and 6, respectively) describe in detail, the generic NUMAC PRNM design including the OPRM functions (LTSSS Option III) and several plant-specific variations and plant-specific actions.

The currently installed SSES 1 and 2 OPRM system implements the LTSSS Option III as described in Reference 4. The currently installed OPRM system has some separate hardware, but functions logically with the APRM system and receives inputs from the PRNM system. With the replacement NUMAC PRNMS, the existing OPRM hardware is removed and the function is digitally integrated within the PRNM equipment. The NUMAC PRNM LTRs, NEDC-32410P-A and NEDC-32410P-A, Supplement 1, discuss implementation of the OPRM functions within the PRNM equipment.

Precedent licensing submittals have been approved by NRC for Nine Mile Point Unit 2, Browns Ferry Units 2 and 3, Hatch Units 1 and 2, Fermi Unit 2, Limerick Units 1 and 2, Peach Bottom Units 2 and 3, and Brunswick Units 1 and 2.

3.2 NRC Staff Evaluation

By letter dated September 5, 1995 (Reference 9), the NRC staff approved GE LTR NEDC-32410P-A, "Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC-PRNM) Retrofit Plus Option III Stability Trip Function." This LTR addressed the full scope of the modification to replace the power range monitoring portion of an analog neutron monitoring system in GE BWRs with a GE NUMAC PRNMS including an OPRM. In this LTR, the NRC staff approved proposed TS changes for APRM reactor trip and rod-block protective functions. By letter dated August 15, 1997 (Reference 10), the NRC staff approved Supplement 1 to NEDC-32410P-A (herein both referred to as NUMAC PRNM LTR), which includes TS requirements for an OPRM and clarifies issues related to the APRM.

PPL's letter (Reference 2) supplemented the initial application by responding to the NRC staff's request for additional information (RAI) letter dated November 7, 2005 (Reference 7). In its letter, PPL (1) provides corrected plant configuration as described by the NUMAC PRNM LTR section (section 2.3.3.5.1.3 vs. 2.3.3.5.1.4), (2) provides the qualification summary of the overall system, and (3) changes the name of the "OPRM Trip" function to "OPRM Upscale" in the TSs and Bases to maintain conformity with the NUMAC PRNM LTR and the industry standard terminology.

In PPL's supplemental letter (Reference 3), PPL provided a response to the NRC staff's RAI letter dated February 9, 2006 (Reference 8). In its letter, PPL provided information on two requests: (1) changes to the hardware, software, or processes used to fabricate the system since the NUMAC configuration originally reviewed by the NRC and the production of the SSES 1 and 2 specific equipment and the justifications that these changes do not affect the SSES 1 and 2 system capability to meet the original protection system design requirements and (2) the type of information that is exchanged, the operator involvement, and the various isolation concerns with regard to the data transmission path between the PRNMS and the plant computer.

PPL's proposed TS changes for the SSES 1 and 2 PRNMS installation is planned in two phases. Phase 1 (the subject amendment request) includes a full PRNMS installation that retains the current "non-APRM/RBM/TSs" (or "non-ARTS") version of the RBM. Phase 2 will include minor modifications to the PRNM equipment to incorporate the "ARTS" logic in the RBM and implement associated setpoint modifications for RBM and APRM equipment.

PPL indicated in its June 27, 2006, submittal, that for SSES 1, Phase 1 is planned for incorporation during the spring 2006 outage with Phase 2 to follow at a separate time; while for SSES 2, Phase 1 and Phase 2 are planned to be incorporated during the spring 2007 outage. The Phase 1 documentation does not include licensing documentation required for ARTS implementation. The TS amendment request in PPL's referenced letters, is specifically to support the licensing review of the Phase 1 PRNM modification with current "non-ARTS." A separate "ARTS" TS amendment request, with associated TS mark-ups, is being prepared for Phase 2 which the NRC staff will review separately.

3.3 NRC Staff Evaluation of PPL's supplemental response

As part of its RAI response, PPL was to provide the changes to the hardware, software, or processes used to fabricate the system since the NUMAC configuration was originally reviewed by the NRC, and the justifications that these changes do not affect the SSES 1 and 2 system capability to meet the original protection system design requirements. PPL's response to these areas are discussed below.

3.3.1 Software

A list was provided of changes made to the safety-related APRM/OPRM firmware since the original design. The list contained file (or module) names, dates, and a brief description of the change. The NRC staff found the list to be acceptable as each change was adequately described and dated for each software file. PPL stipulated that all software changes, to the project database as well as source files, are in accordance with the Software Management Plan, identified in the software design process below, and have undergone validation and verification (V&V) actions fully consistent with those applied to the original design. The NRC staff finds these software changes acceptable since they are developed and confirmed with V&V testing, to the same process reviewed and approved by the NRC.

3.3.2 Hardware

PPL provided in Appendix C of their supplemental letter (Reference 3), "NUMAC Hardware Module Change Summary," which included a list of major subcomponents, including their respective part number and revision number (e.g., central processing unit board, memory board, power supply, display unit, etc.) to the NRC staff. The process for determining and accepting how a subcomponent change is analyzed to be acceptable in terms of form, fit and function is documented in the GE design control program (EOP 55-2.00 and EOP 55-10). A significant change would be one which a "form, fit and function" modification is made that would require a change to the schematic drawings of the circuitry, or any physical change which could affect the seismic or environmental qualification of the system. Based on this criterion and the list of changes made to the major subcomponents, PPL determined that only one change made to the hardware would be considered a significant change. That one change was to the Communication Memory Module which consisted of replacing the originally used Optical Electrical Interface Board (228B2720G004) with Optical Electrical Interface Board (148C7608G001G001). The Optical Electrical Interface Board is a daughter-board installed on the Random-Access Memory Communication mother-board (228B2714G003) that was used in the original design. The new Optical Electrical Interface Board eliminated an unused RS-232 electrical output, added three fiber-optic outputs, and changed the fiber-optic connectors to an industry standard type. With the exception of the circuit schematic diagram, there were no significant changes that required a change to the system firmware or any physical change that affected the seismic or environmental qualification of the system. The NRC staff finds the identification and justification of this change acceptable, that being the change to the Communication Memory Module, and the NUMAC Major Subcomponent Table to be complete, in terms of adequate part numbers, changes, and descriptions.

3.3.3 Software Design Process

The NRC staff reviewed PPL's response with focus on the "Information to be Reviewed," Section 2 of Branch Technical Position (BTP), Instrumentation and Controls Branch (HICB)-14, "Guidance on Software Reviews for Digital Computer-Based Instrumentation and Control Systems." PPL provided a correlation of NUMAC items to the various process planning, implementation, and design outputs listed in Section 2 of BTP HICB-14. The overall design process and configuration control is documented in four GE corporate plans: overall GE Quality Assurance Program, NUMAC Software Configuration Management Plan, NUMAC Software Management Plan, and the NUMAC Software V&V Plan. Procedure and revision numbers were provided for each of these documents; and the description of changes were provided for the only GE plan that was revised (the Software Management Plan) since the time of the original NRC review. In Appendix B of their supplemental letter (Reference 3), PPL provided a NUMAC APRM Firmware Development Process Synopsis explaining the design inputs and firmware control, history, testing and future applications. The NRC staff finds the software design process acceptable, in terms of the description provided, as follows:

1. Although the NRC issued BTP-14 after the original PRNM design and the NRC review of the NUMAC PRNM LTR, the NRC staff finds that PPL provided a sufficient correlation between topics of BTP-14 and the project software design documents.

2. In the firmware development process synopsis, the NRC staff finds that PPL provided an acceptable representation of how the new and revised firmware is (a) developed, based on design inputs and database files, (b) controlled, and (c) tested using a consistent V&V process.

3.4 NRC Staff Evaluation of the NUMAC PRNMS installation

As stated in the NRC staff's SE of NEDC-32410P-A, to receive NRC approval of a NUMAC PRNMS installation, PPL must confirm the following:

1. The applicability of NEDC-32410P-A, including clarifications and reconciled differences between the specific plant design and the topical report design descriptions;

2. The applicability of the BWR Owners' Group TRs that address the NUMAC PRNMS and associated instability functions, set points and margins;

3. Plant-specific revised TSs for the NUMAC-PRNMS functions are consistent with NEDC-32410P-A, Appendix H, and Supplement 1;

4. Plant-specific environmental conditions are enveloped by the NUMAC-PRNMS equipment environmental qualification values;

5. Administrative controls are provided for manually bypassing APRM/OPRM channels or protective functions, and for controlling access to the APRM/OPRM panel and channel bypass switch;

6. Any changes to the plant operator's panel have received human factors reviews per plant-specific procedures;

PPL's actions with regard to the above conditions are discussed in the following sections.

3.4.1 The applicability of NEDC-32410P-A, including clarifications and reconciled differences between the specific plant design and the topical report design descriptions

The NRC staff compared the applicable SSES 1 and 2 design features with the corresponding design features in the NUMAC PRNM LTR. SSES 1 and 2 are both the GE BWR/4 design which is addressed in the LTR. The current six-APRM channel configuration is replaced with four APRM channels, each using ¼ of the total LPRM detectors. The outputs from all four APRM channels are sent to each of the four 2-out-of-4 voter channels, so that each of the inputs to the RPS is a voted result of all four APRM channels. Two of the four voter channels are assigned to RPS trip system A and the other two to RPS trip system B. The APRM scram trip function will be retained, and includes the addition of four 2-out-of-4 voter channels which are added between the APRM channels and the input to the RPS.

Recirculation flow signal processing, previously accomplished using separate hardware within the existing PRNM control panels, is integrated into the APRM chassis in the new PRNMS. The existing four-channel recirculation flow processing system (four flow transmitters on each recirculation loop) is retained. The transmitters are being replaced but solely for the purpose of establishing signal interface compatibility (10-50 milli-amps (mA) output transmitters to 4-20 mA output transmitters) with the standard NUMAC PRNM equipment. In the current system, two flow channels provide inputs to the three APRM channels in one RPS trip system while the other two flow channels provide inputs to the other three APRM channels in the second RPS trip system. In the replacement PRNMS, each flow channel provides inputs to one of the four APRM channels. Therefore, each APRM channel also provides the signal processing for one flow channel in the replacement PRNM. The APRM hardware also performs the recirculation upscale flow alarm function.

The basic RBM logic will remain the same as in the current system, except that the LPRM signals and recirculation flow signals will be provided digitally from the APRM channels. However, the NUMAC RBM chassis provides some additional surveillance capability that allows testing of functions in all plant conditions. The same hardware, contained within the RBM chasses, which performs the RBM logic, will also perform the recirculation flow comparison alarm function in the replacement system. In the replacement system, this function compares the recirculation flow values from each of the four flow channels.

The OPRM Option III Stability Trip Function is incorporated into the PRNM equipment. The computations for this trip are done by a separate Automatic Signal Processor Module in each PRNM chassis. The OPRM function continues to satisfy the same NRC-approved requirements as the currently installed OPRM equipment. The changes to the current OPRM logic are the reassigning of current LPRM inputs to the new OPRM cells. The current OPRM cell assignments are selected for compatibility with the current PRNM's six-APRM, two-LPRM channel configuration. The replacement system's OPRM cell assignments are selected for compatibility with the four-APRM configuration of the NUMAC PRNM. Both configurations are included in the NRC-reviewed and approved BWROG LTRs, applicable to the OPRM Stability Option III. The current OPRM trip logic is the "1-out-of-2 taken twice" which is being revised to input to the 2-out-of-4 voter logic. This logic is in accordance with and discussed in the reviewed and approved PRNM system NUMAC PRNM LTR.

The new PRNMS will modify the means by which the system's data is transmitted to the plant process computer; however, all existing information (i.e., LPRM, APRM, trip status, etc.) will be transmitted. The current APRM system sends digitized data to Plant Integrated Computer System (PICSY) via the present OPRM module. Some analog data goes through a hardwire connection. The new system will transmit PRNM data digitally through a serial fiber-optic link to the new Multi-Vendor Data (MVD) (acquisition system) interface unit. Essentially, the data transmission path has changed from going through hardwire and the OPRM module, to all process data going through the MVD module. The MVD will, in turn, transfer the information on an Ethernet bus to the plant process computer. Similarly, plant computer-calculated LPRM gain values and calculated core thermal power (to be used by APRM to adjust the APRM gains) are transmitted via the ethernet bus to the MVD, and on to the PRNMS. The sequence of events data points from the PRNM system will be provided as needed from the MVD.

The NRC staff reviewed this non-safety-system-to-safety-system communication path to verify the criteria of the Institute of Electrical and Electronics Engineers (IEEE) Standard 279-1971, Section 4.7, “Control and Protection System Interaction,” were met. These IEEE criteria include “No credible failure at the output of an isolation device shall prevent the associated protection system channel from meeting the minimum performance requirements specified in the design basis.” By SE dated September 5, 1995, the NRC approved these optic devices used in the PRNM design as acceptable isolation devices between the control and protection systems.

In Reference 3, PPL provided that the process to generate the LPRM gain and calculated core thermal power values is changed from fully manual to semi-automatic. These “pending” values will be displayed and reviewed by a plant technician, but not downloaded until accepted. If acceptable, the values are downloaded by specific technician action for use by the PRNM. The NRC staff finds this process acceptable since it is unchanged, meets the IEEE Standard 279-1971 criteria, and still requires a manual action to both initiate the process then accept and implement the results.

For the hardware description of the process, the RBM chassis receives the information from the plant computer and transmits this data via the Fiber Direct Data Interface (FDDI) modules to the APRMs. The FDDI modules operate in pairs, one at each end of the fiber-optic link, where each unit can transmit to or receive data from the other unit. Data received is stored in “reflected memory” such that the receiving unit has a copy of the transmitting unit’s data. The applicable 386SX computer may or may not access the received data and update the data to be transmitted when needed. In this configuration, the fiber-optic link provides the hardware isolation, and the FDDI module provides the data insolation. The transmission and reception of the data occurs without need for control from the 386SX computer. Error checking protocols are built into the hardware to provide assurance of error-free data. Multiple banks of memory are used and switched by the FDDI Module based on its reception status so that only complete sets of data are made available to the 386SX computer. Similarly, only complete sets of data are transmitted. The NRC staff finds this process acceptable as the data is checked manually, and error checking protocols are used before the values are downloaded to the PRNM system. These proposed design modifications conform to the NUMAC PRNMS design description in the NUMAC PRNM LTR, and are compatible with the existing plant neutron monitoring system and RPS. Therefore, the NRC staff finds that the NUMAC PRNMS design is applicable to SSES 1 and 2.

3.4.2 The applicability of the BWROG topical reports that address the NUMAC-PRNMS and associated instability functions, setpoints and margins

SSES 1 and 2 currently have installed an OPRM system covered by TS 3.3.1.3 that incorporates Stability Option III, the same OPRM function that is described in the NUMAC PRNM LTRs and BWROG LTRs. The NUMAC PRNM modification incorporates the OPRM Option III function into the PRNM equipment as described in the NUMAC PRNM LTRs. Therefore, TS 3.3.1.3 is being deleted, and an OPRM Upscale Function has been added to the SSES 1 and 2 TSs 3.3.1.1 as an “APRM Function” (Function 2.f), consistent with NUMAC PRNM LTR Supplement 1, Appendix H. A footnote for Function 2.f (not shown in the NUMAC PRNM LTR) has been added to document that the period based detection algorithm setpoint limits are defined in the Core Operating Limits Report (COLR). Additions to the TS Bases for Function 2.f have also been incorporated to be consistent with the NUMAC PRNM LTR but with some revision to more clearly present the information, and with additions to completely address OPRM related setpoints and adjustable parameters.

The NUMAC PRNM LTR, Section 8.4, "OPRM Related RPS Trip Functions," describes a transition period between installation of an initial OPRM system to when the system is "armed" and operational. This transition period is intended to allow an initial period of operation with the first use of the OPRM function in order to validate its design basis and confirm initial design assumptions. PPL contends that the initial startup period for the current OPRM system demonstrated the algorithm to be robust and not sensitive to system settings within the range of values described in GE LTR NEDO-32465, “Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications” (Reference 11). Based on the data received during the transition period for the currently "armed" and operating digital OPRM system, and review of the design and operating experience of the GE NUMAC OPRM system, PPL proposed that the replacement OPRM be installed and activated without an additional transition period for evaluation.

The NRC staff evaluated three factors presented by PPL which include (1) the OPRM Option III instability trip system currently operating at SSES 1 and 2, (2) the extensive pre-operational observation and tuning period to make that system operational, and (3) the operating experience and lack of extensive changes to their operating core characteristics. The NRC staff also considered the human factor issues addressed during the design process which was the inclusion of the OPRM TS Requirements Manual and the Operating Events Reports from precedent plant installation OPRM events in the April 2005 Operator cycle specific training. Based on its evaluation of this information, the NRC staff finds the proposed waiver of the evaluation period to be acceptable.

3.4.3 Provide plant-specific revised TS for the PRNMS functions consistent with NEDC-32410P-A, Appendix H, and Supplement 1

PPL has stipulated TS changes conforming to Section 8.0 of the NUMAC PRNM LTR and the NRC staff finds those changes acceptable. The following are the exceptions, changes, and additional information to Section 8.0.

3.4.3.1 TS 3.3.1.1 Functions and Minimum Number of Operable APRM Channels

In Sections 8.3.1.4 and 8.3.2.4 of the NUMAC PRNM LTR, GE recommends deleting the APRM Downscale function and deleting the note that removes the shorting links, respectively. Neither the function nor the shorting links are used by SSES 1 and 2; therefore, this exception is acceptable to the NRC staff.

3.4.3.2 TS 3.3.1.1.12 Channel Functional Test

In Section 8.3.4.2.4 of the NUMAC PRNM LTR, GE recommends adding a notation to the Bases for the APRM Simulated Thermal Power (STP) - High function that the test shall include the recirculation flow input processing and exclude the flow transmitters. For SSES 1 and 2, PPL added this notation to the Channel Functional Test SR 3.3.1.1.12 and has expanded it from the NUMAC PRNM LTR to also apply to the OPRM Upscale function (to cover OPRM Upscale enable). Since the revised notes were incorporated into SR 3.3.1.1.12, and with additional testing increasing system performance, the NRC staff finds this exception acceptable.

3.4.3.3 TS 3.3.1.1.18 Channel Calibration

Section 8.3.4.3.4 of the NUMAC PRNM LTR, GE recommends adding notation to the Bases for the Channel Calibration for the APRM STP - High and OPRM Upscale functions to include requirements for calibration of the recirculation flow transmitters and flow processing function. For SSES 1 and 2, this notation has also been included in the Channel Calibration (SR 3.3.1.1.18) and has been expanded from the NUMAC PRNM LTR to include the OPRM Upscale function. Since the additional testing will enhance the system performance, the NRC staff finds this exception acceptable.

3.4.3.4 TS SR 3.3.1.1.20 Reactor Core Flow/Recirculation Drive Flow Alignment

PPL added a new SR 3.3.1.1.20 that addresses reactor core flow/recirculation drive flow alignment. The NUMAC PRNM LTR assumes that drive flow/core flow alignment is accomplished as a "flow channel" calibration while performing the APRM STP and OPRM channel calibrations. However, drive flow/core flow alignment needs to be physically performed when the unit is in power operations and the system has reached normal reactor core flow and recirculation flow conditions. This requirement cannot be accomplished during a refueling outage, which is the time when the APRM channel calibration would normally be performed. Separating this flow SR from the APRM channel calibration recognizes that the performance of this part of the channel calibration may be performed at a different time than the calibration of the APRM flow processing functions, and eliminates the potential need to maintain administrative control of a "partially completed" surveillance. The NRC staff finds this acceptable since the addition of the separate SR does not constitute a new SR, but rather separates out a part of a currently defined calibration surveillance.

3.4.3.5 TS SR 3.3.1.1.17 Response Time Testing

The response time testing proposed in the SSES 1 and 2 TSs will test both of the redundant OPRM and both of the redundant APRM trip outputs from each voter during one application of

the SR. This testing rate (compared to the justification in the NUMAC PRNM LTR) has been selected to simplify the recordkeeping for the SR. In addition, a description of the RPS response time testing requirement for the voter Function 2.e has been added to the SR 3.3.1.1.17 Bases, including a table showing an acceptable testing sequence. The specific tests will be defined in SSES 1 and 2 procedures. Since this testing is consistent with the sequencing described in NUMAC PRNM LTR Supplement 1, but at twice the rate for all components, the NRC staff finds the proposed response time testing acceptable.

3.4.3.6 TS 3.3.1.1.19 OPRM - related RPS Trip Functions - Channel Functional Test

PPL identified that the SR 3.3.1.3.5 requirement is being transferred to the new Section 3.3.1.1, under SR 3.3.1.1.19, and is consistent with section 8.4.4.2.4 of the NUMAC PRNM LTR. The NRC staff notes that there is a difference in the comparison of the recirculation drive flow value. The NUMAC PRNM LTRs stipulate this flow must be “< 60% of rated recirculation drive flow.” PPL requests “$\leq$ value equivalent to the core flow value defined in the COLR.”

The following reasons for this are presented below:

- The term, "value equivalent to the core flow value defined in the COLR," shows that this value, 65 million-pound-mass per hour (Mlb/Hr), is presently maintained in the COLR. In addition, the value 65 Mlb/HR is the value presently found in SR 3.3.1.3.5 which is being replaced with SR 3.3.1.1.19.

- The drive flow value represented in the NUMAC PRNM LTR is not sufficient for the design of the SSES 1 and 2 core. In the new SR 3.3.1.1.19 bases, a method, for the purpose of this surveillance, and consistent with the value defined in the COLR, is provided for conversion from core flow values used in this SR.

- The representation of "$\leq$" versus "<" as found in the NUMAC PRNM LTR is conservative, and is being maintained to reflect the present TS SR 3.3.1.3.5 requirement.

Based on review of information from PPL, the NRC staff finds that the identified changes are acceptable.

3.4.3.7 TS SR 3.3.1.1.18 OPRM - Related RPS Trip Functions - Channel Calibration

PPL has provided an additional note for SR 3.3.1.1.18 (corresponds to SR 3.3.1.1.13 in the NUMAC PRNM LTR). The additional note corresponds to functions 2.b and 2.f to state that SR 3.3.1.1.18 includes calibrating the associated recirculation loop flow channel. This additional information does not change the intent of the NUMAC PRNM LTR. Also, the SR 3.3.1.1.18 Bases discussion has been modified from that shown in the NUMAC PRNM LTRs (SR 3.3.1.1.13 in the NUMAC PRNM LTR) to include discussion of the OPRM Trip auto-enable function and to address the alignment of reactor core flow with recirculation drive flow (including a reference to the added drive flow alignment SR 3.3.1.1.20, which is not included in the NUMAC PRNM LTR).

The NRC staff has determined these changes do not change the intent of the NUMAC PRNM LTRs or affect the associated NUMAC PRNM LTR justifications and are therefore acceptable.

3.4.3.8 TS 3.3.1.1, TS 3.3.2.1, Table 3.3.1.1-1, and Table 3.3.2.1-1

PPL has reorganized the equation that determines the allowable value for the (flow biased) STP - High and RBM Low Power Range Upscale functions. The formula has been reorganized to allow the values of ΔW, the correction factor for the estimate of the back flow contribution in the non-operable recirculation loop in one vs. two loop operation, to become more apparent. Therefore, the equation in note (b) of Table 3.3.1.1-1 (and Table 3.3.2.1-1) has been simplified to show this value without changing the entry in the "Allowable Value" column of Table 3.3.1.1.1-1 (and Table 3.3.2.1-1). The new NUMAC PRNMS has the capability to physically enter this correction value as part of the system operation so that it no longer needs to be manually maintained as is done for the current system. Therefore, since this change merely changes the format of the note and not the Allowable Value, nor exceed the scope of the NUMAC PRNM LTR, the NRC staff finds this change acceptable.

3.4.3.9 TS 3.4.1, TS 3.10.8, and TS 5.6

PPL proposed changes to (1) the limiting condition for operation statements in TS 3.4.1, "Recirculation Loops Operating," and TS 3.10.8, "Shutdown Margin Test - Refueling," and (2) Section 5.6.5, "Core Operating Limits Reports," of TS 5.6, "Reporting Requirements," to reflect the result of the PRNMS upgrade that were not specifically discussed in the NUMAC PRNM LTR. The NRC staff concludes these changes are acceptable since they are all administrative and required by the plant specific application.

The NRC staff's conclusion is that the proposed TS changes are consistent with the referenced NRC-approved GE NUMAC PRNM LTR. No exceptions have been taken to the safety bases of the referenced GE NUMAC PRNM LTR.

3.4.4 Plant-specific environmental conditions are enveloped by the NUMAC PRNMS equipment environmental qualification values

In Table 1, the SSES 1 and 2 plant-specific environmental conditions for temperature, humidity, pressure, and radiation are compared to the NUMAC PRNMS environmental qualification values.

Table 1
Comparison of SSES 1 and 2 Environmental Conditions with
NUMAC PRNM Environment Qualification Values

	SSES 1 and 2	NUMAC PRNMS
Temperature Degrees C (Degrees F)	16E C to 27E C (60E F to 80E F)	5E C to 50E C (41E F to 122E F)
Humidity RH (Relative Humidity)	10% to 60% RH	10% to 90% RH
Pressure (pounds/square inch absolute)	14.7 psia to 14.705 psia	13 psia to 16 psia
Radiation TID (Total Integrated Dose)	$\leq$ 1 E-3 Rads/hr dose rate $\leq$ 1 E+3 TID	1 E-3 Rads/hr dose rate 1 E+3 Rads TID

As shown in Table 1, the SSES 1 and 2 environmental conditions are enveloped by the NUMAC PRNMS qualification values, and, therefore, are acceptable.

PPL provided the “Qualification Summary” in support of their evaluations that confirm that the seismic response spectra for SSES 1 and 2 is within the NUMAC PRNMS seismic qualification envelope. The NRC staff finds the seismic qualification of the PRNM system acceptable for SSES 1 and 2.

The NUMAC PRNM LTR states that new equipment and plant modifications or surrounding equipment should not produce unacceptable levels of Electromagnetic (EM) Interference (EMI) emissions that could adversely affect NUMAC equipment, or the licensee is to take action to prevent these emissions from reaching potentially sensitive equipment. These measures apply for both noise susceptibility and emissions. SSES 1 and 2 procedures specifically require evaluation of EMI/radio frequency interference susceptibility and the impact of the proposed modification on the plant. Evaluation of equipment qualification levels to confirm compliance with the EMI requirements are documented in the Qualification Summary. EM environment surveys have been completed at SSES 1 and 2 within the lower relay rooms to support installation of the current OPRM. At that time, the environment at the point of installation was found to be within the Electric Power Research Institute TR-102323-R1 recommended levels. The NRC staff finds this approach acceptable for ensuring the EMI environment conforms to the requirements of GDC-4.

PPL has also submitted methods of controlling emissions including (1) prohibiting use of portable transceivers near sensitive equipment, (2) allowing arc welding activities to only be performed when any potential effect on instrumentation and controls equipment is tolerable relative to safe operation of the equipment, and (3) evaluating EMI emissions from new equipment installed at SSES 1 and 2 as part of the normal design modification process per SSES 1 and 2 procedures. The NRC staff finds PPL’s evaluation of the EMI environment and the measures taken to reduce adverse EMI effects, noted above, to be an acceptable approach for ensuring the NUMAC PRNMS EMI environment conforms to the requirements of GDC-4 for protection against adverse environmental effects.

3.4.5 Administrative controls are provided for manually bypassing APRM/OPRM channels or protective functions, and for controlling access to the APRM/OPRM panel and channel bypass switch

In the SE of NUMAC PRNM LTR, the NRC staff found acceptable, the NUMAC PRNMS design features that control access to setpoint adjustments, calibrations, and test points. This included multiple levels of access security, including keylock access and software password protection. PPL is also controlling physical access to the PRNMS cabinet and channel bypass switch via plant security keycard access to the plant control room (APRM bypass switch) and lower relay room (PRNMS cabinet). Administrative controls are also in place such as those implemented by the SSES 1 and 2 Work Control Center during procedural surveillance testing and maintenance access with the current PRNM system and OPRM hardware. Therefore, the NRC staff finds that PPL has acceptable controls for controlling access to the PRNMS panel and the APRM/OPRM channel bypass switch.

3.4.6 Any changes to the plant operator's panel have received human factors reviews per plant-specific procedures

PPL stated that human factors engineering is part of the technical procurement specification and will be addressed during the design modification process. Current PICSY based OPRM displays will be retained. In addition, OPRM Stability Option III, operator cycle specific training has been performed to review the OPRM system and perform two different demonstrations of OPRM responses in the control room simulator. It is also planned, starting in the April 2005 operator cycle-specific training, to review the OPRM TSs Technical Requirements Manual and Operating Events report outlining the Nine Mile Point Unit 2 and Perry Unit 1 OPRM events. The NRC staff finds this approach for addressing human factors acceptable.

3.5 Additional PRNMS functions

All power range neutron monitoring functions will be retained, including LPRM detector signal processing, LPRM averaging, and APRM trips. In some cases, the existing functions will be improved with additional filtering or modified processing. These include LPRM filtering and, for some functions, APRM filtering. The LPRM signal input filtering is improved using advanced digital processing methods. The digital filtering provides improved noise rejection for AC power related noise and some non-nuclear type transients without affecting the system response to real neutron flux signals.

For the APRM, a filtered APRM flux signal, STP, is generated using a 6-second (nominal value) first order filter. The APRM flow-biased scram trip (and the associated clamp) will continue to operate from STP to provide the same response characteristics as the current system. In the NUMAC PRNM, STP is also used for APRM calibration against core thermal power to provide a better indication of actual average flux and for the APRM upscale rod block trips. APRM unfiltered flux signal supplies reference signal input to the RBM, the same as the current system. If the APRM is indicating less than the low power range setpoint, the RBM is automatically bypassed. The APRM upscale scram trip will continue to operate from unfiltered APRM flux to meet the trip response time assumptions in the safety analyses. Both the filtered APRM flux (STP) and unfiltered APRM flux are displayed for the operator. The filtered APRM flux provides the best indication of true average power while the unfiltered flux provides a real-time indication of APRM flux changes.

The OPRM Option III Stability Trip Function is digitally incorporated into the PRNM equipment. The OPRM function continues to satisfy the same NRC-approved requirements as the currently installed OPRM equipment. The new PRNMS will modify the means by which the system's data is transmitted to the plant process computer; however, all existing information (i.e., LPRM, APRM, trip status, etc.) will be maintained.

3.6 Conclusion

On the basis of the above review and justifications for TS changes, the NRC staff concludes that for Phase 1, PPL's proposed TS changes for SSES 1 and 2 are consistent with the NRC staff-approved guidance in the NUMAC PRNM LTR, and no exceptions have been taken to the safety bases of the NUMAC PRNM LTR. The NUMAC PRNM system, including replacement of

the existing OPRM Stability Option III functions, provides an acceptable level of system redundancy. The new NUMAC PRNM system is designed and will be installed so as not to degrade the existing LRPM, APRM, OPRM, or RPS system, and the system retains all of the safety functions of the existing system. The NRC staff, therefore, concludes that the proposed license amendment is acceptable. The NRC staff further concludes that PPL has properly addressed the plant-specific conditions described in the NRC staff's SE for the NUMAC PRNM LTR , and, therefore, finds the NUMAC PRNMS modification and associated TS changes to be acceptable.

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 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 (70 FR 54088). 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.

7.0 REFERENCES

1. Letter from B.T. McKinney to U.S. NRC, "Susquehanna Steam Electric Station Proposed License Amendment Nos. 272 for Unit 1 Operating License No. NPF-14 and 241 for Unit 2 Operating License No. NPF-22 Power Range Neutron Monitor System Digital Upgrade PLA-5880," June 27, 2005.

2. Letter from B.T. McKinney to U.S. NRC, "Susquehanna Steam Electric Station Proposed License Amendment Nos. 272 for Unit 1 Operating License No. NPF-14 and 241 for Unit 2 Operating License No. NPF-22 Power Range Neutron Monitor System Digital Upgrade Supplemental Information PLA-5983," December 1, 2005.

3. Letter from B.T. McKinney to U.S. NRC, “Susquehanna Steam Electric Station Proposed License Amendment Nos. 272 for Unit 1 Operating License No. NPF-14 and 241 for Unit 2 Operating License No. NPF-22 Power Range Neutron Monitor System Digital Upgrade PLA-6012,” February 28, 2006.

4. Licensing Topical Report NEDO-31960-A, Supplement 1, “BWR Owners’ Group Long-Term Stability Solutions Licensing Methodology (Supplement 1),” November 1995.

5. Licensing Topical Report NEDC-32410P-A, Volumes 1 and 2, “Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC-PRNM) Retrofit Plus Option III Stability Trip Function,” October 1995.

6. Licensing Topical Report NEDC-32410P-A, Supplement 1, “Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC-PRNM) Retrofit Plus Option III Stability Trip Function,” November 1997.

7. Letter from U.S. NRC (R. Guzman) to PPL (B. McKinney), “Request For Additional Information (RAI) - Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2) - Power Range Neutron Monitor System Digital Upgrade (TAC Nos. MC7486 and MC7487),” November 7, 2005.

8. Letter from U.S. NRC (R. Guzman) to PPL (B. McKinney), “Request For Additional Information (RAI) - Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2) - Power Range Neutron Monitor System Digital Upgrade (TAC Nos. MC7486 and MC7487),” February 9, 2006.

9. Letter from U.S. NRC (B. Boger) to Nuclear Services and Projects Department (D. Reigel), “Acceptance of Licensing Topical Report NEDC-32410P, Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC-PRNM) Retrofit Plus Option III Stability Trip Function (TAC No. M90616),” September 5, 1995.

10. Letter from U.S. NRC (D. Matthews) to General Electric Company (D. Reigel), “Licensing Topical Report NEDC-32410P, Supplement 1, Nuclear Measurement Analysis and Control Power Range Neutron Monitor (NUMAC-PRNM) Retrofit Plus Option III Stability Trip Function (TAC No. M95746),” August 15, 1997.

11. Licensing Topical Report NEDO-32465-A, “Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Application,” August 1996.

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Date: March 6, 2006