

Mr. Harold W. Keiser
 Executive Vice President
 Nuclear Business Unit
 Public Service Electric & Gas
 Company
 Post Office Box 236
 Hancocks Bridge, NJ 08038

March 23, 1999

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 (TAC NOS. M96638 AND M96639)

Dear Mr. Keiser:

The Commission has issued the enclosed Amendment Nos. 218 and 200 to Facility Operating License Nos. DPR-70 and DPR-75 for the Salem Nuclear Generating Station, Unit Nos. 1 and 2. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated September 25, 1996, as supplemented on October 29, 1997, March 16, 1998, and February 8, 1999.

These amendments revise the voltage and frequency acceptance criteria and the start-timing methodology for the emergency diesel generator TSs surveillance testing.

The NRC found that the completion of its review was delayed for over a year by the submission of multiple changes by the licensee.

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

Sincerely,
 ORIGINAL SIGNED BY:
 Patrick D. Milano, Senior Project Manager
 Project Directorate I-2
 Division of Licensing Project Management
 Office of Nuclear Reactor Regulation

Docket Nos. 50-272/50-311

- Enclosures: 1. Amendment No. 218 to License No. DPR-70
 2. Amendment No. 200 to License No. DPR-75
 3. Safety Evaluation

cc w/encls: See next page

DISTRIBUTION

Docket File	EAdensam	GHill(4)	JLinville, RGN-I
PUBLIC	TClark	JCalvo	RNorsworthy (E-Mail SE)
PDI-2 Reading	PMilano	RWessman	ACRS
JZwolinski	OGC	WBeckner	*Previously Concurred

OFFICE	PDI-2/PM	PDI-2/EA	EELB/C*	EMEB/C*	OGC*	PDI-2/D
NAME	PMilano:mw	TClark	JCalvo	RWessman	CBarth	EAdensam
DATE	3/19/99	3/19/99	12/23/98	12/23/98	03/09/99	3/19/99

OFFICIAL RECORD COPY
 DOCUMENT NAME: SA96638.AMD

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

March 23, 1999

Mr. Harold W. Keiser
Executive Vice President -
Nuclear Business Unit
Public Service Electric & Gas
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Sincerely,

A handwritten signature in black ink, appearing to read "Patrick D. Milano".

Patrick D. Milano, Senior Project Manager
Project Directorate I-2
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-272/50-311

Enclosures: 1. Amendment No. 218 to
License No. DPR-70
2. Amendment No. 200 to
License No. DPR-75
3. Safety Evaluation

cc w/encls: See next page

Mr. Harold W. Keiser
Public Service Electric & Gas
Company

cc:

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Salem Nuclear Generating Station,
Units 1 and 2

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

PUBLIC SERVICE ELECTRIC & GAS COMPANY

PHILADELPHIA ELECTRIC COMPANY

DELMARVA POWER AND LIGHT COMPANY

ATLANTIC CITY ELECTRIC COMPANY

DOCKET NO. 50-272

SALEM NUCLEAR GENERATING STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 218
License No. DPR-70

1. The Nuclear Regulatory Commission (the Commission or the NRC) has found that:
 - A. The application for amendment filed by the Public Service Electric & Gas Company, Philadelphia Electric Company, Delmarva Power and Light Company and Atlantic City Electric Company (the licensees) dated September 25, 1996, as supplemented on October 29, 1997, March 16, 1998, and February 8, 1999, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and 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 rules and 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. DPR-70 is hereby amended to read as follows:

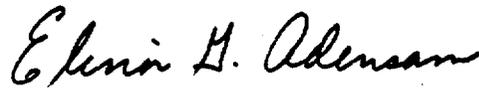
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(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 218, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance to be implemented within 90 days.

FOR THE NUCLEAR REGULATORY COMMISSION



Elinor G. Adensam, Director
Project Directorate I-2
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: March 23, 1999

ATTACHMENT TO LICENSE AMENDMENT NO. 218

FACILITY OPERATING LICENSE NO. DPR-70

DOCKET NO. 50-272

Revise Appendix A as follows:

Remove Pages

3/4 8-3
3/4 8-4
3/4 8-5
3/4 8-5a
B 3/4 8-1

Insert Pages

3/4 8-3
3/4 8-4
3/4 8-5
3/4 8-5a
B 3/4 8-1

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Two physically independent A.C. circuits between the offsite transmission network and the onsite Class 1E distribution system (vital bus system) shall be:

- a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments, power availability, and
- b. Demonstrated OPERABLE at least once per 18 months during shutdown by transferring (manually and automatically) vital bus supply from one 13/4 kv transformer to the other 13/4 kv transformer.

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

- a. At least once per 31 days on a STAGGERED TEST BASIS by:
 1. Verifying the fuel level in its day tank.
 2. Verifying the diesel generator starts from standby conditions* and achieves ≥ 3910 volts and ≥ 58.8 Hz in ≤ 13 seconds, and subsequently achieves steady state voltage of ≥ 3910 and ≤ 4400 volts and frequency of 60 ± 1.2 Hz.

Subsequently, verifying the generator is synchronized with voltage maintained ≥ 3910 and ≤ 4580 volts, gradually loaded to 2500-2600 kw**, and operates at a load of 2500-2600 kw for greater than or equal to 60 minutes.
 3. Verifying the diesel generator is aligned to provide standby power to the associated vital bus.
- b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to one hour by checking for and removing accumulated water from the day tanks.
- c. At least once per 6 months by verifying the diesel generator starts from standby conditions* and achieves ≥ 3910 volts and ≥ 58.8 Hz in ≤ 13 seconds, and subsequently achieves steady state voltage of ≥ 3910 and ≤ 4400 volts and frequency of 60 ± 1.2 Hz.

The generator shall be synchronized to its emergency bus with voltage maintained ≥ 3910 and ≤ 4580 volts, loaded to 2500-2600** kw in less than or equal to 60 seconds, and operate at a load of 2500-2600 kw for at least 60 minutes.

This test, if it is performed so it coincides with the testing required by Surveillance Requirement 4.8.1.1.2.a.2, may also serve to concurrently meet those requirements.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- d. At least once per 18 months during shutdown by:
1. DELETED
 2. Verifying that, on rejection of a load greater than or equal to 820 kw, the voltage and frequency are restored to ≥ 3910 and ≤ 4400 volts and 60 ± 1.2 Hz within 4 seconds, and subsequently achieves a steady state frequency of ≥ 58.8 and ≤ 60.5 Hz.
 3. Simulating a loss of offsite power by itself, and:
 - a) Verifying de-energization of the vital bus and load shedding from the vital bus.
 - b) Verifying the diesel starts on the auto-start signal*, energizes the vital bus with permanently connected loads within 13 seconds, energizes the auto-connected shutdown loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization of these loads, the steady state voltage and frequency of the vital bus shall be maintained at ≥ 3910 and ≤ 4400 volts and ≥ 58.8 and ≤ 60.5 Hz during this test.
 4. Verifying that on an ESF actuation test signal without loss of offsite power the diesel generator starts on the auto-start signal and operates on standby for greater than or equal to 5 minutes*. The diesel generator shall achieve ≥ 3910 volts and ≥ 58.8 Hz in ≤ 13 seconds, and subsequently achieves steady state voltage of ≥ 3910 and ≤ 4400 volts and frequency of ≥ 58.8 and ≤ 60.5 Hz.
 5. Not Used.
 6. Simulating a loss of offsite power in conjunction with an ESF actuation test signal, and:
 - a) Verifying de-energization of the vital bus and load shedding from the vital bus.
 - b) Verifying the diesel starts on the auto-start signal*, energizes the vital bus with permanently connected loads within 13 seconds, energizes the auto-connected emergency (accident) loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After energization of these loads, the steady state voltage and frequency of the vital bus shall be maintained at ≥ 3910 and ≤ 4400 volts and ≥ 58.8 and ≤ 60.5 Hz during this test.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- c) Verifying that all nonessential automatic diesel generator trips (i.e., other than engine overspeed, lube oil pressure low, 4 KV bus differential and generator differential), are automatically bypassed upon loss of voltage on the vital bus concurrent with a safety injection actuation signal.

- 7. Verifying the diesel generator operates for at least 24 hours*. During the first 2 hours of this test, the diesel generator shall be loaded to 2760-2860 kw.** During the remaining 22 hours of this test, the diesel generator shall be loaded to 2500-2600 kw**. The steady state voltage and frequency shall be maintained at ≥ 3910 and ≤ 4580 volts and 60 ± 1.2 Hz during this test.

- 8. Verifying that the auto-connected loads to each diesel generator do not exceed the two hour rating of 2860 kw.

- 9. Verifying that with the diesel generator operating in a test mode (connected to its bus), a simulated safety injection signal overrides the test mode by (1) returning the diesel generator to standby operation and (2) automatically energizing the emergency loads with offsite power.

- e. At least once per ten years or after any modifications which could affect diesel generator interdependence by starting all diesel generators simultaneously*, during shutdown, and verifying that all diesel generators accelerate to at least 58.8 Hz in less than or equal to 13 seconds.

- f. At least once per 18 months, the following test shall be performed within 5 minutes of diesel shutdown after the diesel has operated for at least two hours at 2500-2600 kw**:

Verifying the diesel generator starts and achieves ≥ 3910 volts and ≥ 58.8 Hz in ≤ 13 seconds, and subsequently achieves steady state voltage of ≥ 3910 and ≤ 4400 volts and frequency of 60 ± 1.2 Hz.

4.8.1.1.3 The diesel fuel oil storage and transfer system shall be demonstrated OPERABLE:

- a. At least once per 31 days by:
 - 1. Verifying the level in each of the above required fuel storage tanks.
 - 2. Verifying that both fuel transfer pumps can be started and transfer fuel from the fuel storage tanks to the day tanks.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- b. At least once per 92 days by verifying that a sample of diesel fuel from each of the above required fuel storage tanks is within the acceptable limits specified in Table 1 of ASTM D975-77 when checked for viscosity, water and sediment.

4.8.1.1.4 Reports - NOT USED

* Surveillance testing may be conducted in accordance with the manufacturer's recommendations regarding engine prelube, warm-up and loading (unless loading times are specified in the individual Surveillance Requirements).

** This band is meant as guidance to preclude routine exceedances of the diesel generator manufacturer's design ratings. Loads in excess of this band for special testing or momentary variations due to changing bus loads shall not invalidate the test.

3/4.8 ELECTRICAL POWER SYSTEMS
BASES

3/4.8.1 and 3/4.8.2 A.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for 1) the safe shutdown of the facility, and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criterion 17 of Appendix "A" to 10 CFR Part 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the accident analyses and are based upon maintaining at least two independent sets of onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of one onsite A.C. source.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that 1) the facility can be maintained in the shutdown or refueling condition for extended time periods and 2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.

The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are based upon the recommendations of Regulatory Guide 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, and Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977. Regulatory Guide 1.108 criteria for determining and reporting valid tests and failures, and accelerated diesel generator testing, have been superseded by implementation of the Maintenance Rule for the diesel generators per 10CFR50.65. In addition to the Surveillance Requirements of 4.8.1.1.2, diesel preventative maintenance is performed in accordance with procedures based on manufacturer's recommendations with consideration given to operating experience.

The minimum voltage and frequency stated in the Surveillance Requirements (SR) are those necessary to ensure the Emergency Diesel Generator (EDG) can accept Design Basis Accident (DBA) loading while maintaining acceptable voltage and frequency levels. Stable operation at the nominal voltage and frequency values is also essential in establishing EDG OPERABILITY, but a time constraint is not imposed. The lack of a time constraint is based on the fact that a typical EDG will experience a period of voltage and frequency oscillations prior to reaching steady state operation if these oscillations are not dampened out by load application. In lieu of a time constraint in the SR, controls will be provided to monitor and trend the actual time to reach stable operation within the band as a means of ensuring there is no voltage regulator or governor degradation that could cause an EDG to become inoperable.

3/4.8 ELECTRICAL POWER SYSTEMS

BASES (Continued)

"Standby condition" for the purpose of defining the condition of the engine immediately prior to starting for surveillance requirements requires that the lube oil temperature be between 100 °F and 170 °F. The minimum lube oil temperature for an OPERABLE diesel is 100 °F.

The thirteen second time requirement for the Emergency Diesel Generator to reach rated voltage and frequency was originally based on a Westinghouse assumption of fifteen seconds that included the delay time between the occurrence of the incident and the application of electrical power to the first sequenced safeguards pump (BURL-3011, dated November 13, 1974) and included an instrument response time of two seconds (BURL-1531, dated July 27, 1970). The times specified in UFSAR Section 15.4 bound the thirteen seconds specified in the TS.

The narrower band for frequency specified for testing performed in steady state isochronous operation will ensure the EDG will not be run in an overloaded condition (steady state) during accident conditions. Steady state is assumed to be achieved after one minute of operation in the isochronous mode with all required loads sequenced on the bus.

The narrower band for steady state voltage is specified for operation when the EDG is not synchronized to the grid to ensure the voltage regulator will protect driven equipment from over-voltages during accident conditions. Procedural controls will ensure that equipment voltages are maintained within acceptable limits during testing when paralleled to the grid.

The wider band for frequency is appropriate for testing done with the governor in the droop mode. Likewise the wider band for voltage is appropriate when paralleled to the grid.

All voltages and frequencies specified in SR 4.8.1.1.2 are representative of the analytical values and do not account for postulated instrument inaccuracy. Instrument inaccuracies for EDG voltage and frequency are administratively controlled.

Preventive maintenance includes those activities (including pre-test inspections, measurements, adjustments and preparations) performed to maintain an otherwise OPERABLE EDG in an OPERABLE status. Corrective maintenance includes those activities required to correct a condition that would cause the EDG to be inoperable.

Surveillance requirement 4.8.1.2 is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during performance of the surveillance requirement, and to preclude de-energizing a required ESF bus or disconnecting a required offsite circuit during performance of surveillance requirements. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

PUBLIC SERVICE ELECTRIC & GAS COMPANY

PHILADELPHIA ELECTRIC COMPANY

DELMARVA POWER AND LIGHT COMPANY

ATLANTIC CITY ELECTRIC COMPANY

DOCKET NO. 50-311

SALEM NUCLEAR GENERATING STATION, UNIT NO. 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 200
License No. DPR-75

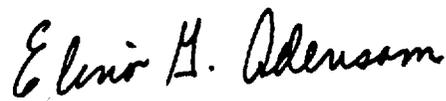
1. The Nuclear Regulatory Commission (the Commission or the NRC) has found that:
 - A. The application for amendment filed by the Public Service Electric & Gas Company, Philadelphia Electric Company, Delmarva Power and Light Company and Atlantic City Electric Company (the licensees) dated September 25, 1996, as supplemented on October 29, 1997, March 16, 1998, and February 8, 1999, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;
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 - 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. DPR-75 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 200 , are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance to be implemented within 90 days.

FOR THE NUCLEAR REGULATORY COMMISSION



Elinor G. Adensam, Director
Project Directorate I-2
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of Issuance: March 23, 1999

ATTACHMENT TO LICENSE AMENDMENT NO. 200

FACILITY OPERATING LICENSE NO. DPR-75

DOCKET NO. 50-311

Revise Appendix A as follows:

Remove Pages

3/4 8-3
3/4 8-4
3/4 8-5
3/4 8-6
B 3/4 8-1

Insert Pages

3/4 8-3
3/4 8-4
3/4 8-5
3/4 8-6
B 3/4 8-1

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Two physically independent A.C. circuits between the offsite transmission network and the onsite Class 1E distribution system (vital bus system) shall be:

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4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

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Subsequently, verifying the generator is synchronized with voltage maintained ≥ 3910 and ≤ 4580 volts, gradually loaded to 2500-2600 kw**, and operates at a load of 2500-2600 kw for greater than or equal to 60 minutes.

3. Verifying the diesel generator is aligned to provide standby power to the associated vital bus.
- b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the day tanks.
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This test, if it is performed so it coincides with the testing required by Surveillance Requirement 4.8.1.1.2.a.2, may also serve to concurrently meet those requirements.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- d. At least once per 18 months during shutdown by:
1. DELETED
 2. Verifying that, on rejection of a load greater than or equal to 820 kw, the voltage and frequency are restored to ≥ 3910 and ≤ 4400 volts and 60 ± 1.2 Hz within 4 seconds, and subsequently achieves a steady state frequency of ≥ 58.8 and ≤ 60.5 Hz.
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 5. Deleted
 6. Simulating a loss of offsite power in conjunction with an ESF actuation test signal, and
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ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- c) Verifying that all nonessential automatic diesel generator trips (i.e., other than engine overspeed, lube oil pressure low, 4 KV Bus differential and generator differential) are automatically bypassed upon loss of voltage on the vital bus concurrent with a safety injection actuation signal.

- 7. Verifying the diesel generator operates for at least 24 hours*. During the first 2 hours of this test, the diesel generator shall be loaded to 2760-2860 kw**. During the remaining 22 hours of this test, the diesel generator shall be loaded to 2500-2600 kw**. The steady state voltage and frequency shall be maintained at ≥ 3910 and ≤ 4580 volts and 60 ± 1.2 Hz during this test.

- 8. Verifying that the auto-connected loads to each diesel generator do not exceed the two hour rating of 2860 kw.

- 9. Verifying that with the diesel generator operating in a test mode (connected to its bus), a simulated safety injection signal overrides the test mode by (1) returning the diesel generator to standby operation and (2) automatically energizing the emergency loads with offsite power.

- e. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting all diesel generators simultaneously*, during shutdown, and verifying that all diesel generators accelerate to at least 58.8 Hz in less than or equal to 13 seconds.

- f. At least once per 18 months, the following test shall be performed within 5 minutes of diesel shutdown after the diesel has operated for at least two hours at 2500-2600 kw**:

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4.8.1.1.3 The diesel fuel oil storage and transfer system shall be demonstrated OPERABLE:

- a. At least once per 31 days by:
 - 1. Verifying the level in each of the above required fuel storage tanks.
 - 2. Verifying that both fuel transfer pumps can be started and transfer fuel from the fuel storage tanks to the day tanks.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- b. At least once per 92 days by verifying that a sample of diesel fuel from each of the above required fuel storage tanks is within the acceptable limits specified in Table 1 of ASTM D975-77 when checked for viscosity, water and sediment.

4.8.1.1.4 Reports - NOT USED

* Surveillance testing may be conducted in accordance with the manufacturer's recommendations regarding engine prelube, warm-up and loading (unless loading times are specified in the individual Surveillance Requirements).

** This band is meant as guidance to preclude routine exceedances of the diesel generator manufacturer's design ratings. Loads in excess of this band for special testing or momentary variations due to changing bus loads shall not invalidate the test.

ELECTRICAL POWER SYSTEMS

BASES

3/4.8.1 and 3/4.8.2 A.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

The OPERABILITY of the A.C. and D.C power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for 1) the safe shutdown of the facility, and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criterion 17 of Appendix "A" to 10 CFR Part 50.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the accident analyses and are based upon maintaining at least two independent sets of onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of one onsite A.C. source.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that 1) the facility can be maintained in the shutdown or refueling condition for extended time periods and 2) sufficient instrumentation and control capability is available for monitoring and maintaining the unit status.

The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are based upon the recommendations of Regulatory Guide 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, and Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977. Regulatory Guide 1.108 criteria for determining and reporting valid tests and failures, and accelerated diesel generator testing, have been superseded by implementation of the Maintenance Rule for the diesel generators per 10CFR50.65. In addition to the Surveillance Requirements of 4.8.1.1.2, diesel preventative maintenance is performed in accordance with procedures based on manufacturer's recommendations with consideration given to operating experience.

The minimum voltage and frequency stated in the Surveillance Requirements (SR) are those necessary to ensure the Emergency Diesel Generator (EDG) can accept Design Basis Accident (DBA) loading while maintaining acceptable voltage and frequency levels. Stable operation at the nominal voltage and frequency values is also essential in establishing EDG OPERABILITY, but a time constraint is not imposed. The lack of a time constraint is based on the fact that a typical EDG will experience a period of voltage and frequency oscillations prior to reaching steady state operation if these oscillations are not dampened out by load application. In lieu of a time constraint in the SR, controls will be provided to monitor and trend the actual time to reach stable operation within the band as a means of ensuring there is no voltage regulator or governor degradation that could cause an EDG to become inoperable.

3/4.8 ELECTRICAL POWER SYSTEMS

BASES (Continued)

"Standby condition" for the purpose of defining the condition of the engine immediately prior to starting for surveillance requirements requires that the lube oil temperature be between 100 °F and 170 °F. The minimum lube oil temperature for an OPERABLE diesel is 100 °F.

The thirteen second time requirement for the Emergency Diesel Generator to reach rated voltage and frequency was originally based on a Westinghouse assumption of fifteen seconds that included the delay time between the occurrence of the incident and the application of electrical power to the first sequenced safeguards pump (BURL-3011, dated November 13, 1974) and included an instrument response time of two seconds (BURL-1531, dated July 27, 1970). The times specified in UFSAR Section 15.4 bound the thirteen seconds specified in the TS.

The narrower band for frequency specified for testing performed in steady state isochronous operation will ensure the EDG will not be run in an overloaded condition (steady state) during accident conditions. Steady state is assumed to be achieved after one minute of operation in the isochronous mode with all required loads sequenced on the bus.

The narrower band for steady state voltage is specified for operation when the EDG is not synchronized to the grid to ensure the voltage regulator will protect driven equipment from over-voltages during accident conditions. Procedural controls will ensure that equipment voltages are maintained within acceptable limits during testing when paralleled to the grid.

The wider band for frequency is appropriate for testing done with the governor in the droop mode. Likewise the wider band for voltage is appropriate when paralleled to the grid.

All voltages and frequencies specified in SR 4.8.1.1.2 are representative of the analytical values and do not account for postulated instrument inaccuracy. Instrument inaccuracies for EDG voltage and frequency are administratively controlled.

Preventive maintenance includes those activities (including pre-test inspections, measurements, adjustments and preparations) performed to maintain an otherwise OPERABLE EDG in an OPERABLE status. Corrective maintenance includes those activities required to correct a condition that would cause the EDG to be inoperable.

Surveillance requirement 4.8.1.2 is modified by a Note. The reason for the Note is to preclude requiring the OPERABLE DG(s) from being paralleled with the offsite power network or otherwise rendered inoperable during performance of the surveillance requirement, and to preclude de-energizing a required ESF bus or disconnecting a required offsite circuit during performance of surveillance requirements. With limited AC sources available, a single event could compromise both the required circuit and the DG. It is the intent that



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NOS. 218 AND 200 TO FACILITY OPERATING

LICENSE NOS. DPR-70 AND DPR-75

PUBLIC SERVICE ELECTRIC & GAS COMPANY

PHILADELPHIA ELECTRIC COMPANY

DELMARVA POWER AND LIGHT COMPANY

ATLANTIC CITY ELECTRIC COMPANY

SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-272 AND 50-311

1.0 INTRODUCTION

By letter dated September 25, 1996, as supplemented on October 29, 1997, March 16, 1998, and February 8, 1999, the Public Service Electric & Gas Company (the licensee) submitted a request for changes to the Salem Nuclear Generating Station, Unit Nos. 1 and 2, Technical Specifications (TSs). The requested changes would revise the voltage and frequency acceptance criteria and the start-timing methodology for the TSs surveillance testing of the emergency diesel generators (EDGs). The October 29, 1997, March 16, 1998, and February 8, 1999, letters provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

2.0 EVALUATION

2.1 BACKGROUND

Salem Units 1 and 2 are each equipped with three EDGs that provide onsite ac power for the 4160-volt electrical safety divisions. The licensee addresses three issues related to EDG surveillance testing in this submittal. The first two, related to the steady-state voltage and frequency bands, were identified during a review of calculations performed in conjunction with the NRC's Electrical Distribution System Functional Inspection (EDSFI). This review resulted in revisions to the EDG steady-state loading calculations. The licensee submitted the results of these calculations to NRC on February 7, 1997. These calculations are available in the NRC's Public Document Room (Accession No. 9702100407). The third issue, which implied that the timed surveillance starts require stabilizing within the voltage and frequency bands in the designated time frame specified in the TS, was identified during the review of the testing methodology. The requirement introduces an increased probability that the EDGs would experience unwarranted test failures and require increased EDG starts and/or adjustment to the governor and voltage regulator controls. The proposed changes to the TS will resolve these issues related to the EDG surveillance testing.

2.2 Steady-state EDG Frequency Band

The steady-state EDG frequency specified in the surveillance requirements (SRs) that test the EDG during simulated loss-of-offsite power (LOOP) conditions is changed from 60 ± 1.2 Hz to the range 58.8 to 60.5 Hz while the governor is in the isochronous mode.

Because of findings from the EDSFI, the licensee revised its EDG steady-state loading calculation. These revisions addressed potential EDG overloading resulting from excessive frequency conditions during post-accident operation with auto-connected loads sequenced on the bus. The calculation concluded that the EDG may exceed the rating specified by the manufacturer if the EDG is operated at greater than 60.5 Hz in the steady-state conditions (e.g., LOOP with a loss-of-coolant accident).

There are two modes of operation for the EDG governor controls: the isochronous mode that maintains frequency when the EDG alone is powering the bus (i.e., the bus is not paralleled to the grid) and the droop mode which, by providing additional flexibility in the frequency control band, allows the EDG to be paralleled to the grid. The governor controls are maintained in the isochronous mode when in standby but are shifted to the droop mode immediately before testing sequences that result in paralleling of the EDG to the grid.

The current SR 4.8.1.1.2.d specifies an EDG frequency band of 60 ± 1.2 Hz in both modes. During surveillance testing in the droop mode with the EDG paralleled to the grid, EDG loading is manually applied. Surveillance procedures ensure that the manual EDG loading does not exceed EDG limits. Therefore, the existing values for frequency are not being changed in those SRs that test the EDG with the governor in the droop mode.

Post-accident scenarios are provided in the isochronous mode when the bus is isolated from the offsite source, and auto-connected loads are being sequenced on the bus. The isochronous mode has a narrower control band than the droop mode. During testing in the isochronous mode, the steady-state frequency must be below 60.5 Hz in order to demonstrate that the governor will prevent overloading of the EDG during post-accident conditions.

SR 4.8.1.1.2.d.2, 4.8.1.1.2.d.3.b, 4.8.1.1.2.d.4, and 4.8.1.1.2.d.6.b of the TS are satisfied by running the EDGs in the isochronous mode. The licensee proposes to revise these SRs with a narrower band of frequency (58.8 to 60.5 Hz) so that the governor prevents controlling of the EDG in an overload condition. For the remaining SRs, the EDGs are tested in the droop mode; therefore, the existing frequency band (60 ± 1.2 Hz) need not be changed.

By letter dated October 29, 1997, the licensee proposed changes to SR 4.8.1.1.2.d.2 that were contained in the previous submittal dated September 25, 1996. Upon subsequent review the licensee determined that the proposed changes to the load reject SR 4.8.1.1.2.d.2 are too restrictive and may lead to declaring an EDG inoperable when EDG is still capable of design basis function. The licensee proposed to revise SR 4.8.1.1.2.d.2 as follows (changes indicated in bold):

“Verifying that, on rejection of a load greater than or equal to 820 kW, the voltage and frequency are restored to ≥ 3910 and ≤ 4440 volts and 60 ± 1.2 Hz within 4 seconds, and subsequently achieves a steady state frequency of ≥ 58.8 and ≤ 60.5 Hz.”

The concern with overloading the EDG due to excessive frequency is a steady state concern. Revising the frequency band in SR 4.8.1.1.2.d.2 to between 58.8 and 60.5 HZ within 4 seconds is actually testing the EDGs dynamic loading abilities, but it will also challenge the emergency trip features (e.g., overspeed). Since a significant portion of the EDG loading is shed during the load reject test, allowing the larger frequency band during the first 4 seconds of the surveillance will not subject the EDG to any potential overloading concern. Subsequently verifying that the frequency returns to within the band of 58.8 to 60.5 Hz following initial load reject test will verify that there is no degradation of the governor that could cause the EDG to become inoperable.

The proposed changes are consistent with Calculation No. ES-9.002, Revision 2, submitted by the licensee. Since the proposed narrower band of frequency for the isochronous mode is bounded by existing TS, there is no change in the margin of safety, and the narrower band provides further conservatism. Therefore, the staff finds the change acceptable.

2.3 Steady-state EDG Voltage

The steady-state EDG voltages specified in SRs 4.8.1.1.2.a.2, 4.8.1.1.2.c, 4.8.1.1.2.d.2, 4.8.1.1.2.d.3.b, 4.8.1.1.2.d.4, 4.8.1.1.2.d.6.b, 4.8.1.1.2.d.7, and 4.8.1.1.2.f that test the EDG while it is disconnected from the grid and paralleled to the grid are changed from 3950-4580 volts to 3910-4400 volts and 3910-4580 volts, respectively.

Because of the findings from the EDSFI, the licensee prepared additional calculations to address voltage limits. These calculations concluded that driven equipment can experience damage if the bus voltage is operated at more than 4400 volts in the steady-state condition, with the EDG powering the bus and the bus separated from the grid. The proposed changes will ensure that the driven equipment is protected from potential overvoltage conditions during postulated accident conditions.

The EDGs are tested in three different electrical configurations: (a) with the EDG output breaker open, (b) with the EDG output breaker closed and the associated 4-kV bus paralleled to the grid, and (c) with the EDG output breaker closed with the associated 4-kV bus separated from the grid. It is appropriate to maintain the voltage band at 3910-4580 volts when it is paralleled to the grid because the driven equipment is protected by controlling the bus voltage independent of the diesel generator voltage regulator. The narrower band of 3910-4400 volts should be maintained when the generator is separated from the grid because this action demonstrates that the voltage regulator will protect driven equipment during accident conditions when the manual bus voltage control is not assumed.

All SRs in TS 4.8.1.1.2.d start the EDG with the generator separated from the grid. For these SRs, the narrower voltage band is appropriate to ensure that the voltage regulator control prevents exposing driven equipment to a damaging voltage condition during post-accident conditions. However, for those SRs where the EDG is subsequently paralleled to the grid, the wider band is applied to the paralleled configuration because it is necessary for the generator to match grid voltage conditions while remaining within generator reactive (VAR) loading limitations. During testing with the EDG at the higher voltage, normal system operating procedures ensure that bus voltages are maintained to support acceptable motor terminal voltage. The EDG and the 4-kV buses are rated at 4580 volts and are not affected by the higher generator terminal voltage during the testing.

The proposed changes are consistent with Calculation No. ES-8.007, Revision 2, submitted by the licensee. Since (a) the narrower band of voltage for the isochronous mode is bounded by existing TS, (b) there is no change in the margin of safety, and (c) the narrower band provides additional conservatism, the staff finds the changes acceptable.

2.4 Voltage and Frequency Bands for Unloaded Start Time Testing

The licensee proposes (a) to eliminate the voltage and frequency bands of ≥ 3950 and ≤ 4580 volts and 60 ± 1.2 Hz currently specified in TS for unloaded start time testing and replace them with minimum values of ≥ 3910 volts and ≥ 58.8 Hz; (b) to eliminate the 10-second start requirement to attain an engine speed of 900 rpm; and (c) to replace the term "ambient" with the term "standby" and to replace the term "shall" in the footnote with the term "may" to allow the manufacturer's recommendations to be followed for loading, warmup and prelubrication.

The purpose of the SRs that perform an unloaded, timed start is to demonstrate that the EDG has the capability of accepting a load within 13 seconds from receipt of the start signal. This supports the accident analysis assumption that automatic bus loading will occur within 17 seconds from the start of the event. The time start test is accomplished by initiating a start signal and timing it so as to achieve a speed and voltage that satisfies the EDG output breaker closure interlocks. The frequency and voltage are set at 57 Hz and 3863 volts respectively, to satisfy the EDG output breaker closure interlocks. At these values, coincident with an undervoltage condition on the respective 4160-volt vital bus, the EDG output breaker will close and the EDG will be ready to accept loads. The values of ≥ 58.8 Hz and ≥ 3910 volts, which were selected as timing criteria, provide conservatism when compared to the previous output breaker interlock setpoints.

The proposed elimination of the upper bands for voltage (4580 volts) and frequency (61.2 Hz), currently required for EDG testing, results from the EDG's tendency to routinely overshoot the upper bands when the EDG is tested in the unloaded condition because of the considerable rotational inertia of the EDG and the initial response of the governor under unloaded conditions. It is expected that the EDG will quickly return to the required voltage and frequency bands; however, a number of EDG tests have failed because of the inability of the EDG to reach stability within the voltage and frequency bands in 13 seconds. Failure of the 13-second test resulted in the EDGs being declared inoperable and subsequent remedial

testing of the EDGs, thus resulting in excessive adjustment of the EDGs' governors and voltage regulators and excessive retesting of the EDGs. Under actual conditions, however, the emergency loads would be accepted by the EDG near the lower voltage and frequency bands and the resultant effect, similar to applying a brake to a spinning wheel, would quickly reverse the tendency to overshoot the upper voltage and frequency bands.

As part of efforts related to generic improvements of the Standard Technical Specifications, the staff has agreed to delete the upper voltage and frequency bands for the initial 13-second period following the fast start during no-load EDG testing. The staff is concerned, however, that failure to properly adjust the EDG voltage regulator and governor components could result in the EDGs becoming inoperable. An improperly adjusted governor or voltage regulator may cause the EDG to fail to achieve steady-state operation in the unloaded condition. To ensure that this condition does not arise, the licensee proposes to add the following statement to the TS bases: "In lieu of a time constraint in the SR, controls will be provided to monitor and trend the actual time to reach stable operation within the band as a means of ensuring there is no voltage regulator and governor degradation that could cause an EDG to become inoperable."

On the basis of the above information, the staff concludes that monitoring and trending the actual time of the EDG to reach stable operation within the frequency and voltage band will ensure there is no voltage regulator and governor degradation, therefore the proposed change, which deletes the upper voltage and frequency bands for the EDG 13-second test is acceptable.

The licensee also proposes to eliminate the timing to the rated engine speed of 900 rpm within 10 seconds in SRs 4.8.1.1.2.a.2, 4.8.1.1.2.c, 4.8.1.1.2.e and 4.8.1.1.2.f. Because the diesel engine is directly coupled to the generator and the generator output frequency is directly proportional to the engine speed in rpm, it is necessary to monitor only one of these parameters, in addition to the voltage, to ensure a successful EDG start. The timing of the frequency is proposed since the 13 seconds is within the time credited in accident analysis and the timing of 900 rpm within 10 seconds is not associated with any specific design parameter.

In SR 4.8.1.1.2.e for the once-every-10-year start, the timed speed requirement is satisfied with a frequency of 58.8 Hz in less than or equal to 13 seconds. This figure is consistent with other time start specifications. The engine speed requirement of 900 rpm in 10 seconds is redundant to the output frequency and therefore recording the amount of time needed to achieve the rated engine speed is not necessary. Based on the above, elimination of the engine speed requirement of 900 rpm within 10 seconds in SRs 4.8.1.1.2.a.2, 4.8.1.1.2.c, 4.8.1.1.2.e and 4.8.1.1.2.f is acceptable.

The licensee proposes to replace the term "ambient" with "standby" in describing the EDG prestart condition. The term "ambient" implies that the diesel engine is at the same temperature as the surrounding air temperature before starting. In fact, diesel engines are maintained in a prewarmed and prelubricated (standby) condition through the use of an engine keep-warm system to minimize the wear on the engine during starting. The definition of the standby condition has been added to the TS Bases 3/4.8.1 and 3/4.8.2 and states that the lube oil temperature is required to be between 100 °F and 170 °F prior to starting the engine

lube oil temperature is required to be between 100 °F and 170 °F prior to starting the engine for surveillance requirements. The licensee stated that this position was agreed to by the engine vendor. In addition, the licensee proposes to replace the term "shall" in the footnote with "may" to allow the use of the manufacturer's recommendations for loading, warmup, and prelubrication, rather than requiring loading and prelubrication for each start. The staff finds the above changes to be consistent with Regulatory Guide 1.9 and acceptable.

The phrase "After energization of these loads" will be added to TS 4.8.1.12.d.3.b and TS 4.8.1.1.2.d.6.b to indicate when steady state is achieved. Additional explanation of the term "steady state" will be added to the TS bases. Also, the licensee proposes to add new TS bases that will describe the revised start timing requirements, describe origination of the 13-second requirement, provide a mechanism for identifying degradation of governor or voltage controls during unloaded starts, and define terms "standby condition" and "preventive maintenance" used in the TS. These proposed changes are acceptable to the staff.

2.5 Summary

Based on the above, the staff concludes that the proposed changes to the TS will resolve EDSFI outstanding issues related to the EDG surveillance testing. Therefore, the staff finds the proposed changes to be acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Jersey 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 changes 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 (61 FR 55039). 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.

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