June 27, 1991

Docket Nos. 50-387/388

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Mr. Harold W. Keiser
Senior Vice President-Nuclear
Pennsylvania Power and Light Company
2 North Ninth Street
Allentown, Pennsylvania 18101

Dear Mr. Keiser:

SUBJECT: LOCA/FALSE LOCA INTERLOCK TESTING, SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 (TAC NOS. 77755 AND 77756)

The Commission has issued the enclosed Amendment No. 112 to Facility Operating License No. NPF-14 and Amendment No. 81 to Facility Operating License No. NPF-22 for the Susquehanna Steam Electric Station, Units 1 and 2. These amendments are in response to your letter dated July 27, 1990.

These amendments would change the Technical Specifications by requiring that the LOCA/False LOCA interlocks be tested every 18 months and by incorporating language which allows the tests to be successfully completed by any series of sequential, overlapping or total channel steps such that the entire channel is tested.

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

Sincerely,

/S/

James J. Raleigh, Acting Project Manager
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 112 to License No. NPF-14
2. Amendment No. 81 to License No. NPF-22
3. Safety Evaluation

cc w/enclosures:
See next page

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June 27, 1991

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

June 27, 1991

Docket Nos. 50-387/388

Mr. Harold W. Keiser
Senior Vice President-Nuclear
Pennsylvania Power and Light Company
2 North Ninth Street
Allentown, Pennsylvania 18101

Dear Mr. Keiser:

SUBJECT: LOCA/FALSE LOCA INTERLOCK TESTING, SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 (TAC NOS. 77755 AND 77756)

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James J. Raleigh

James J. Raleigh, Acting Project Manager
Project Directorate I-2
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
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cc w/enclosures:
See next page

cc:

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Allentown, Pennsylvania 18101

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

PENNSYLVANIA POWER & LIGHT COMPANY

ALLEGHENY ELECTRIC COOPERATIVE, INC.

DOCKET NO. 50-387

SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 112
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 the Pennsylvania Power & Light Company, dated July 27, 1990, 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. 112 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. PP&L shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Walter R. Butler, Director
Project Directorate I-2
Division of Reactor Projects - I/II

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 27, 1991

ATTACHMENT TO LICENSE AMENDMENT NO. 112

FACILITY OPERATING LICENSE NO. NPF-14

DOCKET NO. 50-387

Replace the following pages of the Appendix A Technical Specifications with enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change. The overleaf page is provided to maintain document completeness.*

REMOVE	INSERT
3/4 5-5	3/4 5-5
3/4 5-6	3/4 5-5a
-	3/4 5-6*
-	-

2. For the HPCI system, verifying that the system develops a flow of at least 5000 gpm against a test line pressure of 210 ± 15 psig when steam is being supplied to the turbine at 150 ± 15 psig.*

3. Performing a CHANNEL CALIBRATION of the CSS header ΔP instrumentation and verifying the setpoint to be ≤ 1 psid.

4. Verifying that the suction for the HPCI system is automatically transferred from the condensate storage tank to the suppression chamber on a condensate storage tank water level - low signal and on a suppression chamber - water level high signal.

5. Performing a CHANNEL CALIBRATION of the condensate transfer pump discharge low pressure alarm instrumentation and verifying the low pressure alarm setpoint to be ≥ 113 psig.

d. For the ADS:

1. At least once per 31 days, performing a CHANNEL FUNCTIONAL TEST of the accumulator backup compressed gas system low pressure alarm system.

2. At least once per 18 months:

a) Performing a system functional test which includes simulated automatic actuation of the system throughout its emergency operating sequence, but excluding actual valve actuation.

b) Manually** opening each ADS valve when the reactor steam dome pressure is greater than or equal to 100 psig* and observing that either:

1) The control valve or bypass valve position responds accordingly, or

2) There is a corresponding change in the measured steam flow.

c) Performing a CHANNEL CALIBRATION of the accumulator backup compressed gas system low pressure alarm systems and verifying air alarm setpoint of 2070 ± 35 psig on decreasing pressure.

e. At least every 18 months the following shall be accomplished by any series of sequential, overlapping or total channel steps such that the entire channel is tested:

*The provisions of Specification 4.0.4 are not applicable provided the surveillance is performed within 12 hours after reactor steam pressure is adequate to perform the test.

**ADS solenoid energization shall be used alternating between ADS Division 1 and ADS Division 2.

SURVEILLANCE REQUIREMENTS (Continued)

1. A functional test of the interlocks associated with LPCI and CS pump starts in response to an automatic initiation signal in Unit 1 followed by a "False" automatic initiation signal in Unit 2.

2. A functional test of the interlocks associated with LPCI and CS pump starts in response to an automatic initiation signal in Unit 2 followed by a "False" automatic initiation signal in Unit 1.

3. A functional test of the interlocks associated with LPCI and CS pump starts in response to simultaneous occurrence of an automatic initiation signal in both Unit 1 and Unit 2 and a Loss-of-Offsite-Power condition affecting both Unit 1 and Unit 2.

3/4 5.2 ECCS - SHUTDOWN

LIMITING CONDITION FOR OPERATION

3.5.2 At least two of the following subsystems shall be OPERABLE:

a. Core spray system (CSS) subsystems with a subsystem comprised of:

1. Two OPERABLE CSS pumps, and
2. An OPERABLE flow path capable of taking suction from at least one of the following water sources and transferring the water through the spray sparger to the reactor vessel:

a) From the suppression chamber, or

b) When the suppression chamber water level is less than the limit or is drained, from the condensate storage tank containing at least 135,000 available gallons of water, equivalent to a level of 49%.

b. Low pressure coolant injection (LPCI) system subsystems with a subsystem comprised of:

1. At least one OPERABLE LPCI pump, and
2. An OPERABLE flow path capable of taking suction from the suppression chamber upon being manually realigned and transferring the water to the reactor vessel.

APPLICABILITY: OPERATIONAL CONDITION 4 and 5*.

ACTION

a. With one of the above required subsystems inoperable, restore at least two subsystems to OPERABLE status within 4 hours or suspend all operations with a potential for draining the reactor vessel.

b. With both of the above required subsystems inoperable, suspend CORE ALTERATIONS and all operations with a potential for draining the reactor vessel. Restore at least one subsystem to OPERABLE status within 4 hours or establish SECONDARY CONTAINMENT INTEGRITY within the next 8 hours.

*The ECCS is not required to be OPERABLE provided that the reactor vessel head is removed, the cavity is flooded, the spent fuel pool gates are removed, and water level is maintained within the limits of Specification 3.9.8 and 3.9.9.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

PENNSYLVANIA POWER & LIGHT COMPANY

ALLEGHENY ELECTRIC COOPERATIVE, INC.

DOCKET NO. 50-388

SUSQUEHANNA STEAM ELECTRIC STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 81
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 the Pennsylvania Power & Light Company, dated July 27, 1990, 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. 81 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. PP&L shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

Walter R. Butler

Walter R. Butler, Director
Project Directorate I-2
Division of Reactor Projects - I/II

Attachment:
Changes to the Technical
Specifications

Date of Issuance: June 27, 1991

ATTACHMENT TO LICENSE AMENDMENT NO. 81

FACILITY OPERATING LICENSE NO. NPF-22

DOCKET NO. 50-388

Replace the following pages of the Appendix A Technical Specifications with enclosed pages. The revised page is identified by Amendment number and contains vertical lines indicating the area of change.

REMOVE	INSERT
3/4 5-5	3/4 5-5*
3/4 5-6	3/4 5-6

SURVEILLANCE REQUIREMENTS (Continued)

2.# For the HPCI system, verifying that the system develops a flow of at least 5000 gpm against a test line pressure of 210 ± 15 psig when steam is being supplied to the turbine at 150 ± 15 psig.*

3. Performing a CHANNEL CALIBRATION of the CSS header ΔP instrumentation and verifying the setpoint to be ≤ 1 psid.

4. Verifying that the suction for the HPCI system is automatically transferred from the condensate storage tank to the suppression chamber on a condensate storage tank water level - low signal and on a suppression chamber - water level high signal.

5. Performing a CHANNEL CALIBRATION of the condensate transfer pump discharge low pressure alarm instrumentation and verifying the low pressure alarm setpoint to be ≥ 113 psig.

d. For the ADS:

1. At least once per 31 days, performing a CHANNEL FUNCTIONAL TEST of the accumulator backup compressed gas system low pressure alarm system.

2. At least once per 18 months:

a) Performing a system functional test which includes simulated automatic actuation of the system throughout its emergency operating sequence, but excluding actual valve actuation.

b) Manually** opening each ADS valve when the reactor steam dome pressure is greater than or equal to 100 psig* and observing that either:

1) The control valve or bypass valve position responds accordingly, or

2) There is a corresponding change in the measured steam flow.

---

*The provisions of Specification 4.0.4 are not applicable provided the surveillance is performed within 12 hours after reactor steam pressure is adequate to perform the test.

**ADS solenoid energization shall be used alternating between ADS Division 1 and ADS Division 2.

#For the startup following the Third Refueling and Inspection Outage, this surveillance shall read as follows:

For the HPCI System, verifying that the system develops a flow of at least 4850 gpm against a test line pressure of 600 psig when steam is being supplied to the turbine at 150 ± 15 psig.*

SURVEILLANCE REQUIREMENTS (Continued)

c) Performing a CHANNEL CALIBRATION of the accumulator backup compressed gas system low pressure alarm systems and verifying air alarm setpoint of 2070 ± 35 psig on decreasing pressure.

e. At least every 18 months the following shall be accomplished by any series of sequential, overlapping or total channel steps such that the entire channel is tested:

1. A functional test of the interlocks associated with LPCI and CS pump starts in response to an automatic initiation signal in Unit 1 followed by a "False" automatic initiation signal in Unit 2.

2. A functional test of the interlocks associated with LPCI and CS pump starts in response to an automatic initiation signal in Unit 2 followed by a "False" automatic initiation signal in Unit 1.

3. A functional test of the interlocks associated with LPCI and CS pump starts in response to simultaneous occurrence of an automatic initiation signal in both Unit 1 and Unit 2 and a Loss-of-Offsite-Power condition affecting both Unit 1 and Unit 2.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 112 TO FACILITY OPERATING LICENSE NO. NPF-14

AMENDMENT NO. 81 TO FACILITY OPERATING LICENSE NO. NPF-22

PENNSYLVANIA POWER & LIGHT COMPANY

ALLEGHENY ELECTRIC COOPERATIVE, INC.

SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

DOCKET NOS. 50-387 AND 388

1.0 INTRODUCTION

By letter dated July 27, 1990, Pennsylvania Power and Light Company and Allegheny Electric Cooperative, Inc. (the licensees) submitted a request for changes to the Susquehanna Steam Electric Station, Units 1 and 2, Technical Specifications (TS). The requested changes would change the Technical Specifications by requiring that the LOCA/False LOCA interlocks be tested every 18 months and by incorporating language which allows the tests to be successfully completed by any series of sequential, overlapping or total channel steps such that the entire channel is tested.

2.1.0 BACKGROUND

The licensee is proposing to increase the testing frequency of the LOCA/False LOCA interlocks between the Residual Heat Removal (RHR) and Core Spray (CS) pumps for Susquehanna Steam Electric Station, Units 1 and 2. The existing Technical Specification requires testing of the RHR and CS pumps on the simultaneous shutdown of the units at an interval not less than five years. The licensee has determined that the interlocks are an important feature of the Emergency Core Cooling System (ECCS) and should be tested more frequently than required by the existing specification. Susquehanna is proposing to perform the surveillance every eighteen months using the existing surveillance procedures with some modifications.

The surveillance involves testing the pump interlocks that prevent the overloading of the 4Kv buses and the diesel generators. The existing Surveillance Procedures would be modified to allow the interlocks to be tested by any series of sequential, overlapping or total channel steps such that the entire channel would be tested. Under this testing proposal, a dual unit outage would not be required.

To support the proposed changes to the Technical Specifications the licensee submittal includes: Description of Change, Hazard Evaluation, and the Marked-up Technical Specification.

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2.2 DISCUSSION AND EVALUATION

The staff has evaluated the Susquehanna Units 1 and 2 proposal in the following major areas:

- Pump interlock Basis - The original technical basis of the interlocks must not change.

- Shared Diesel Generator - Sufficient diesel capacity must exist to service accident conditions in both units.

- LOCA/False LOCA Signal - The difference between a real LOCA condition and a false LOCA signal must be made.

- Surveillance Procedures - Changes to existing procedures must not be too extensive to alter procedures' objectives.

The RHR System and the CS System are powered from 4Kv buses. Power to the 4Kv buses comes from offsite sources or from onsite sources by the standby diesel generators. Each unit has four RHR pumps, two of which are preferred pumps. Each unit has four CS pumps, two of which are also preferred pumps. The interlocks implemented by relays and relay contacts are provided between corresponding RHR and CS pumps in Susquehanna Unit 1 and Unit 2. The interlocks prevent two corresponding RHR and CS pumps from operating at the same time. Operating only one corresponding RHR and CS pump at a time protects against overloading the 4Kv buses and overloading the diesel generators in the event of a loss of offsite power (LOOP).

When a LOCA occurs in one unit, with no other abnormal conditions in the non-LOCA unit, all eight pumps are started. When a LOCA occurs in one unit and a LOCA/False LOCA occurs in the other unit, only the preferred pumps from each unit would be running. Under this condition, the non-preferred pumps would be tripped. To accomplish this the proper bus loading and shedding is preformed by the system logic.

Technical Specification 4.5.1.e requires that the RHR and CS pumps be tested during the first simultaneous shutdown (Units 1 and 2) of duration greater than 7 days occurring more than five years following the previous testing. As written, testing may not occur at all in five years if there is not a dual unit outage of significant length. In evaluating the need to test these interlocks, Susquehanna examined twelve surveillance procedures for the RHR System, CS System, and the Diesel Generators and determined that with the exception of a few relays and contacts, the interlocks associated with the Technical Specification Surveillance 4.5.1.e were being tested periodically (18 months). Subsequent to this evaluation, eight of the twelve surveillances were revised to include the additional relays and contacts. This testing is accomplished by permitting the tests to be successfully completed by any series of sequential, overlapping or total channel steps such that the entire channel is tested. The staff has concluded that with the modified changes, Technical Specification Surveillance 4.5.1.e is being met every 18 months.

The sharing of diesel generators is governed by 10 CFR 50, Appendix A, General Design Criterion 5. GDC 5 requires that the design assume the event of an accident in one unit, and an orderly shutdown and cooldown of the other unit. 10 CFR 50, Appendix A, General Design Criterion 17 requires an onsite electric power system and an offsite electric power system such that each electrical system provides sufficient capacity to accomplish the safety functions. The Susquehanna submittals provide sufficient information to conclude that both GDC 5 and GDC 17 would still be met with the new testing frequency. Three different indications can occur in a LOCA : (1) Low reactor water level, (2) Low reactor pressure, and (3) High drywell pressure. Any combination of two of these signals energizes relays in the Residual Heat Removal and Core Spray Systems. To the plant initially, both signals are identical. However, a false LOCA signal is an injection of a LOCA signal into the non-accident unit ECCS logic when a LOCA in reality does not exist. Susquehanna system logic does not automatically identify a real LOCA from a false LOCA. The Control Room operators manually validate or refute the LOCA signals by utilizing the three LOCA parameter indications. Distinction between a real and false LOCA is necessary to optimize the handling of an accident.

The staff has reviewed the existing twelve surveillance procedures with the required markups. The procedures are the 18 month surveillances performed on the RHR System, CS System, and the Diesel Generators. In summary the procedures:

1. Call for system and logic system functional checks of the RHR Divisions 1 and 2;

2. Call for CS System logic functional check of Loops A & B and Divisions 1 and 2; and

3. Call for checking the Diesel Generator automatic start and sequence logic for bus energizing & load shedding.

The procedures denote where the changes are made to the text. The changes to the existing procedures are minor and do incorporate the words to be able to test the interlocks every 18 months. Each procedure checks only a piece of the loop which combined with the rest of the procedures tests the total system loop. It is preferred that testing of the entire loop be performed in one complete sequence. However, testing by a series of sequential and overlapping steps is an acceptable method.

2.3 EVALUATION SUMMARY

Susquehanna has proposed increasing the surveillance test frequency for the LOCA/False pump interlocks to once every eighteen months. This proposal involves changing Technical Specification 4.5.1.e. The RHR and CS pump interlocks prevent the overloading of the 4Kv buses and diesel generators in a LOOP. The original interlock basis remains the same and is not impacted by the more frequent testing.

Our regulations at 10 CFR 50 require at that an onsite and an offsite electrical source be provided to service the safety system functions. Susquehanna meets the regulations by providing adequate cooling capacity to both units simultaneously in normal and accident conditions.

The system logic is unable to distinguish between a true LOCA and a false LOCA. This distinction is necessary to optimize handling of the accident conditions. However, the operator has the necessary indications to determine the true LOCA conditions.

The existing surveillance procedures are modified to enable testing the complete interlock channels every eighteen months. Changes have been made to the RHR, CS, and diesel generators surveillance procedures to include the interlock relays and relay contacts to test in pieces the entire channel. The functional testing of the interlocks by the series of sequential and overlapping steps is acceptable.

3.0 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.

4.0 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 changed 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. 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.

5.0 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 Contributor: J. Ibarra

Date: June 27, 1991