Docket No. 50-387/388

DEC 3 1985

Mr. Harold W. Keiser
Vice President
Nuclear Operations
Pennsylvania Power & Light Company
2 North Ninth Street
Allentown, Pennsylvania 18101

Dear Mr. Keiser:

SUBJECT: AMENDMENT NOS. 51 AND 19 TO FACILITY OPERATING LICENSE NOS. NPF-14 and NPF-22, SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

The Nuclear Regulatory Commission has issued the enclosed Amendment Nos. 51 and 19 to Facility Operating License Nos. NPF-14 and NPF-22 for the Susquehanna Steam Electric Station, Units 1 and 2, respectively. The amendments are in response to your letters dated December 31, 1984, July 1, 1985, August 7, 1985, August 23, 1985 and September 4, 1985. These amendments revise the Unit 1 and Unit 2 Technical Specifications to allow LCO extensions for tie-in preparations necessary for the installation of the fifth diesel. In conjunction with the granting of these amendments, the staff has denied, in part, two of the proposed changes to the Technical Specifications. They are Technical Specification 3.8.1.1.d and a portion of Technical Specification 3.8.1.1.e for both Units 1 and 2. On October 17, 1985 your staff was informed of the NRC staff's position in this regard. A denial notice will be processed separately for these actions. A copy of the related safety evaluation supporting Amendment Nos. 51 and 19to Facility Operating License Nos. NPF-14 and NPF-22 is enclosed.

The approval of these amendments also requires a one time exemption from the single failure criteria for the onsite electric power supplies as provided in the General Design Criteria 17 of 10 CFR Part 50, Appendix A. In response to your letter of September 23, 1985, such a one time exemption is being issued separately.

Sincerely,

Anthony Bournia, Acting Director
of BWR Project Directorate No. 3
Division of BWR Licensing

Enclosures:
1. Amendment Nos.51 & 19 to NPF-14 and NPF-22
2. Safety Evaluation

cc w/enclosure:
See next page

Distribution:
See next page

*Previously concurred:

LB#2/DL/LA	LB#2/DL/PM	OELD	LB#2/DL/BC	AD/L/DL
*EHylton	*MCampagnone:dh	*JGoldgerg	WButler	TMNovak
10/05/85	10/05/85	11/12/85	11/07/85	10/ /85

3. This amendment is effective upon commencement of the fifth diesel generator tie-in, and is to expire upon completion of 60 cumulative days in the LCO.

FOR THE NUCLEAR REGULATORY COMMISSION

Original signed by

Anthony Bournia, Acting Director
of BWR Project Directorate No. 3
Division of BWR Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: DEC 03 1985

*Previously concurred:

LB#2/DL/LA	LB#2/DL/PM	LB#2/DL/BC	OELD	AD/L/DL
*EHylton	MCampagnone:dh	*WButler	*JGoldberg	*TMNovak
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Anthony Bournia, Acting Director
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LB#2/DL/LA	LB#2/DL/PM	LB#2/DL/BC	OELD	AD/L/DL
*EHylton	*MCampagnone:dh	*WButler	JGoldberg	TMNovak
11/05/85	11/05/85	11/07/85	11/12/85	11/ /85

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

Docket No. 50-387/388

Mr. Harold W. Keiser
Vice President
Nuclear Operations
Pennsylvania Power & Light Company
2 North Ninth Street
Allentown, Pennsylvania 18101

Dear Mr. Keiser:

SUBJECT: AMENDMENT NOS. 51 AND 19 TO FACILITY OPERATING LICENSE NOS. NPF-14 and NPF-22, SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2

The Nuclear Regulatory Commission has issued the enclosed Amendment Nos. 51 and 19 to Facility Operating License Nos. NPF-14 and NPF-22 for the Susquehanna Steam Electric Station, Units 1 and 2, respectively. The amendments are in response to your letters dated December 31, 1984, July 1, 1985, August 7, 1985, August 23, 1985 and September 4, 1985. These amendments revise the Unit 1 and Unit 2 Technical Specifications to allow LCO extensions for tie-in preparations necessary for the installation of the fifth diesel. In conjunction with the granting of these amendments, the staff has denied, in part, two of the proposed changes to the Technical Specifications. They are Technical Specification 3.8.1.1.d and a portion of Technical Specification 3.8.1.1.e for both Units 1 and 2. On October 17, 1985 your staff was informed of the NRC staff's position in this regard. A denial notice will be processed separately for these actions. A copy of the related safety evaluation supporting Amendment Nos. 51 and 19 to Facility Operating License Nos. NPF-14 and NPF-22 is enclosed.

The approval of these amendments also requires a one time exemption from the single failure criteria for the onsite electric power supplies as provided in the General Design Criteria 17 of 10 CFR Part 50, Appendix A. In response to your letter of September 23, 1985, such a one time exemption is being issued separately.

Sincerely,

Anthony Bournia, Acting Director
of BWR Project Directorate No. 3
Division of BWR Licensing

Enclosures:
1. Amendment Nos. 51 & 19 to NPF-14 and NPF-22
2. Safety Evaluation

cc w/enclosure:
See next page

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Regional Administrator, Region I
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King of Prussia, Pennsylvania 19406

Susquehanna

Cc: Governor's Office of State Planning & Development
Attn: Coordinator, State Clearinghouse
P O. Box 1323
Harrisburg, Pennsylvania 17120

Mr. Bruce Thomas, President
Board of Supervisors
R. D. #1
Berwick, Pennsylvania 18603

U. S. Environmental Protection Agency
Attn: EIS Coordinator
Region III Office
Curtis Building
6th and Walnut Streets
Philadelphia, Pennsylvania 19106

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. 51
License No. NPF-14

1. The Nuclear Regulatory Commission (the Commission or the NRC) having found that:

   A. The application for an amendment filed by the Pennsylvania Power & Light Company, dated December 21, 1984 as supplemented on July 1, 1985, August 7, 1985, August 23, 1985 and September 4, 1985 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 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. 51, and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. PP&L shall operate facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This amendment is effective upon commencement of the fifth diesel generator tie-in, and is to expire upon completion of 60 cumulative days in the LCO.

FOR THE NUCLEAR REGULATORY COMMISSION

Anthony Bournia, Acting Director
of BWR Project Directorate No. 3
Division of BWR Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: DEC 08 [illegible]

ATTACHMENT TO LICENSE AMENDMENT NO. 51
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.

REMOVE	INSERT
3/4 7-1	3/4 7-1
3/4 7-2	3/4 7-2
3/4 8-1	3/4 8-1
	3/4 8-1a
3/4 8-2	3/4 8-2

3/4.7 PLANT SYSTEMS

3/4.7.1 SERVICE WATER SYSTEMS

RESIDUAL HEAT REMOVAL SERVICE WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.1.1 Two independent residual heat removal service water (RHRSW) system subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE RHRSW pump*, and

b. An OPERABLE flow path capable of taking suction from the spray pond and transferring the water through one RHR heat exchanger.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, 4, and 5.**

ACTION:

a. In OPERATIONAL CONDITION 1, 2 or 3:

1. With one RHRSW subsystem inoperable, restore the inoperable subsystem to OPERABLE status with at least one OPERABLE pump* within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

2. With both RHRSW subsystems inoperable, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN*** within the following 24 hours.

b. In OPERATIONAL CONDITION 3 or 4 with the RHRSW subsystem, which is associated with an RHR loop required OPERABLE by Specification 3.4.9.1 or 3.4.9.2, inoperable, declare the associated RHR loop inoperable and take the ACTION required by Specification 3.4.9.1 or 3.4.9.2, as applicable.

c. In OPERATIONAL CONDITION 5 with one RHRSW subsystem, which is associated with an RHR system required OPERABLE by Specification 3.9.11.1 or 3.9.11.2, inoperable, declare the associated RHR system inoperable and take the ACTION required by Specification 3.9.11.1 or 3.9.11.2, as applicable.

SURVEILLANCE REQUIREMENTS

4.7.1.1 Each residual heat removal service water system subsystem shall be demonstrated OPERABLE at least once per 31 days by verifying that each valve in the flow path that is not locked, sealed or otherwise secured in position, is in its correct position.

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*May not be a pump required for Unit 2.
**See Specification 3.9.11.1 and 3.9.11.2 for applicability.
***Whenever both RHRSW subsystems are inoperable, if unable to attain COLD SHUTDOWN as required by this ACTION, maintain reactor coolant temperature as low as practical by use of alternate heat removal methods.

PLANT SYSTEMS

EMERGENCY SERVICE WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.1.2 Two independent emergency service water system loops shall be OPERABLE with each loop comprised of:

a. Two OPERABLE emergency service water pumps, and
b. An OPERABLE flow path capable of taking suction from the spray pond and transferring the water to the associated safety related equipment.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, 4, 5 and *.

ACTION:

a. In OPERATIONAL CONDITION 1, 2, or 3:
   1.# With one emergency service water pump inoperable, restore the inoperable pump to OPERABLE status within 7 days or be in a least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
   2. With two emergency service water pumps inoperable, restore at least one inoperable pump to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
   3. With one emergency service water system loop otherwise inoperable, restore the inoperable loop to OPERABLE status with at least one OPERABLE pump within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. In OPERATIONAL CONDITION 4, 5 or *:
   1. With one pump in an emergency service water system loop inoperable, verify adequate cooling capability remains available for the diesel generators required to be operable by Specification 3.8.1.2 or declare the affected diesel generator(s) inoperable and take the ACTION required by Specification 3.8.1.2.
   2. With two pumps in an emergency service water system loop inoperable or with the loop otherwise inoperable declare the associated safety related equipment inoperable (except diesel generators), and follow the applicable ACTION statements. Verify adequate cooling remains available for the diesel generators required to be operable by Specification 3.8.1.2 or declare the affected diesel generator(s) inoperable and take the ACTION required by Specification 3.8.1.2.

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*When handling irradiated fuel in the secondary containment.

#When any diesel generator is removed from service in order to do work associated with tying in the additional diesel generator and its associated emergency service water pump is inoperable, Action a.1 shall read as follows:

a.1 With one emergency service water pump inoperable, restore the inoperable pump to OPERABLE status when its associated diesel generator is restored to OPERABLE status per Specification 3.8.1.1.

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

A.C. SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Four separate and independent diesel generators*, each with:

1. Separate engine mounted day fuel tanks containing a minimum of 325 gallons of fuel,

2. A separate fuel storage system containing a minimum of 47,570 gallons of fuel, and

3. A separate fuel transfer pump.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:#

a. With either one offsite circuit or one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within 1 hour and 4.8.1.1.2.a.4, for one diesel generator at a time, within 4 hours and at least once per 8 hours therafter; restore at least two offsite circuits and four diesel generators to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. With one offsite circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within 1 hour and 4.8.1.1.2.a.4, for one diesel generator at a time, within 3 hours and at least once per 8 hours thereafter; restore at least one of the inoperable A.C. sources to OPERABLE status within 12 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. Restore at least two offsite circuits and four diesel generators to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

*Shared with Unit 2.

#Prior to but within 24 hours of removing any diesel generator from service in order to do work associated with tying in the additional diesel generator, Surveillance Requirement 4.8.1.1.2.a.4 shall be performed on the diesel generators which are to remain in service.

When any diesel generator is removed from service in order to do work associated with tying in the additional diesel generator, the ACTIONS shall read as follows:

a. With one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour and 4.8.1.1.2.a.4, within 72 hours and at least once per 72 hours thereafter; restore at least four diesel genarators to OPERABLE status within 60 days of accumulated tie-in outage time for all four diesels or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. The provisions of Specification 3.0.4 are not applicable.

b. With one offsite circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour and 4.8.1.1.2.a.4, within 24 hours and at least once per 72 hours thereafter; restore at least two offsite circuits to OPERABLE status within 12 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. With the two offsite circuits restored to OPERABLE status, follow ACTION a.

c. With one diesel generator of the above required A.C. electrical power sources inoperable, in addition to ACTION a or b, above, verify within 2 hours that all required systems, subsystems, trains, components and devices that depend on the remaining diesel generators as a source of emergency power are also OPERABLE except as noted in Specification 3.7.1.2; otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

d. With two of the above required offsite circuits inoperable, demonstrate the OPERABILITY of four diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4, for one diesel generator at a time, within four hours and at least once per 8 hours thereafter, unless the diesel generators are already operating; restore at least one of the inoperable offsite circuits to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 12 hours. With only one offsite circuit restored to OPERABLE status, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

e. With two or more of the above required diesel generators inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within one hour and 4.8.1.1.2.a.4, for one diesel generator at a time, within 2 hours; restore at least three of the diesel generators to OPERABLE status within 2 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. With three diesel generators restored to OPERABLE status, follow ACTION a.

ACTION (Continued)

c. With one diesel generator of the above required A.C. electrical power sources inoperable, in addition to ACTION a or b, above, verify within 2 hours that all required systems, subsystems, trains, components and devices that depend on the remaining diesel generators as a source of emergency power are also OPERABLE; otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

d. With two of the above required offsite circuits inoperable, demonstrate the OPERABILITY of four diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4, for one diesel generator at a time, within four hours and at least once per 8 hours thereafter, unless the diesel generators are already operating; restore at least one of the inoperable offsite circuits to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 12 hours. With only one offsite circuit restored to OPERABLE status, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

e. With two or more of the above required diesel generators inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within one hour and 4.8.1.1.2.a.4, for one diesel generator at a time, within 2 hours, and at least once per 8 hours thereafter; restore at least three of the diesel generators to OPERABLE status within 2 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. Restore four diesel generators to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

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. 19
License No. NPF-22

1. The Nuclear Regulatory Commission (the Commission or the NRC) having found that:

   A. The application for an amendment filed by the Pennsylvania Power & Light Company, dated December 21, 1984 as supplemented on July 1, 1985, August 7, 1985, August 23, 1985 and September 4, 1985 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 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. 19, 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 amendment is effective upon commencement of the fifth diesel generator tie-in, and is to expire upon completion of 60 cumulative days in the LCO.

FOR THE NUCLEAR REGULATORY COMMISSION

Anthony Bournia, Acting Director
of BWR Project Directorate No. 3
Division of BWR Licensing

Attachment:
Changes to the Technical
Specifications

Date of Issuance: DEC 03 '98

ATTACHMENT TO LICENSE AMENDMENT NO. 19
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 pages are identified by Amendment number and contain vertical lines indicating the area of change.

REMOVE	INSERT
3/4 7-1	3/4 7-1
3/4 7-2	3/4 7-2
3/4 7-3	3/4 7-3
3/4 7-4	3/4 7-4
3/4 8-1	3/4 8-1
	3/4 8-1a
3/4 8-2	3/4 8-2

3/4.7 PLANT SYSTEMS

3/4.7.1 SERVICE WATER SYSTEMS

RESIDUAL HEAT REMOVAL SERVICE WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.1.1 Two independent residual heat removal service water (RHRSW) system subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE RHRSW pump*, and

b. An OPERABLE flow path capable of taking suction from the spray pond and transferring the water through one RHR heat exchanger.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, 4, and 5**.

ACTION:

a. In OPERATIONAL CONDITION 1, 2, or 3:

   1. With one RHRSW subsystem inoperable, restore the inoperable subsystem to OPERABLE status with at least one OPERABLE pump* within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

   2. With both RHRSW subsystems inoperable, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN*** within the following 24 hours.

b. In OPERATIONAL CONDITION 3 or 4 with the RHRSW subsystem, which is associated with an RHR loop required OPERABLE by Specification 3.4.9.1 or 3.4.9.2, inoperable, declare the associated RHR loop inoperable and take the ACTION required by Specification 3.4.9.1 or 3.4.9.2, as applicable.

c. In OPERATIONAL CONDITION 5 with one RHRSW subsystem, which is associated with an RHR system required OPERABLE by Specification 3.9.11.1 or 3.9.11.2, inoperable, declare the associated RHR system inoperable and take the ACTION required by Specification 3.9.11.1 or 3.9.11.2, as applicable.

SURVEILLANCE REQUIREMENTS

4.7.1.1 Each residual heat removal service water system subsystem shall be demonstrated OPERABLE at least once per 31 days by verifying that each valve in the flow path that is not locked, sealed, or otherwise secured in position, is in its correct position.

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*May not be a pump required for Unit 1.

**See Specifications 3.9.11.1 and 3.9.11.2 for applicability.

***Whenever both RHRSW subsystems are inoperable, if unable to attain COLD SHUTDOWN as required by this ACTION, maintain reactor coolant temperature as low as practical by use of alternate heat removal methods.

EMERGENCY SERVICE WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.1.2 Two independent emergency service water system loops shall be OPERABLE with each loop comprised of:

a. Two OPERABLE emergency service water pumps, and
b. An OPERABLE flow path capable of taking suction from the spray pond and transferring the water to the associated safety-related equipment.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, 4, 5, and *.

ACTION:

a. In OPERATIONAL CONDITION 1, 2, or 3:

1.# With one emergency service water pump inoperable, restore the inoperable pump to OPERABLE status within 7 days or be in a least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

2. With two emergency service water pumps inoperable, restore at least one inoperable pump to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

3. With one emergency service water system loop otherwise inoperable, restore the inoperable loop to OPERABLE status with at least one OPERABLE pump within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. In OPERATIONAL CONDITION 4, 5 or *:

1. With one pump in an emergency service water system loop inoperable, verify adequate cooling capability remains available for the diesel generators required to be operable by Specification 3.8.1.2 or declare the affected diesel generator(s) inoperable and take the ACTION required by Specification 3.8.1.2.

2. With two pumps in an emergency service water system loop inoperable or with the loop otherwise inoperable declare the associated safety related equipment inoperable (except diesel generators), and follow the applicable ACTION statements. Verify adequate cooling remains available for the diesel generators required to be operable by Specification 3.8.1.2 or declare the affected diesel generator(s) inoperable and take the ACTION required by Specification 3.8.1.2.

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*When handling irradiated fuel in the secondary containment.

#When any diesel generator is removed from service in order to do work associated with tying in the additional diesel generator and its associated emergency service water pump is inoperable, Action a.1 shall read as follows:

a.1 With one emergency service water pump inoperable, restore the inoperable pump to OPERABLE status when its associated diesel generator is restored to OPERABLE status per Specification 3.8.1.1.

SURVEILLANCE REQUIREMENTS

4.7.1.2 The emergency service water system shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power operated, or automatic) servicing safety-related equipment that is not locked, sealed, or otherwise secured in position, is in its correct position.

b. At least once per 18 months by verifying that each pump starts automatically when its associated diesel generator starts.

c. At least once per 18 months by verifying that each automatic valve properly cycles to its proper position in its required time following receipt of an automatic pump start signal.

ULTIMATE HEAT SINK

LIMITING CONDITION FOR OPERATION

3.7.1.3 The spray pond shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, 3, 4, 5, and *.

ACTION:

a. With the groundwater level at any spray pond area observation well greater than or equal to 663' Mean Sea Level (MSL), prepare and submit a Special Report to the Commission pursuant to Specification 6.9.2 within the next 10 days outlining the cause of the high groundwater level and the plans for restoring the level to within the limit.

b. With the spray pond otherwise inoperable:

1. In OPERATIONAL CONDITION 1, 2, or 3, be in at least HOT SHUTDOWN within 12 hours and in COLD SHUTDOWN within the next 24 hours.

2. In OPERATIONAL CONDITION 4 or 5, declare the RHRSW system and the emergency service water system inoperable and take the ACTION required by Specifications 3.7.1.1 and 3.7.1.2.

3. In Operational Condition *, declare the emergency service water system inoperable and take the ACTION required by Specification 3.7.1.2. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.7.1.3 The spray pond shall be determined OPERABLE by verifying:

a. The average water temperature, which shall be the arithmetical average of the spray pond water temperature at the surface, mid and bottom levels, to be less than or equal to 88°F at least once per 24 hours.

b. The water level is greater than or equal to 678'1" MSL USGS, at least once per 12 hours.

c. The groundwater level at observation wells 1, 3, 4, 5, 6, and 1113 to be less than 663' MSL at least once per 31 days.

*When handling irradiated fuel in the secondary containment.

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

A.C. SOURCES - OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and

b. Four separate and independent diesel generators*, each with:

1. Separate engine mounted day fuel tanks containing a minimum of 325 gallons of fuel,

2. A separate fuel storage system containing a minimum of 47,570 gallons of fuel, and

3. A separate fuel transfer pump.

APPLICABILITY: OPERATIONAL CONDITIONS 1, 2, and 3.

ACTION:#

a. With either one offsite circuit or one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within 1 hour and 4.8.1.1.2.a.4, for one diesel generator at a time, within 4 hours and at least once per 8 hours thereafter; restore at least two offsite circuits and four diesel generators to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

b. With one offsite circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within 1 hour and 4.8.1.1.2.a.4, for one diesel generator at a time, within 3 hours and at least once per 8 hours thereafter; restore at least one of the inoperable A.C. sources to OPERABLE status within 12 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. Restore at least two offsite circuits and four diesel generators to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

*Shared with Unit 1.

#Prior to but within 24 hours of removing any diesel generator from service in order to do work associated with tying in the additional diesel generator, Surveillance Requirement 4.8.1.1.2.a.4 shall be performed on the diesel generators which are to remain in service.

When any diesel generator is removed from service in order to do work associated with tying in the additional diesel generator, the ACTIONS shall read as follows:

a. With one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour and 4.8.1.1.2.a.4, within 72 hours and at least once per 72 hours thereafter; restore at least four diesel generators to OPERABLE status within 60 days of accumulated tie-in outage time for all four diesels or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. The provisions of Specification 3.0.4 are not applicable.

b. With one offsite circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a within one hour and 4.8.1.1.2.a.4, within 24 hours and at least once per 72 hours thereafter; restore at least two offsite circuits to OPERABLE status within 12 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. With the two offsite circuits restored to OPERABLE status, follow ACTION a.

c. With one diesel generator of the above required A.C. electrical power sources inoperable, in addition to ACTION a or b, above, verify within 2 hours that all required systems, subsystems, trains, components and devices that depend on the remaining diesel generators as a source of emergency power are also OPERABLE except as noted in Specification 3.7.1.2; otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

d. With two of the above required offsite circuits inoperable, demonstrate the OPERABILITY of four diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4, for one diesel generator at a time, within four hours and at least once per 8 hours thereafter, unless the diesel generators are already operating; restore at least one of the inoperable offsite circuits to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 12 hours. With only one offsite circuit restored to OPERABLE status, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

e. With two or more of the above required diesel generators inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within one hour and 4.8.1.1.2.a.4, for one diesel generator at a time, within 2 hours; restore at least three of the diesel generators to OPERABLE status within 2 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. With three diesel generators restored to OPERABLE status, follow ACTION a.

LIMITING CONDITION FOR OPERATION (Continued)

ACTION (Continued)

c. With one diesel generator of the above required A.C. electrical power sources inoperable, in addition to ACTION a or b, above, verify within 2 hours that all required systems, subsystems, trains, components and devices that depend on the remaining diesel generators as a source of emergency power are also OPERABLE; otherwise, be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

d. With two of the above required offsite circuits inoperable, demonstrate the OPERABILITY of four diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4, for one diesel generator at a time, within four hours and at least once per 8 hours thereafter, unless the diesel generators are already operating; restore at least one of the inoperable offsite circuits to OPERABLE status within 24 hours or be in at least HOT SHUTDOWN within the next 12 hours. With only one offsite circuit restored to OPERABLE status, restore at least two offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

e. With two or more of the above required diesel generators inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within one hour and 4.8.1.1.2.a.4, for one diesel generator at a time, within 2 hours, and at least once per 8 hours thereafter; restore at least three of the diesel generators to OPERABLE status within 2 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours. Restore four diesel generators to OPERABLE status within 72 hours from time of initial loss or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.

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

SAFETY EVALUATION
AMENDMENT NOS. 51 AND 19 TO
FACILITY OPERATING LICENSE NOS. NPF-14 AND NPF-22
SUSQUEHANNA STEAM ELECTRIC STATION UNITS 1 AND 2 (SSES-1, SSES-2)
DOCKET NOS. 50-387, 50-388

Introduction

By the letter dated December 21, 1984, the Pennsylvania Power and Light Company (the licensee) proposed changes to Technical Specifications 3.7.1.2 and 3.8.1.1. The changes were proposed on a one time basis to allow the licensee to remove the 4 existing diesel generators (DG-A,B,C and D) one at a time, from service for an accumulated time of 60 days, i.e., an average of 15 days per diesel generator, which is much more than the limit of 72 hours (3 days) permitted by the present Technical Specifications. The changes are needed in order to perform work on the connection of the power and control circuits to the new fifth diesel generator (DG-E) which is being installed at the Susquehanna Station. The change would allow the units to operate while the generator tie-in work is conducted.

The main purpose of the fifth diesel generator is to avoid a two unit shutdown, if one of the 4 existing diesel generators becomes inoperable. The SSES Technical Specifications require plant shutdown within 72 hours of declaring a diesel generator to be inoperable. The fifth emergency diesel generator will be used as a replacement and will have the capability of supplying the emergency loads of any one of the four existing diesel generators. As such, the main purpose of the fifth diesel generator is to allow maintenance to be performed on any one of the four existing diesel generators without the necessity for a two unit outage.

By letters dated July 1, 1985, August 7, 1985, August 23, 1985, and September 4, 1985 the licensee provided additional information in support of the proposed changes. In addition, by letter dated September 23, 1985, the licensee requested a one time exemption from the single further criteria for the onsite electric power supplies as proveded in General Design Criteria 17 of 10 CFR Part 50, Appendix A. The related exemption is the subject of a separate Safety Evaluation dated December 3, 1985.

For evaluating the changes to the Technical Specification and the acceptability of the related exemption, the staff reviewed the licensee's technical justifications for each change and also their justifications based on a Probabilistic Risk Assessment (PRA) study on the subject. The staff also reviewed the reliability of the Offsite Power System as the preferred source of power to the plant safe shutdown system, and the reliability of the existing diesel generators to ascertain that, while one of them is taken out of service to complete the new diesel generator tie-in work under the extended Limiting Conditions for Operation (LCO), the remaining three will provide a reliable

source of emergency power. The tie-in work itself, including applicable procedures, was reviewed to demonstrate that this work will not degrade the operability of the safe shutdown systems, including the remaining diesel generators, while the plant continues to operate. Included in this review was the adequacy of the post-modification testing for each diesel generator (i.e. testing before a diesel is returned to service and another one is taken out of service for the tie-in work). The staff also reviewed the related plant Emergency Procedures, and operator training and knowledge, to verify that such procedures are adequate in dealing with a postulated emergency while in the extended LCO and that the operator would properly respond to the emergency. The details of this review are discussed below.

Evaluation

A. Technical Specification Changes

In order to determine the acceptability of this amendment and its overall safety implications it is important to understand the Technical Specification changes being made. The changes to the Technical Specifications for SSES-1 and SSES-2 are described below.

Action a. of TS 3.8.1.1

1. The footnote associated with Action a. of TS 3.8.1.1 requires that prior to removing any diesel generator from service, in order to do work associated with tying-in the E diesel, Surveillance Requirement 4.8.1.1.2.a.4 will be performed during the previous 24 hours.

2. TS 4.8.1.1.2.a.4, is changed from testing 4 hours after the LCO, to testing 72 hours after one diesel is removed from service.

3. The subsequent testing frequency of 4.8.1.1.2.a.4 is changed from testing the diesels once every 8 hours to once every 72 hours.

4. Action a. of 3.8.1.1 is changed from requiring diesel generator operability within 72 hours of the LCO to a total time of 60 accumulated days for all four diesel generators.

Action b. of TS 3.8.1.1

5. The start of the first testing per TS 4.8.1.1.2.a.4 is changed from testing within 3 hours after the LCO to testing within 24 hours after the LCO.

6. Same change as described in item 3 of Action a. above.

Action c. TS 3.8.1.1

The words "except as noted in specification 3.7.1.2" have been added to alert the operators that the ESW pump associated with the inoperable diesel generator will not automatically start upon demand.

Action d. of TS 3.8.1.1

7. The present TS requirements will be applicable during the fifth diesel generator tie-in work. During a conference call on October 17, 1985 with the licensee it was determined that there was no basis to change the existing 3.8.1.1.d Technical Specification as it adequately covers the extended LCO conditions.

Action e. of TS 3.8.1.1

8. The present TS requires surveillance 4.8.1.1.2.a.4 to be performed within 2 hours and at least 8 hours thereafter; three of the diesels must be restored within 2 hours or be in Hot Shutdown (HS) within the next 12 hours. The changed TS requires surveillance 4.8.1.1.a.4 to be performed within 2 hours; at least three diesels must be operable within 2 hours or be in HS within the next 12 hours.

9. The present TS requires all four of the diesel generators to be restored to operable status within 72 hours. The changed TS requires three diesels to be operable before following Action a.

Action a. of TS 3.7.1.2

10. The footnote to TS 3.7.1.2 Action a.1. allows the Emergency Service Water (ESW) pump associated with the diesel taken out of service to remain inoperable until its associated diesel generator is returned to service.

The staff evaluation of the licensee's justification for the above changes is as follows:

1. When a Diesel is taken out of service for the purpose of tying in the E diesel the remaining three diesels will be tested for operability during the previous 24 hours. A certain fraction of a diesel generator's failure to start comes from failures to the diesel incurred while in standby status. By successfully testing the diesel before the demand is required, the reliability of successful starts is inherently increased by decreasing the time in standby status. This is also consistent with the operating practice which the licensee already employs.

2. The 72 hour testing frequency used when a diesel is taken out of service is based on Generic letter 84-15 (Reference 12) and on the present TS Table 4.8.1.1.2-1, Diesel Generator Test Schedule. Generic letter 84-15, Item 1, encourages a reduction in cold fast starts as a means of preventing premature diesel engine degradation. Table 4.8.1.1.2-1 prescribes the test frequency by the number of failures in the last 100 valid tests.

Under the worst case condition, the diesels would be required to be tested every 72 hours to prove operability. This change is consistent with the recommendations of Generic letter 84-15 and the TS diesel generator operability requirements.

3. Same justification and evaluation as item 2 above applies.

4. The TS change allows 60 days of accumulated diesel generator inoperability to accommodate tying in the E diesel. It was estimated that approximately 15 days per diesel would be required to make all power control circuit connections. The safety significance of having a diesel inoperable for 60 days was evaluated on a Probabilistic Risk Assessment (PRA) basis. For the technical adequacy of justification of the PRA, refer to Section F. under the evaluation section of this report.

5. Changing the start of first testing from within 3 hours after the LCO to within 24 hours is based on the fact that a diesel will not be taken out of service when an offsite circuit is already out of service. The last diesel test will be within the previous 72 hours and therefore testing the diesels within 24 hours adequately establishes reliability.

6. Same justification and evaluation as item 2 above applies.

7. No change in current technical specification.

8. The reduced testing (i.e., no testing every 8 hours thereafter) is consistent with the recommendations of Generic Letter 84-15. (see items 2. above). Furthermore, the diesels would have been tested prior to but within 24 hours of the LCO work and also tested every 72 hours after entering the LCO. The diesels would be tested again within 2 hours if two or more diesels become inoperable. Therefore, the reduced testing is acceptable.

9. The change in the present TS reflects the fact that it will be normal, during the temporary TS change, for a diesel to be out of service.

10. The licensee has stated that removing a diesel generator does not affect the automatic transfer from the A to the B train of the ESW system. The effect of the loss of the associated ESW pump on the associated systems is addressed by the PRA study. This change poses no significant decrease in plant safety or its core cooling capability and is therefore acceptable.

Based on the above, the staff concludes that these TS changes are based on conservative principles, conform to applicable guidance on the subject, and are therefore acceptable. In addition, the staff concludes that the licensee has taken appropriate measures to compensate for taking a diesel out of service beyond the presently allowable 3 days and that a one-time Technical Specification change to extend the LCO is acceptable.

B. Reliability of Offsite Power System

The offsite power system is the preferred power source for the plant. The bulk power system (electrical grid) is the source of electrical energy for the offsite power system. The safety function of the offsite power system is to furnish electrical energy to assure that the specified acceptable fuel design limits and design conditions of the reactor coolant pressure boundary will not be exceeded as a result of anticipated operational occurrences and that core cooling, containment integrity, and other vital dependent offsite circuits of sufficient capacity and capability supply electrical power to the onsite distribution system for Susquehanna Units 1 and 2 to provide for the above safety function. In the unlikely event of a simultaneous loss of both offsite circuits; an onsite emergency power system, which is common and shared between Units 1 and 2, provides this function. The staff had previously reviewed the design of these systems and had concluded that the design meets the requirements of General Design Criteria 5, 17 and 18 and is acceptable (Reference 7).

The offsite power system is designed to provide a reliable source of power to the plant safe shutdown systems. The two separate sources of offsite power have sufficient separation and isolation so that no single event such as transformer failure or transmission line tower failure can cause simultaneous disruptions of both sources.

The licensee's plan for the bulk power system is in accordance with established bulk power planning criteria. These criteria are based on the Reliability Principles and Standards of the Mid-Atlantic Area Council which is a regional reliability council of the National Electric Reliability Council. Digital power flow and transient stability studies were conducted to demonstrate that the bulk power system is in compliance with these reliability criteria. The digital power flow studies include an evaluation of all practical single contingencies, including double circuit power line outage conditions and several abnormal system disturbance conditions. Transient stability studies show that, for various 230-kilovolt and 500-kilovolt system faults, system stability is maintained and satisfactory restoration of the system voltage occurs resulting in no interruptions of the offsite power supply system. The loss of either Susquehanna Unit 1 or Unit 2 represents the loss of the largest single supply to the grid. For the loss of either Susquehanna unit, grid stability and integrity are maintained (Reference 7).

Based on the results of the stability studies presented in the Final Safety Analysis Report, there is reasonable assurance that the ability of the Pennsylvania Power and Light Company grid to provide offsite power to the Susquehanna Steam Electric Station will not be impaired by the loss of the largest external single supply to the grid, the loss of the most critical transmission line, or the loss of a Susquehanna unit itself.

In the unlikely event of loss of offsite power (LOOP), i.e., simultaneous loss of both offsite sources, procedures are in place to restore offsite power to the plant. The restoration time depends upon the cause of the outage. If no damage exists, the offsite power can be restored within minutes by automatic or supervisory switching operations. In the event of a grid blackout, it is expected to restore the offsite power to the plant within 2 to 3 hours. Finally, in most cases, the restoration is expected within 6 hours (Reference 3 and 4).

In the unlikely event of a LOOP, the plant could still be safely shutdown using the onsite emergency power system and onsite batteries. Of the 4 existing diesel generators in the onsite emergency power system, one is sufficient to place both units in the cold shutdown condition. Three diesel generators provide sufficient power to place both units in cold shutdown conditions, following a simultaneous loss of offsite power and a design basis loss of coolant accident in one unit (Reference 4).

During the LCO work involving any of the 4 existing diesel generators, the licensee will take all precautions to maintain the high reliability of the two offsite power sources. Similarly, when a significant degradation of the reliability of the offsite power sources is expected, such as during severe weather conditions, the licensee will not undertake the tie-in work. If the tie-in work is already in progress under these conditions, the licensee will exit the LCO as expeditiously as practical (Reference 4). These precautions will ensure maintaining the reliability of the offsite power system during the tie-in work.

In the unlikely event of a station blackout (SBO), i.e., a simultaneous loss of both offsite and onsite alternating current power systems, the plant can sustain such an event for an estimated period of 24 hours using in place plant procedures (Reference 4 and 13).

Based on the above, the staff concludes the reliability of the offsite power system is adequate for allowing the licensee to extend the existing LCO for the onsite electrical power sources on a one time basis, and that sufficient redundant methods exist to safely shutdown the plant in the event of anticipated operational occurrences or postulated accidents during the extended LCO.

C. Reliability of Installed Diesel Generators

Reliability and capability of diesel generators for onsite Emergency Power Systems are required by 10 CFR 50, Appendix A, Criterion 17. The four installed diesels at Susquehanna demonstrated this reliability and capability by successfully completing the test requirements of IEEE Standard 387-1977 (Reference 15). Periodic on-going surveillance testing in accordance with Plant Technical Specifications will assure continued capability and reliability of the diesel generator systems.

During the first quarter of 1985, the NRC staff conducted a reliability evaluation of the Susquehanna diesel generators by reviewing the failure history of the diesels. Conclusions reached during this study are that the present 0.99 diesel generator reliability is adequate, based upon only one valid failure in the last 100 starts (Reference 14). Further review by the NRC Regional Office, of the subsequent operation and failure history of the diesels, confirms the reliability conclusions of this study. A review of failure causes by the licensee with the diesel generator manufacturer has led to several changes which should further assure a continued high level of reliability.

Based upon the above, the staff concludes that the three remaining OPERABLE Susquehanna diesel generators will provide a reliable source of onsite emergency power during this 60 day period in which the tie-in work will be performed.

D. Work Performed Under the LCO

Sequentially, one at a time, the four diesel generators will be taken out of service to modify power, control, and instrumentation circuitry such that the new 5th diesel generator can function as a manual swing spare for any one of the four existing diesels.

Work to be performed during the Limiting Conditions for Operation will be performed in accordance with licensee plant modification procedures. The procedures include the following:

1. Modification of the diesel generators' 4 KV power cubicles split the power bus bars such that incoming power from each diesel generator is routed through a new dual circuit breaker cubicle and then to the safety related 4KV busses. The work consists of removing bolted sections of bus bars in the 4 KV power cubicles and terminating power cables to the dual circuit breaker cubicle.

2. Routing control, instrumentation and alarm circuits for each diesel generator such that they go through new switching cubicles which permit manual switching of these circuits such that the 5th diesel generator circuits assume the identity of any of the four existing diesels.

   This work consists of determinating circuits in each diesel generator motor control center, engine and generator control cubicles. Determinated cables will be pulled out of these cubicles and reterminated in new terminal boxes that are wired to the new switching cubicles. New cables will be pulled into the cubicles to make up circuits at terminal points where other wiring was determinated earlier. Additional alarm and indication circuits will be installed for the diesel generators' circuit breakers and transfer switches alignment information.

3. All work performed will be inspected, tested, and verified in accordance with licensee procedures prior to declaring a modified diesel generator operable, and returning it to service for plant operation. Verification will include power, control, instrumentation and alarm circuits testing. Verification also includes start-up and operation of each diesel including synchronizing and loading onto the grid. The verification of operability must be completed prior to taking another diesel generator out of service for tie-in work.

   The staff reviewed the modification packages and the applicable procedures and drawings, to verify that no adverse effects on the safety related systems will be caused by the LCO work. The staff concluded that the work to be performed during the tie-in of the 5th diesel generator does not cause degradation of, or adversely affect the ability of the diesel generators or other safety related systems and equipment to perform their intended safety functions. All work performed during the extended LCO is performed on diesel generator equipment and circuits that are both physically and electrically isolated from other safety related circuits and equipment. This isolation assures no adverse effects on other plant safety related systems.

   Based on the above, the staff concludes that the 5th diesel generator can be installed in accordance with the licensee's design modification packages and plant modification procedures without degrading other plant safety related systems.

E. Emergency Procedures and Operator Training

   The licensee has developed sufficient emergency procedures to respond to a partial or complete loss of any or all sources of power to safe shutdown systems. This includes situations involving loss of offsite power sources, onsite power sources, and a simultaneous loss of offsite and onsite power sources (station blackout). In the event of a station blackout, the reactor core isolation cooling (RCIC) system, or high pressure coolant injection (HPCI) system can be used to provide make-up water to the reactor vessel for a period of 8 hours. It is estimated that the plant can sustain a station blackout for 24 hours using RCIC, HPCI, and the diesel driven fire pump. The staff has determined that the licensee has developed sufficient emergency procedures for these systems (Reference 4).

   Additional emergency procedures did not have to be developed for the period of the LCO extension. The existing emergency procedures already encompass these operational conditions. The staff reviewed selected samples of the procedures, to ascertain the adequacy of these emergency procedures during the LCO extension. Operator training and knowledge related to these procedures was also reviewed. Each was found to be adequate.

F. PRA Evaluation

This portion of the staff's overall review gives the staff estimate of the increment in probability of severe core damage from this temporary Technical Specification change and gives the analysis in support of this estimate. In reference 1, PP&L estimated the increment in core melt probability from this temporary Technical Specification change as 1.4×10^{-6}; the analysis supporting this estimate is given more completely in reference 3.

The staff has obtained a conservative estimate of 3×10^{-5} (or about 20 times larger than the licensee's estimate) for the increment in core melt probability from this temporary Technical Specification. Of this, there is an estimated probability of about 2×10^{-5} that both units will experience severe core damage, and an estimated probability of 1×10^{-5} that unit 1 will experience severe core damage, but not unit 2, with the same probability for unit 2 experiencing severe core damage, but not unit 1.

Thus the probability that at least one of the units will experience severe core damage is increased by 4×10^{-5}, by the temporary Technical Specification change. This does not take into account the fact that, after the 5th diesel generator is connected, the frequency of severe core damage will be decreased so that the probability of severe core damage over the lifetime of the units would likely decrease.

The staff estimate of severe core damage is modeled on the analysis of loss of offsite power transients at the Shoreham Nuclear Power Station, as given in the BNL review of the Shoreham PRA (Reference 16). (The Shoreham plant and the Susquehanna plant are both BWR-4 plants.) In addition, information was obtained from the station blackout evaluation performed by PP&L for Susquehanna (Reference 17).

There are two major reasons for the difference in results in the staff analysis and the analysis given by the licensee in reference 3. The first is the frequency of extended losses of offsite power. The reference 3 analysis assumes that the frequency of losses of the offsite power exceeding 10 hours is 8×10^{-5}/yr. The staff, basing its analysis on NUREG-1032, draft for comment (Reference 18), obtains a frequency of losses of offsite power exceeding 10 hours of 6×10^{-3}/yr, nearly two orders of magnitude higher. The second major reason for the difference in estimates of the probability of severe core damage for this requested Technical Specification change is the inclusion of an additional sequence. During station blackout the only reactor vessel water level indication available in the control room is narrow range indication.

These narrow range indicators will read higher than the true water level, because of flashing in the reference leg which occurs on the loss of drywell cooling. Therefore there is the potential for human error in excessive throttling of HPCI or RCIC, and core uncovery, or , conversely, in excessive water flow to the reactor resulting in a level 8 trip, with subsequent failure in restart of the high pressure coolant injection system or the reactor core isolation cooling system. The value for the human error was taken from the BNL analysis for Shoreham.

System Analysis

DC Systems

At Susquehanna, there are both 125 VDC batteries, required for operation of the safety/relief valves in the relief mode, and 250 VDC batteries, required for operation of the High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC) systems.

According to the Station Blackout Analysis and Test Plan of the licensee (Reference 17), the 125 VDC system is expected to last a minimum of 6 hours. When these batteries are exhausted it will be impossible to maintain depressurization. According to the same document, the 250 VDC batteries, required for RCIC and HPCI operation, will last 24 hours. According to information obtained informally from the licensee, the RCIC and HPCI systems also require 125 VDC, because Bailey controllers in these systems are on 125 VDC buses. The Shoreham PRA made a similar statement for its battery lifetime, but BNL rejected the assumption, estimating the batteries would last only 10 hours, similar to the time batteries would last in other BWRs reviewed by BNL. The staff has made the same assumption of a 10 hour battery lifetime, for 250 VDC system. Reference 17 indicates that the 125 VDC lifetime can be extended by transferring some of the emergency lighting loads by center-tapping the 250 VDC batteries and running temporary cables. The staff has therefore assumed that the 125 VDC batteries will be available for 10 hours. In estimating the life of the 250 VDC batteries, the number of trips/restarts of the RCIC system must be taken into account. As mentioned above there is only narrow range level indication of reactor vessel water level in the control room, so that minimization of the number of trips/restarts of the RCIC system may be difficult but must be taken into account. We note that because HPCI and RCIC are estimated to fail in a time frame on the order of 8 hours, according to the licensee, even if the 250 VDC batteries were to last longer, the estimated core melt probability (due to the temporary Technical Specification change) would be essentially the same.

Diesel-driven Fire Pump

As long as the reactor is depressurized, and as long as HPIC or RCIC is available for the first hour, then, after this time, the diesel-driven fire pump could be used to maintain core cooling. However, the Shoreham PRA gave no credit for the use of the diesel-driven fire pump at Shoreham, because its use requires extensive operator action under high stress conditions. The staff will also not give any credit for the diesel-driven fire pump in this case. The staff notes, however, that the results are insensitive to the assumption that the diesel-driven fire pump will not be used successfully. The reason is that the use of the diesel-driven fire pump requires maintenance of depressurization, and this requires the 125 VDC batteries. As will be seen below, one of the most important sequences involves a station blackout in excess of 10 hours. Since the batteries are assumed to deplete in 10 hours, depressurization cannot be maintained in excess of 10 hours, and the diesel-driven fire pump cannot

be used to mitigate this sequence. Another important sequence involves prompt failure of HPCI and RCIC, under station blackout conditions. This sequence also cannot be mitigated by the diesel-driven fire pump.

Onsite AC System

The diesel generators depend on service water. It turns out that the emergency service water (ESW) system is configured such that the failure of or unavailability, of diesel generators A and B will fail fans which cool the service water pumps. The licensee has assumed that failure of these fans in effect will fail the service water pumps. The staff has made the same assumption. In addition, there are dependencies of certain valves in the service water sytem on diesel generators A and B. With service water failed, the other diesel generators are failed consequentially. It follows therefore that if diesel generator A is in maintenance and diesel B fails, or vice versa, then the other diesel generators will fail, according to the licensee's assumptions.

The licensee has, for simplicity, assumed in effect that the failure of or unavailability of any two diesel genreators leads to station blackout. The staff has made the same assumption. In addition, we shall take .03 per demand as the failure-to-start probability for a diesel generator. This is a typical, industry average value, given, e.g., in the IREP Procedures Guide, NUREG/CR-2778. Such a value may be conservative, for the present case. The reason is that a certain fraction of the failures of diesel generators are related to the time in standby since the last test. During the LCO extension the remaining three diesel generators will be tested 24 hours before each diesel generator is taken out of service. Thus the standby-related failures will be decreased. Although there is some uncertainty as to the relative importance of the standby-related failure, Mankamo and Pullekinen (Reference 19) state that the diesel generator failure probability is described mainly by the standby failure rate, and that the starting-stress-related failures are relatively small. If this is the case, the failure probability of a diesel generator is overestimated in our analysis. The possible conservatisms in the staff analysis are probably greatest in the staff's treatment of the failure probability of the onsite power system. A nonconservatism in the staff's analysis is the neglect of sequences involving diesel generator failure to run.

Frequency of Losses of Offsite Power Exceeding a Specified Duration

The staff follows the procedure in NUREG-1032, draft for comment, Reference 18, in determining the frequency of loss of offsite power exceeding a specified duration. According to various characteristics of the plant and its grid, the procedure in NUREG-1032 assigns a plant to a cluster of plants, and then gives, for each cluster of plants, a frequency of losses of offsite power exceeding a specified duration. The various plant characteristics are switchyard design, grid reliability and recovery characteristics, severe weather characteristics, and extremely severe weather characteristics. The staff assumed that the plant is in the grouping with best switchyard design, and best grid reliability and recovery characteristics. This assumption does not play a paramount

role in the actual number because of the severe weather, and extremely severe weather characteristics of the plant. The following information, obtained from the Susquehanna FSAR (pages 2.3-3 to 2.3-6), was needed for the computation of the severe weather indices used in NUREG-1032, draft for comment:

(1) There were 38 tornadoes within 50 miles of site, between 1950 and 1973.

(2) The frequency of winds exceeding 74 miles per hour is .02/year.

(3) There are between 40 and 50 inches of snow per year.

Therefore, the staff obtains the following weather hazards rates

$h(\text{tornado}) = 2.1\times10^{-4}\text{mi}^2/\text{yr}$
$h(\text{wind}) = .02/\text{year}$
$h(\text{snow/ice}) = 45\ \text{inches/yr}$

The expected frequencies of loss of offsite power from each weather related cause is given by the formula listed below:

$$S=Ph,$$

where, from reference 18

$P(\text{tornado}) = 27\ \text{mi}^2$
$P(\text{wind}) = .026/\text{incident}$
$P(\text{snow/ice}) = 1.8\times10^{-4}/\text{inch of snow fall}$

The staff obtains for the expected frequencies of losses of offsite power of each weather type,

$S(\text{tornado}) = .0057/\text{yr}$
$S(\text{wind}) = 5.2\times10^{-4}/\text{yr}$
$S(\text{snow/ice}) = .008/\text{yr}$

The sum of the categories of S is .0142, which places Susquehanna in severe weather category S3. The plant does not have the capability of recovering from a severe weather induced loss of offsite power within 2 hours. It is therefore in recovery class 2, which places it in severe weather/recovery class SR6. The tornado frequency places the plant in extremely severe weather category SS4. With this assignment of the plant to S3 and SS4, Table A.10 of NUREG-1032, (draft for comments) indicates that Susquehanna is in cluster 4. This assumes we are interested in an average, year-round, frequency of loss of offsite power. However, the actual outage will likely take place in the winter. In this case, the severe weather/recovery class will still be SR6. The frequency of losses of offsite power due to snow increases, and that due to high wind and tornadoes decreases. However, the chance of a loss of offsite power due to extremely severe weather conditions (winds in excess of 125 mph) decreases. Nevertheless, it is judged that even if one considered that the diesel generator outage will likely take place in the January/February time frame, that Susquehanna is still assigned to cluster 4.

Using the assignment of the plant to cluster 4, valid for an average year-round frequency of losses of offsite power, the following frequencies of losses of offsite power exceeding t hours is obtained from Figure A.14 of Reference 18:

t	frequency
1/2 hr	.045/yr
4 hrs	.011/yr
10 hrs	.006/yr

Sequences and Their Quantification

The staff has estimated the probability of severe core damage (due to the temporary Technical Specification change) from the sequences judged most important. The selection of the most important sequences was determined from an examination of the BNL review (Reference 16) of the Shoreham PRA. The sequences we have selected contribute about 2/3 of the core melt frequency from the loss of offsite power initiator, in the BNL review of Shoreham. The neglect of the other sequences constitutes a non-conservative assumption. We will first estimate the probability per year of severe core damage from loss of offsite power transients under the condition that one diesel generator is out of service. Then, by multiplying by 60/365, we obtain the increase in core melt probability from the 60 day cumulative outage. As discussed earlier the staff assumed that the diesel generator that is out of service is either diesel generator A or B; if diesel generator A is out of service, and diesel generator B fails (or vice versa), then station blackout follows.

Sequences Involving Loss of Reactor Water Level Instrumentation

At Susquehanna, under station blackout conditions, there is a loss of all reactor water level instrumentation in the control room, except for narrow range water level indicators. Moveover, the reference leg of these narrow range water level indicators may flash, so that the reactor water level indication will be higher than the true water level. Under these circumstances, BNL estimated the conditional probability of core melt as .05, and the staff has used this value. If there is excessive throttling of the high pressure system, the core will uncover. If there is excessive flow to the reactor, there will be level 8 trips. Each restart of the high pressure system represents a battery drain, and a challenge to the high pressure system.

The sequence is therefore quantified as follows, assuming diesel generator A is out of service:

frequency of loss of offsite power exceeding 1/2 hour:	.045/yr
probability Diesel Generator B fails:	.03
probability of Human Error due to loss of wide range water level instrumentation in control room:	.05
Sequence frequency	6.8×10^{-5}/yr

The staff notes that wide range water level indication will still be available outside the control room, at a local reactor building instrument rack (see p. 2-5 of Reference 17). If communication could be set up between this local reactor building instrument rack and control room, and appropriate procedures followed, it would appear that the frequency of this sequence could be decreased.

Sequence Involving HPCI/RCIC Prompt Failures

The staff takes the probability of joint failure of HPCI and RCIC as .01, from the BNL review of Shoreham. This value applies to the 0-2 hr time frame after offsite power is lost. The quantification, again assuming that diesel generator A is out of service, is:

frequency of losses of offsite power exceeding 1/2 hr:	.045/yr
probility of Diesel Generator B failing to start:	.03
probability that HPCI and RCIC fail	.01
Sequence frequency	1.4×10^{-5}/yr

Station Blackout for 10 Hours

As discussed, the staff has assumed a depletion time for the 125 VDC batteries and the 250 VDC batteries of 10 hours, but even if the 250 VDC batteries had a longer depletion time, the results would not be affected much, because of failure of HPCI/RCIC due to lack of room cooling. The quantification, again assuming that diesel generator A out of service:

frequency of loss of offsite power for greater than 10 hrs:	.006/yr
probability Diesel Generator B fails:	.03
failure to repair diesel generator in 10 hrs:	.5
Sequence frequency	9×10^{-5}/yr

Sequence Involving Station Blackout for Between 4 and 10 Hours, with Failure of HPCI and RCIC in This Time Period.

BNL, in its review of the Shoreham PRA, estimates a probability of 0.13 for joint failure of HPCI and RCIC in the 4 to 10 hour time frame; the principal cause of this joint failure is premature battery failure. The quantification, again assuming diesel generator A is out of service is then :

frequency of losses of offsite power for between 4 and 10 hrs. = .0011-.006 = .005/yr	
probability that diesel generator B fails	= .03
probability that HPCI/RCIC fails	= .13
probability of nonrecovery of diesel generator	= .7
Sequence frequency	1.4×10^{-5}/yr

Increase in Core Melt Probability from the 60 Day Cumulative Outage of the Diesel Generators.

As mentioned above, to determine this increase in core melt probability we must sum the above sequence frequencies and multiply by 60/365. The staff has obtained a probability of $3x10^{-5}$. The last two sequences lead to a double core melt; hence the part of the $3x10^{-5}$ corresponding to a double core melt is $1.7x10^{-5}$, and the probability that Unit 1 will have a core melt, but not Unit 2, during the outage period, is $1.3x10^{-5}$.

Conclusion

Based on the above discussion in sections A-F, the NRC staff has concluded that the proposed temporary Technical Specification changes for SSES-1 and SSES-2 are acceptable.

Environmental Consideration

These amendments involve a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and a change in reporting requirements. The staff has determined that these 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 this amendments involve no significant hazards consideration and there has been no public comment on such findings. Accordingly, these amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9) and (c)(10). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of these amendments. However, a related Exemption to GDC-17 is being processed relative to this action and a Notice of Environmental Assessment and Finding of No Significant Impact has been processed relative to the Exemption. This Notice of Environmental Assessment and Finding of No Significant Impact was published in the Federal Register on December 2, 1985 (50 FR 49470).

Conclusions

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Dated: DEC 3 1985

References

1. Licensee letter PLA-2346, Proposed Amendment NO. 58 to NPF-14 and Proposed Amendment No. 13 to NPF-22, N.W. Curtis to A. Schwencer December 21, 1984.

2. Licensee letter PLA-2501, Additional Information on item 1 above, N.W. Curtis to W.R. Butler, July 1, 1985.

3. Licensee letter PLA-2514, Additional Information on item 1 above, N.W. Curtis to W.R. Butler, August 7, 1985.

4. Licensee letter PLA-2523, Additional Information on item 1 above, N.W. Curtis to W.R. Butler, August 23, 1985.

5. Licensee letter PLA-2524, Revision 1 to item 1 above, N.W. Curtis to W.R. Butler, August 23, 1985.

6. SSES Final Safety Analysis Report, Revision 35, July 1984, Section 8.0, Electric Power.

7. NUREG-0776, Safety Evaluation Report related to the operation of Susquehanna Steam Electric Station, Units 1 and 2, April 1982, and its supplements.

8. NUREG-0800, Standard Review Plan, Revision 2, July 1981.

9. NUREG/CR-0550, Enhancement of Onsite Emergency Diesel Reliability February 1979.

10. Regulatory Guide 1.93, Availability of Electric Power Sources, December 1974.

11. Regulatory Guide 1.108, Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants, Revision 1, August 1977.

12. Generic Letter 84-15, from Director, Division of Licensing, to all Licensees, Proposed Staff Actions to Improve Diesel Generator Reliability, July 2, 1984.

13. Licensee letter PLA-1136, Station Blackout Safety Analysis and Test Plan, N.W. Curtis to A. Schwencer, June 15, 1982.

14. NRC Internal Memorandum, Evaluations of Susquehanna Diesel Generator Failures, L.S. Rubenstein to H.R. Denton, March 8, 1985.

15. Licensee letter PLA-958, Diesel Generator 300 Start Test, N.W. Curtis to A. Schwencer, January 18, 1982.

16. D. Ilberg, K. Shiu, N. Hanan, E. Anavim, "A Review of the Shoreham Nuclear Power Station Probabilistic Risk Assessment," NUREG/ACR-4050, final draft, June 1985.

17. Letter from N.W. Curtis, Pennsylvania Power and Light, to A. Schwencer, USNRC, June 15, 1982.

18. P.W. Baranowsky, "Evaluation of Station Blackout Accident at Nuclear Power Plants," NUREG-1032, draft for comment, May 1985.

19. T. Mankamo and U. Pulkinnen, Nuclear Safety 23, January - February 1982, p. 32.