BEFORE THE
UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of :

Docket No. 50-387

PP&L, INC. :

PROPOSED AMENDMENT NO. 221
FACILITY OPERATING LICENSE NO. NPF-14
SUSQUEHANNA STEAM ELECTRIC STATION
UNIT NO. 1

Licensee, PP&L, Inc., hereby files proposed Amendment No. 221 to its Facility Operating License No. NPF-14 dated July 17, 1982.

This amendment contains a revision to the Susquehanna SES Unit 1 Technical Specifications.

PP&L, INC.
BY:

R. G. Byram
Sr. Vice President - Generation and Chief Nuclear Officer

Sworn to and subscribed before me
this 19th day of June, 1998.

Janice M. Reese
Notary Public

NOTARIAL SEAL
JANICE M. REESE, Notary Public
City of Allentown, Lehigh County, PA
My Commission Expires June 11, 2001

ATTACHMENT 1 TO PLA-4925

SAFETY ASSESSMENT

SAFETY ASSESSMENT

BACKGROUND:

Presently, SSES is operating under Interim Corrective Actions (ICAs) defined in Technical Specification Section 3.4.1 that define restrictions to plant operation and define operator response to instability events. These actions are the interim actions accepted by the NRC for core protection until a permanent protection system is installed. The ICAs are currently incorporated into SSES Improved Technical Specification (ITS) Section 3.4.1 submitted to USNRC on 8/1/96.

The existing operating restrictions reduce the probability of thermal-hydraulic oscillations by prohibiting operation in defined areas of the Power to Flow Map prone to unstable behavior, and by terminating plant operation when unstable operation is observed. These actions necessarily require heightened vigilance by the Operator and require some amount of interpretation and operational judgment for compliance.

The proposed change alleviates the above described reliance upon the operator by installation of the Oscillating Power Range Monitoring (OPRM) system which will not require operator action or involvement for protection of the MCPR safety limit for any expected instability event. The Technical Specifications will continue to forbid operation with no Reactor Recirculation pumps operating as required by the SSES operating license.

DESCRIPTION OF PROPOSED CHANGE:

The specific changes proposed to the SSES Technical Specifications (note that these are changes to the ITS submittal and not current Technical Specifications) are as follows:

Technical Specification Section 3.3.1.3: OPRM Instrumentation

This new sub-section to the Improved Technical Specification Instrumentation Section is added to delineate the OPRM system Limiting Conditions for Operation, Applicability, Action Statements, Completion Times for Actions and system Surveillance Requirements.

Technical Specification Section 3.4.1: Recirculation Loops Operating

All current references to Conditions and Surveillances involving Power/Flow Map Regions I and II are eliminated, as are all stability-related actions to be taken when in either Region I (immediate scram) or Region II (exit region or scram on observed LPRM/APRM oscillations). The requirement to place the reactor mode switch in shutdown condition when no recirculation pumps are operating while in Mode 1 is not affected.

SAFETY ANALYSIS:

The OPRM system is the SSES permanent automatic long-term solution to the thermal-hydraulic instability issue. The OPRM initiates a Reactor SCRAM via existing RPS trip logic on detection of core power thermal-hydraulic instability oscillation of a magnitude that is in excess of analyzed limits. This action assures automatic protection of the MCPR safety limit under all expected core-wide and regional thermal-hydraulic instability events.

The safety and efficacy of the installed system in meeting the design requirement of detecting and suppressing reactor core thermal-hydraulic instabilities is demonstrated and documented in the following NRC reviewed and approved Licensing Topical Reports:

NEDO-32465-A August 1996	BWROG Reactor Core Stability Detect and Suppress Solutions Licensing Basis Methodology and Reload Applications
NEDO-31960-A November 1995	BWROG Long-Term Stability Solutions Licensing Methodology
NEDO-31960-A Supplement 1 November 1995	BWROG Long-Term Stability Solutions Licensing Methodology
CENPD-400-P-A Rev. 01 May 1995	Generic Topical Report for the ABB Option III Oscillation Power Range Monitor (OPRM)

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 PRNMS panels (1C608). 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 4 LPRMs in geometrically adjacent areas of the core. The use of instantaneous flux and smaller grouping of LPRMs in cells provides better resolution for the detection of instability oscillations than the APRM system alone. By having many cells, each consisting of multiple LPRMs in very close proximity, the OPRM will not be sensitive to single LPRM failures while still providing adequate sensitivity to protect the MCPR Safety Limit.

NEDO-31960-A and Supplement 1 describe three separate algorithms for detecting stability related oscillations: the Period Based Algorithm (PBA), the Amplitude Based Algorithm (ABA), and the Growth Rate Algorithm (GRA). The OPRM modules execute the algorithms and generate alarms and trips based on these calculations. Either module in the pair can trip the OPRM channel. These trips then actuate the Reactor Protection System when the appropriate RPS trip logic is satisfied. The OPRM's trip function is only enabled when the reactor power is greater than or equal to 30% RTP and the core flow is less than or equal to 60Mlb/HR.

The OPRM will provide an alarm to alert the operator when the system is enabled, and provides a pre-trip alarm at the onset of sustained oscillations. The alarm will alert the operator to the plant condition in time for compensatory actions to be taken, in all but the most limiting cases.

Only the Period Based Algorithm is credited in the safety analysis. The remaining algorithms provide defense-in-depth and additional protection against unanticipated oscillations. The Period Based Algorithm detects a stability related oscillation based on the detection of a sustained oscillation, followed by the relative cell signal amplitude exceeding a specified setpoint. The amplitude and growth rate algorithms provide defense-in-depth protection in the event that an instability grows large, or grows rapidly, without detection by the Period Based Algorithm. Parameters for the ABA and GRA will be controlled in the SSES Unit 1 Technical Requirements Manual.

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. This is demonstrated by analyses based on the methodology described in NEDO-32465-A and for future operating cycles will be verified as part of the cycle-specific reload analysis. Additionally, the OPRM is designed and installed so as not to degrade the existing APRM, LPRM, and RPS systems.

Eliminating the current operating restrictions will ease the operator burden and increase the plant operating reliability. The OPRM provides improved protection by automating the detection and suppression function, and allows for a controlled exit from the susceptible regions when entered. The automatic protection function is designed to provide protection for expected modes of oscillation. The defense-in-depth afforded by the Amplitude Based Algorithm and Growth Rate Algorithm provide additional protection against unanticipated events. The increased operator awareness that comes from the available alarms and computer displays will enhance the operator's ability to recognize and respond before the oscillations have a chance to grow, making the current operating restrictions unnecessary and redundant.

Retaining the requirement to scram on natural circulation is a prudent action, given the increased probability of an imminent core instability under natural circulation and the clear ability of the operator to determine that this condition exists.

CONCLUSIONS:

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. The system is designed and installed so as not to degrade the existing APRM, LPRM or RPS systems. Operator burden is eased with the elimination of the current operating restrictions.

ATTACHMENT 2 TO PLA-4925

NO SIGNIFICANT HAZARDS CONSIDERATIONS

NO SIGNIFICANT HAZARDS CONSIDERATIONS AND ENVIRONMENTAL ANALYSIS

STABILITY SOLUTION IMPLEMENTATION

NO SIGNIFICANT HAZARDS CONSIDERATIONS

PP&L has evaluated the proposed Technical Specification change in accordance with the criteria specified by 10 CFR 50.92 and has determined that the proposed change does not involve a significant hazards consideration. The criteria and conclusions of our evaluation are presented below.

1. **The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.**

This proposal does not involve an increase in the probability or consequences of an accident previously evaluated.

The OPRM most directly affects the APRM and LPRM portions of the Power Range Neutron Monitoring system. Its installation does not affect the operation of these sub-systems. None of the accidents or equipment malfunctions affected by these sub-systems are affected by the presence or operation of the OPRM.

The APRM channels provide the primary indication of neutron flux within the core and respond almost instantaneously to neutron flux changes. The APRM Fixed Neutron Flux-High function is capable of generating a trip signal to prevent fuel damage or excessive reactor pressure. For the ASME overpressurization protection analysis in FSAR Chapter 5, the APRM Fixed Neutron Flux-High function is assumed to terminate the main steam isolation valve closure event. The high flux trip, along with the safety/relief valves, limit the peak reactor pressure vessel pressure to less than the ASME Code limits. The control rod drop accident (CRDA) analysis in Chapter 15 takes credit for the APRM Fixed Neutron Flux-High function to terminate the CRDA. The Recirculation Flow Controller Failure event (pump runup) is also terminated by the high neutron flux trip. The APRM Fixed Neutron Flux-High function is required to be OPERABLE in MODE 1 where the potential consequences of the analyzed transients could result in the Safety Limits (e.g., MCPR and Reactor pressure) being exceeded.

The installation of the OPRM equipment does not increase the consequences of a malfunction of equipment important to safety. The APRM and RPS systems are designed to fail in a tripped (fail safe) condition; the OPRM will have no affect on the consequence of the failure of either system. An inoperative trip signal is received by the RPS any time an APRM mode switch is moved to any position other than Operate, an APRM module is unplugged, the electronic operating voltage is low, or the APRM has too few LPRM inputs. These functions are not specifically credited in the accident analysis, but are retained for the RPS as required by the NRC approved licensing basis.

The OPRM allows operation under current operating conditions presently restricted by the current Technical Specifications by providing automatic suppression functions in the area of concern in the event an instability occurs. The consequences of any accident or equipment malfunction are not increased by operating under those conditions. Although protected by the OPRM from thermal-hydraulic core instabilities above 30% core power, operation under natural core recirculation conditions is not allowed. No accidents or transients of a type not analyzed in the FSAR are created by operating under these conditions with the protection of the OPRM system.

This change does not increase the probability of an accident as previously evaluated. The OPRM is designed and installed to not degrade the existing APRM, LPRM, and RPS systems. These systems will still perform all of their intended functions. The new equipment is tested and installed to the same or more restrictive environmental and seismic envelopes as the existing systems. The new equipment has been designed and tested to the electromagnetic interference (EMI) requirements of Reference 2, which assures correct operation of the existing equipment. The new system has been designed to single failure criteria and is electrically isolated from equipment of different electrical divisions and from non-1E equipment. The electrical loading is within the capability of the existing power sources and the heat loads are within the capability of existing cooling systems. The OPRM allows operation under operating conditions presently forbidden or restricted by the current Technical Specifications. No other transient or accident analysis assumes these operating restrictions.

Based upon the analysis presented above, PP&L concludes that the proposed action does not involve an increase in the probability or consequences of an accident previously evaluated.

2. **The proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.**

This proposal does not create the probability of a new or different type of accident from any accident previously evaluated. The OPRM system is a monitoring and accident mitigation system that cannot create the possibility for an accident.

The OPRM will allow operation in conditions currently restricted by the current Technical Specifications. Although protected by the OPRM from thermal-hydraulic core instabilities above 30% core power, operation under natural circulation conditions is not allowed. No accidents or transients of a type not analyzed in the FSAR are created by operating under these conditions with the protection of the OPRM system. No new failure modes of either the new OPRM equipment or of the existing APRM equipment have been introduced. Quality software design, testing, implementation and module self-health testing provides assurance that no new equipment malfunctions due to software errors are created. The possibility of an accident of a new or different type than any evaluated previously is not created.

The new OPRM equipment is designed and installed to the same system requirements as the existing APRM equipment and is designed and tested to have no impact on the existing functions of the APRM system. Appropriate isolation is provided where new interconnections between redundant separation groups are formed. The OPRM modules have been designed and tested to assure that no new failure modes have been introduced.

Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. The proposed change does not involve a significant reduction in the margin of safety.

There has been no reduction in the margin of safety as defined in the basis for the Technical Specifications. The OPRM system does not negatively impact the existing APRM system. As a result, the margins in the Technical Specifications for the APRM system are not impacted by this addition.

Current operation under the ICAs provides an acceptable margin of safety in the event of an instability event as the result of preventive actions and Technical Specification controlled response by the control room operators. The OPRM system provides an increase in the reliability of the protection of the margin of safety by providing automatic protection of the MCPR safety limit, while the protection burden is significantly reduced for the control room operators. This protection is demonstrated as described above, and in the NRC reviewed and approved Topical Reports NEDO-32465-A and CENPD-400-P-A.

Replacement of the ICA operating restrictions from Technical Specifications with the OPRM system does not affect the margin of safety associated with any other system or fuel design parameter.

Therefore, the change does not involve a reduction in the margin of safety.

ENVIRONMENTAL ANALYSIS

An environmental assessment is not required for the proposed change because the requested change conforms to the criteria for actions eligible for categorical exclusion as specified in 10 CFR 51.22(c)(9). The requested change will have no impact on the environment. As discussed above, the proposed change does not involve a significant hazards consideration. The proposed change does not involve a significant change in the types or significant increase in the amounts of effluents that may be released offsite. In addition, the proposed change does not involve a significant increase in the individual or cumulative occupational radiation exposure.