



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

WASHINGTON, D.C. 20555-0001

March 26, 1998

Mr. C. S. Hinnant, Vice President
Carolina Power & Light Company
Brunswick Steam Electric Plant
Post Office Box 10429
Southport, North Carolina 28461

SUBJECT: ISSUANCE OF AMENDMENT NO. 192 TO FACILITY OPERATING LICENSE NO. DPR-71 AND AMENDMENT NO. 223 TO FACILITY OPERATING LICENSE NO. DPR-62 REVISING TECHNICAL SPECIFICATIONS TO ALLOW PERFORMANCE OF CERTAIN EMERGENCY DIESEL GENERATOR SURVEILLANCE REQUIREMENTS DURING PLANT OPERATION - BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2 (TAC NOS. MA0093 AND MA0094)

Dear Mr. Hinnant:

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 192 to Facility Operating License No. DPR-71 and Amendment No. 223 to Facility Operating License No. DPR-62 for Brunswick Steam Electric Plant, Units 1 and 2. The amendments consist of changes to the Technical Specifications and associated Bases in response to your application dated November 6, 1997, as supplemented by your letters dated January 27, March 3, March 6, March 13, and March 18, 1998.

The amendments allow three surveillance requirements associated with the Emergency Diesel Generators to be performed during all Operational Conditions rather than only during shutdown.

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A copy of the related Safety Evaluation is enclosed. A Notice of Issuance will be included in the Commission's bi-weekly Federal Register Notice.

Sincerely,

Original signed by:

(Original Signed By)

David C. Trimble, Project Manager
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-325
and 50-324

Enclosures:

1. Amendment No. 192 to License No. DPR-71
2. Amendment No. 223 to License No. DPR-62
3. Safety Evaluation

cc w/enclosures: See next page

FILENAME - G:\BRUNSWIC\BRA0093.AMD *See previous concurrence

PM:PDII-1	LA:PDII-1	TSB *	OGO	APD:PDII-1	
DTrimble	EDunnington		JHull	PTKuo	
3/19/98	3/20/98	3/24/98	3/20/98	3/25/98	
Yes/No	Yes/No	Yes/No	Yes/No	Yes/No	

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AMENDMENT NO. 192 TO FACILITY OPERATING LICENSE NO. DPR-71 - BRUNSWICK,
UNIT 1 AND AMENDMENT NO. 223 TO FACILITY OPERATING LICENSE NO. DPR-62 -
BRUNSWICK, UNIT 2

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

CAROLINA POWER & LIGHT COMPANY, et al.

DOCKET NO. 50-325

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 192
License No. DPR-71

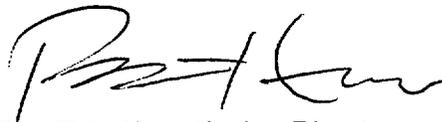
1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment filed by Carolina Power & Light Company (the licensee), dated November 6, 1997, as supplemented by letters dated January 27, March 3, March 6, March 13, and March 18, 1998, complies with the standards 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;
 - 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-71 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 192, are hereby incorporated in the license. Carolina Power & Light Company shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION



Pao-Tsin Kuo, Acting Director
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 26, 1998

ATTACHMENT TO LICENSE AMENDMENT NO. 192

FACILITY OPERATING LICENSE NO. DPR-71

DOCKET NO. 50-325

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

Remove Pages

3/4 8-4
B 3/4 8-1

Insert Pages

3/4 8-4
B 3/4 8-1

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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 the engine-mounted fuel tank.
 2. Verifying the fuel level in the day fuel tank.
 3. Verifying the fuel transfer pump can be started and transfers fuel from the day tank to the engine mounted tank.
 4. Verifying the diesel starts and accelerates to at least 514 rpm in less than or equal to 10 seconds.*
 5. Verifying the generator is synchronized, loaded to greater than or equal to 1750 kw, and operates for greater than or equal to 15 minutes, and
 6. Verifying the diesel generator is aligned to provide standby power to the associated emergency buses.
- b. At least once per 31 days by verifying the fuel level in the plant fuel storage tank.
- c. At least once per 92 days by verifying that a sample of diesel fuel from the fuel storage tank, obtained in accordance with ASTM-D270-65, is within the acceptable limits specified in Table 1 of ASTM-D975-74 when checked for viscosity, water and sediment.
- d. At least once per 18 months by:**
 1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.
 2. Verifying the generator capability to reject a load equal to one core spray pump without tripping.

* The diesel generator start (10 seconds) from ambient conditions shall be performed at least once per 184 days in these surveillance tests. All other engine starts for the purpose of this surveillance testing may be preceded by a manually initiated engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.

** Surveillance Requirements 4.8.1.1.2.d.2, 4.8.1.1.2.d.3, 4.8.1.1.2.d.6, and 4.8.1.1.2.d.7 shall not be performed for diesel generator 1 or 2 with Unit 1 in OPERATIONAL CONDITION 1, 2, or 3.

3/4.8 ELECTRICAL POWER SYSTEMS

BASES

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 Criteria 17 of Appendix "A" to 10 CFR 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 is consistent with the initial condition assumptions of the accident analyses and is based upon maintaining at least one of each of the 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 the other 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 maintain the facility status.

The requirement of Specification 4.8.1.1.1.b to demonstrate the operability of the independent circuits between the offsite transmission network and the onsite Class 1E distribution system may be satisfied by transferring unit loads from the unit auxiliary transformer (UAT) to the start-up auxiliary transformer (SAT). The requirement to perform this demonstration "during shutdown" implies that this testing may be performed by the normal power switching evolutions during unit shutdown or while shutdown.

The requirement of Specification 4.8.1.1.2.d to demonstrate the OPERABILITY of each diesel generator at least once per 18 months will be satisfied by performing the required surveillances on diesel generators number 1 and 2 while Brunswick Unit 1 is in OPERATIONAL CONDITION 4 or 5, and diesel generators number 3 and 4 while Brunswick Unit 2 is in OPERATIONAL CONDITION 4 or 5. While performing the required surveillances of a given diesel generator, the loads associated with that diesel generator are subject to the Limiting Condition for Operation requirements for each system or component that obtains its emergency power from that diesel generator. Surveillance Requirements 4.8.1.1.2.d.1, 4.8.1.1.2.d.4, and 4.8.1.1.2.d.5 may be performed in OPERATIONAL CONDITION 1, 2, 3, 4, or 5.



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

CAROLINA POWER & LIGHT COMPANY, et al.

DOCKET NO. 50-324

BRUNSWICK STEAM ELECTRIC PLANT, UNIT 2
AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 223
License No. DPR-62

1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment filed by Carolina Power & Light Company (the licensee), dated November 6, 1997, as supplemented by letters dated January 27, March 3, March 6, March 13, and March 18, 1998, 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;
 - 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-62 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 223, are hereby incorporated in the license. Carolina Power & Light Company shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION



Pao-Tsin Kuo, Acting Director
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 26, 1998

ATTACHMENT TO LICENSE AMENDMENT NO. 223

FACILITY OPERATING LICENSE NO. DPR-62

DOCKET NO. 50-324

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised areas are indicated by marginal lines.

Remove Pages

3/4 8-4
B 3/4 8-1

Insert Pages

3/4 8-4
B 3/4 8-1

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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 the engine-mounted fuel tank.
 2. Verifying the fuel level in the day fuel tank.
 3. Verifying the fuel transfer pump can be started and transfers fuel from the day tank to the engine mounted tank.
 4. Verifying the diesel starts and accelerates to at least 514 rpm in less than or equal to 10 seconds.*
 5. Verifying the generator is synchronized, loaded to greater than or equal to 1750 kw, and operates for greater than or equal to 15 minutes, and
 6. Verifying the diesel generator is aligned to provide standby power to the associated emergency buses.
- b. At least once per 31 days by verifying the fuel level in the plant fuel storage tank.
- c. At least once per 92 days by verifying that a sample of diesel fuel from the fuel storage tank, obtained in accordance with ASTM-D270-65, is within the acceptable limits specified in Table 1 of ASTM-D975-74 when checked for viscosity, water and sediment.
- d. At least once per 18 months by:**
 1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.
 2. Verifying the generator capability to reject a load equal to one core spray pump without tripping.

* The diesel generator start (10 seconds) from ambient conditions shall be performed at least once per 184 days in these surveillance tests. All other engine starts for the purpose of this surveillance testing may be preceded by a manually initiated engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.

** Surveillance Requirements 4.8.1.1.2.d.2, 4.8.1.1.2.d.3, 4.8.1.1.2.d.6, and 4.8.1.1.2.d.7 shall not be performed for diesel generator 3 or 4 with Unit 2 in OPERATIONAL CONDITION 1, 2, or 3.

3/4.8 ELECTRICAL POWER SYSTEMS

BASES

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 Criteria 17 of Appendix "A" to 10 CFR 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 is consistent with the initial condition assumptions of the accident analyses and is based upon maintaining at least one of each of the 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 the other 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 maintain the facility status.

The requirement of Specification 4.8.1.1.1.b to demonstrate the operability of the independent circuits between the offsite transmission network and the onsite Class 1E distribution system may be satisfied by transferring unit loads from the unit auxiliary transformer (UAT) to the start-up auxiliary transformer (SAT). The requirement to perform this demonstration "during shutdown" implies that this testing may be performed by the normal power switching evolutions during unit shutdown or while shutdown.

The requirement of Specification 4.8.1.1.2.d to demonstrate the OPERABILITY of each diesel generator at least once per 18 months will be satisfied by performing the required surveillances on diesel generators number 1 and 2 while Brunswick Unit 1 is in OPERATIONAL CONDITION 4 or 5 and diesel generators number 3 and 4 while Brunswick Unit 2 is in OPERATIONAL CONDITION 4 or 5. While performing the required surveillances of a given diesel generator, the loads associated with that diesel generator are subject to the Limiting Condition for Operation requirements for each system or component that obtains its emergency power from that diesel generator. Surveillance Requirements 4.8.1.1.2.d.1, 4.8.1.1.2.d.4, and 4.8.1.1.2.d.5 may be performed in OPERATIONAL CONDITION 1, 2, 3, 4, or 5.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 192 TO FACILITY OPERATING LICENSE NO. DPR-71
AND AMENDMENT NO. 223 TO FACILITY OPERATING LICENSE NO. DPR-62
CAROLINA POWER & LIGHT COMPANY
BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
DOCKET NOS. 50-325 AND 50-324

1.0 INTRODUCTION

In its letter of November 6, 1997, supplemented by letters dated January 27, March 3, March 6, March 13, and March 18, 1998, Carolina Power & Light Company proposed that the technical specification (TS) and its associated TS Bases Section for the surveillance requirements (SRs) of the emergency diesel generator (EDG) at Brunswick Steam Electric Plant (Brunswick), Units 1 and 2, be revised. The proposed TS amendment would remove the term "during shutdown" from SR 4.8.1.1.2.d to allow SR 4.8.1.1.2.d.1, SR 4.8.1.1.2.d.4, and SR 4.8.1.1.2.d.5 to be performed when the unit is in operational condition 1, 2, 3, 4, or 5 (i.e., on-line) while adding a footnote (***) to limit performance of SR 4.8.1.1.2.d.2, SR 4.8.1.1.2.d.3, SR 4.8.1.1.2.d.6, and SR 4.8.1.1.2.d.7 when the unit is in operational condition 4 or 5 (i.e., shutdown). Also, the amendment revises the relevant portions of the Bases section of the TS to reflect changes made to SR 4.8.1.1.2.d, and removes an expired footnote that was used for Brunswick Unit 2 for a one-time extension of the 18-month surveillance interval.

If the staff finds the proposed SRs acceptable, the licensee requests that the proposed license amendment be issued by March 28, 1998, as it plans to perform those SRs on-line before the start of the upcoming Brunswick Unit 1 Refueling Outage 11 which is currently scheduled to begin on April 25, 1998.

2.0 DISCUSSION AND EVALUATION

Since EDGs provide the onsite ac standby power source to shut down and maintain the reactor in a safe condition under a design-basis accident (DBA), that is, a loss-of-coolant accident (LOCA) coincident with a loss-of-offsite power (LOOP) event, the licensee finds that the EDG is the most risk-significant component in a nuclear power plant that affects the core damage frequency (CDF). The purpose of the SRs is to reduce that risk by ensuring the ability of the EDGs to meet their loading and timing requirements, as well as maintaining adequate EDG reliability and availability levels. Since the four EDGs at Brunswick are designed and operated with a shared configuration, some safety loads [two residual heat removal (RHR) pumps and one service water (SW) pump] of a unit are powered from the EDGs in the other

unit. Thus, limiting condition for operation (LCO) 3.8.1.1 of the TS requires that all four EDGs be operable whenever either unit is in operation.

The staff has reviewed the proposed changes to SRs and the appropriate Bases Section of the TS at Brunswick Units 1 and 2, and its evaluation is as follows:

1. Modifications to the Provisions of SR 4.8.1.1.2.d

Currently, TS SR 4.8.1.1.2 at Brunswick Units 1 and 2 states, in part, as follows:

Each diesel generator shall be demonstrated OPERABLE:

- d. At least once per 18 months during shutdown by:
 1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.
 2. Verify the generator capability to reject a load equal to one core spray pump without tripping.
 3. Simulating a loss of offsite power in conjunction with an emergency core cooling system test signal, and:
 - a) Verifying de-energization of the emergency buses and load shedding from the emergency buses.
 - b) Verifying the diesel starts from ambient condition on the auto-start signal, energizes the emergency buses with permanently connected loads, energizes the auto-connected loads through the load sequence relays and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads.
 4. Verifying that on the emergency core cooling system test signal, all diesel generator trips except engine overspeed, generator differential, low lube oil pressure, reverse power, loss of field and phase overcurrent with voltage restraint, are automatically bypassed.

5. Verifying the diesel generator operates for greater than or equal to 60 minutes while loaded to greater than or equal to 3500 kW.
6. Verifying that the auto-connected loads to each diesel generator do not exceed the 2000 hour rating of 3850 kW.
7. Verifying that the automatic load sequence relays are OPERABLE with each load sequence time within 10% of the required value.

With the proposed TS amendment, the licensee removes the term "during shutdown" from SR 4.8.1.1.2.d. This allows the performance of SR 4.8.1.1.2.d.1, SR 4.8.1.1.2.d.4, and SR 4.8.1.1.2.d.5 when the unit is on-line (i.e., operational condition 1, 2, 3, 4, or 5); the added footnote (**) limits performance of SR 4.8.1.1.2.d.2, SR 4.8.1.1.2.d.3, SR 4.8.1.1.2.d.6, and SR 4.8.1.1.2.d.7 when the unit is shut down (i.e., operational condition 4 or 5). Thus, the revised portions of SR 4.8.1.1.2.d would read, in part:

d. At least once per 18 months by:**

The footnote (**) for Brunswick Unit 1 TS would read:

** Surveillance Requirements 4.8.1.1.2.d.2, 4.8.1.1.2.d.3, 4.8.1.1.2.d.6, and 4.8.1.1.2.d.7 shall not be performed for diesel generator 1 or 2 with Unit 1 in OPERATIONAL CONDITION 1, 2, or 3.

The footnote (**) for Brunswick Unit 2 TS would read:

** Surveillance Requirements 4.8.1.1.2.d.2, 4.8.1.1.2.d.3, 4.8.1.1.2.d.6, and 4.8.1.1.2.d.7 shall not be performed for diesel generator 3 or 4 with Unit 2 in OPERATIONAL CONDITION 1, 2, or 3.

In Table 1.2 of its TS, Brunswick defines five plant operational conditions as: power operation (1), startup (2), hot shutdown (3), cold shutdown (4), and refueling (5). With the term "during shutdown" deleted, the performance of SR 4.8.1.1.2.d.1, SR 4.8.1.1.2.d.4, and SR 4.8.1.1.2.d.5 could be done on-line when the unit is in operational condition 1, 2, 3, 4, or 5 once every 18-month interval. With the footnote (**) added, the unit must be in shutdown (i.e., operational condition 4 or 5) to perform SR 4.8.1.1.2.d.2, SR 4.8.1.1.2.d.3, SR 4.8.1.1.2.d.6, and SR 4.8.1.1.2.d.7 for its associated EDGs, where EDG 1 and 2 are associated with Unit 1 and EDG 3 and 4 are associated with Unit 2. The licensee justified the proposed TS amendment to SR provisions as follows:

a) **SR 4.8.1.1.2.d.1, SR 4.8.1.1.2.d.4, and SR 4.8.1.1.2.d.5**

The staff reviewed the proposed performance of SR 4.8.1.1.2.d.1, SR 4.8.1.1.2.d.4, and SR 4.8.1.1.2.d.5 on-line for the EDGs at Brunswick Units 1 and 2 and the licensee's response to the staff's RAIs and made the following deterministic and risk assessment:

Deterministic Evaluation

SR 4.8.1.1.2.d.1 requires a partial disassembly of the diesel engine and the generator to inspect the general condition. This inspection is a preventive maintenance that is intended to enhance EDG reliability; it consists of inspecting brushes, collector rings, and brush riggings for the generator, and inspecting cleanliness of the crank case, integrity of the lube oil system, and the condition of the gear train for the diesel engine. SR 4.8.1.1.2.d.4 is performed to ensure that non-critical EDG protective functions (e.g., high jacket water temperature) are bypassed on an accident signal. SR 4.8.1.1.2.d.5 verifies that the EDG can operate for greater than or equal to 60 minutes while loaded to greater than or equal to 3500 kW to demonstrate the maximum expected post-accident EDG loading capability.

For the performance of SRs 4.8.1.1.2.d.1 and 4.8.1.1.2.d.4 when the unit is in power operation, the EDG would not be connected to the safety bus or grid. Therefore, the licensee states that it will neither affect the operability of any other safety-related system nor will it create any perturbations of the electrical distribution system that could challenge plant operation. Although the TS requires that all four EDGs be available when the unit is in power operation, the licensee states that any three of the four EDGs can supply the required loads for the safe shutdown of one unit and a DBA on the other unit without relying on offsite power. Therefore, the licensee states that the performance of SRs 4.8.1.1.2.d.1 and 4.8.1.1.2.d.4 for EDGs during power operation would not adversely affect overall nuclear safety.

SR 4.8.1.1.2.d.5 is performed in a similar manner to an EDG monthly surveillance test, SR 4.8.1.1.2.a.5 which tests the EDG at least once per 31 days, on a staggered test basis, by synchronizing to the emergency bus while loaded to 1750 kW for 15 minutes. The licensee states that the performance of SR 4.8.1.1.2.d.5 during power operation would not adversely affect overall nuclear safety because when performing SR 4.8.1.1.2.d.5 or a monthly test (SR 4.8.1.1.2.a.5), the EDG is started in the manual mode and is synchronized to the emergency bus. When the EDG is synchronized to the emergency bus, the EDG is protected by relays sensing the emergency bus voltage, frequency, directional power from the emergency bus to the balance-of-power (BOP) bus, and the potential overcurrent condition. Actuation of any of these relays, while the EDG is in the manual mode, will trip and separate the EDG from the BOP bus. Should a LOOP or LOCA occur during the test, the EDG output breaker would open, and strip all loads, and the EDG would revert to the

automatic standby mode. This allows the EDG to tie back to the emergency bus (i.e., standby mode) and carry the emergency bus loads if necessary. The licensee believes that tripping of the EDG during performance of SR 4.8.1.1.2.d.5 is not a concern, as the normal offsite power supply will continue to carry BOP bus and emergency bus loads without any significant perturbation of the electrical distribution system, which could challenge plant operation.

The licensee, by letter dated January 27, 1998, indicates that approximate times required per EDG to perform SR 4.8.1.1.2.d.1, SR 4.8.1.1.2.d.4, and SR 4.8.1.1.2.d.5 as 72 hours, 12 hours, and 2 hours, respectively. Since SR 4.8.1.1.2.d.1 and SR 4.8.1.1.2.d.4 are performed together, and SR 4.8.1.1.2.d.5 would not be tested by declaring inoperability (i.e., tested on-line during normal plant operation), which would not affect unavailability, their total cumulative unavailability estimate for these three SRs will be 72 hours. On this basis, the licensee asserts that the above SRs discussed can be completed in 3 days, and certainly within the allowed outage time of 7 days for an inoperable EDG prescribed by TS 3.8.1.1.b.3.

In addition, the licensee cites the following existing administrative controls:

- 1) During the performance of SR 4.8.1.1.2.d.1 or SR 4.8.1.1.2.d.4 when the affected EDG is declared inoperable, the requirements of LCO 3.8.1.1.b are applicable for both units where it requires the operability of the offsite circuits and the remaining EDGs to be demonstrated. This ensures that required ac power supplies are available and operable when an EDG is removed for SRs.
- 2) While performing SR 4.8.1.1.2.d.5, the EDG would not be declared inoperable because of the EDG test override feature, which allows the EDG to remain fully capable of performing its intended safety function.
- 3) The EDGs at Brunswick have shown that they are highly reliable. As of September 1997, the 2 year rolling average availability of the EDGs was 97.7%. EDG unavailability is forecasted, tested, and maintained in accordance with 10 CFR 50.65 (i.e., Maintenance Rule) performance criteria. This ensures that the remaining EDGs would be available for safe shutdown.
- 4) EDG outages will be scheduled in accordance with plant procedure OAP-25, "BNP Integrated Scheduling." The intent of OAP-25 is to enhance the reliability and availability of systems and components covered under the maintenance rule. Per OAP-25, it is acceptable to enter an LCO or an on-line system outage only when the intent is to increase reliability or to reduce shutdown risk associated with safe-shutdown/decay-heat-removal systems or components.

Based on the fact that only three out of four EDGs are needed to mitigate DBA, each EDG has automatic test override design features, only 3 days out of 7 days of the allowed outage time are needed for the required SRs for an inoperable EDG, and the existence of administrative controls, the staff finds that performance of SR 4.8.1.1.2.d.1, SR 4.8.1.1.2.d.4, and SR 4.8.1.1.2.d.5 during power operation would not adversely affect overall nuclear safety; also, the appropriate level of safety can be maintained when performing SRs on-line.

Risk Evaluation

To gain risk insights, the staff used a three-tiered approach to evaluate the risk associated with the requested on-line SR amendment. The first tier evaluates the PRA model and the impact of the change on plant operational risk. The second tier evaluates the assurance that risk-significant plant equipment outage configurations do not occur when specific plant equipment is out of service consistent with the proposed TS modification. The third tier focuses on the ability to evaluate risk-significant plant equipment outage configurations as they evolve. Each tier and the associated findings are discussed below.

Tier 1: PSA Capability and Insights

The Brunswick Individual Plant Examination (IPE) was last updated in 1996 to reflect the changes made to the plant since the 1992 IPE submittal, which evaluated the risk from internal accident initiating events using a Probabilistic Safety Assessment (PSA) model. The updated model reflects new procedures, plant modifications, plant specific component performance data, and initiating event frequencies. Therefore, the 1996 PSA model appears to be a reasonable tool for evaluating risk parameters for this requested TS amendment.

Brunswick's baseline Core Damage Frequency (CDF) has decreased from 2.7E-5/year as reported in the 1992 IPE submittal to 9.2E-6/year. A decrease in the Station Blackout (SBO) contribution to CDF resulted from establishing procedures on DC power recovery (OAOP-39) and Station Blackout (OAOP-36.2). SBO risk was further reduced by the addition of electrical cross-tie logic switches which allow the operators to perform cross-ties between both Units' 4 Kv busses within a shorter time. However, some modeling changes resulted in a CDF increase from the loss of high pressure injection during SBO. For some SBO sequences involving loss of high pressure injection, operators do not have adequate time to perform the emergency bus cross-tie or to use firewater for low pressure injection. The staff also noted that for the high pressure injection systems, High Pressure Coolant Injection (HPCI) and Reactor Core Isolation Cooling (RCIC), while maintenance unavailabilities for these two systems decreased, the failure to run and the failure to start probabilities in the updated PSA model increased since the 1992 IPE study. These results emphasize the importance of HPCI and RCIC at Brunswick for coping with SBO.

While the SBO contribution to the internal events CDF has decreased overall, the performance of on-line EDG maintenance results in an increased CDF during the time interval an EDG is out of service (OOS). Using the 1996 PSA model, the licensee estimated the impact of a 7 day LCO on CDF during the time interval the EDG is OOS, and on the Incremental Conditional Core Damage Probability (ICCDP). During performance of on-line EDG maintenance, the change in CDF was reported to be $5.5E-5$ /year per EDG. The increase in CDF during the performance of the EDG work at the opposite Unit, which may be at power or shutdown, was reported to be $7.1E-6$ /year. For a 7 day LCO, the ICCDPs associated with the Unit performing the on-line work was reported to be $1.1E-6$. Also, for a 7 day LCO, the ICCDP associated with the opposite Unit performing the work, at power or shutdown, was reported to be $1.4E-7$. These ICCDPs are consistent with typical estimates for a 7 day EDG LCO. The staff notes that the licensee expects the work to take 3 days per EDG, and the risk estimates to be correspondingly smaller due to the shorter unavailability duration.

The licensee noted that the estimated ICCDPs correlate to an annual average increase in SBO CDF. That is, the potential EDG unavailability for the full 7 day LCO period once per year will result in an additional annual $1.1E-6$ /year contribution to SBO CDF to the same Unit, and $1.4E-7$ /yr to the opposite Unit. The staff notes that the licensee's estimate conservatively assumed an EDG would enter a 7 day LCO period once during the year to perform SRs 4.8.1.1.2.d.1, 4.8.1.1.2.d.4, and 4.8.1.1.2.d.5, rather than once during the required 18 month TS surveillance period. These reported changes in CDF contributions are small and meet the guidelines for risk informed license amendments outlined in draft regulatory guides DG-1061, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Current Licensing Basis," and DG 1065, "An Approach for Plant-Specific, Risk-Informed Decision Making: Technical Specifications."

The staff notes that a potential additional 7 days of unavailability due to on-line work per year for two EDGs at a Unit will result in a $2.2E-6$ /year SBO CDF increase. Also, if a Unit should be at power and the opposite Unit EDG is unavailable for a 7 day LCO period during the same year, there is an additional annual SBO CDF increase of $1.4E-7$ /year per EDG from the opposite Unit. Therefore, the maximum cumulative increase in the SBO CDF would be $2.5E-6$ /yr based on licensee risk estimates. This maximum increase would raise the SBO CDF from $3.6E-6$ /yr to $6.1E-6$ /yr. Overall, the SBO CDF would remain smaller than reported in the 1992 IPE submittal by about a factor of 2, but the relative importance of SBO to the Brunswick CDF increases. Furthermore, the staff notes that, given the uncertainties in the IPE model, the SBO CDF may be closer to $1E-5$ /year even without considering the contribution from external events.

The licensee's PSA analysis did not identify a change in the CDF from non-SBO loss of decay heat removal LOOP sequences with an EDG in maintenance. A

Unit LOOP concurrent with on-line EDG maintenance would fail the Residual Heat Removal and Service Water equipment powered by the EDG due to the unavailability of its backup power; therefore, the staff reviewed the licensee's PSA analysis of loss of decay heat removal when an EDG is in maintenance. The licensee's PSA analysis showed that the risk associated with non-SBO loss of decay heat removal scenarios is not as significant as from SBO scenarios, and the staff found this insight to be reasonable.

The staff noted that the licensee estimated the annual average increase in large early release frequency from SBO events for a 7 day EDG LCO period to be $1.4E-7$ /yr. The licensee did not have the capability at the time of this review to perform a more detailed calculation of change in the large early release frequency.

The licensee's Maintenance Rule program performance criterion for EDG unavailability is currently less than or equal to 0.033. The updated PSA model assumes an EDG unavailability of 0.038, which is close to the performance goal. The staff notes that the licensee will incorporate the EDG planned unavailability associated with the requested TS amendment into their Maintenance Rule program, and will take appropriate actions as required in accordance with the Maintenance Rule.

For this requested TS amendment, the staff's Tier 1 review finds that the annual average risk associated with the requested TS amendment is small, and the SBO CDF is still expected to meet the Station Blackout Rule (SBOR) goal of $1E-5$ /yr CDF contribution.

Tier 2: Avoidance of Risk-Significant Plant Configurations

The licensee's PSA assessment showed that the risk to both Units is greater during the period the EDG is unavailable. Therefore, the staff reviewed the licensee's on-line work planning processes to avoid risk-significant plant configurations.

The licensee's procedure OAP-025, "BNP INTEGRATED SCHEDULING", Revision 4, dated February 27, 1998, addresses on-line maintenance configuration control. The OAP-25 methodology for assessing and managing on-line maintenance plant risk is detailed and incorporates PSA insights for dominant accident type such as SBO. In addition, the procedure provides guidance to use the Equipment Out Of Service (EOOS) PSA tool and/or to consult the PSA group for planning work, as well as for assessing the risk of emergent failures or changing plant conditions. The licensee informed the staff that the EOOS tool is used to calculate the risk for PSA components, regardless of whether the components have been classified as low or high safety significant. Also, in this procedure, the systems of high safety significance have been identified based on the 1996 PSA model insights and/or as determined by an expert panel. In order to assess the completeness of the list of high safety

significant systems in OAP-025, the licensee performed a sensitivity analysis to identify the high safety significant systems while an EDG is OOS. The sensitivity analysis assumed an opposite Unit EDG was concurrently unavailable, and did not identify any additional high safety significant systems.

The staff's review of OAP-25 noted that under extreme circumstances, the licensee may approve concurrent outages of an EDG and high safety significant systems such as HPCI and RCIC. In response to the staff's question on what the licensee would consider an extreme circumstance, the licensee revised OAP-25 to include the following clarification:

"No system outage, including HPCI or RCIC system outages, will be planned to be performed concurrent with an EDG outage.

Should unforeseen events occur which would require concurrent outages on an EDG and another high safety significant system, continued operation of the affected unit requires approval by the Plant General Manager with risk information being considered in the decision. In such cases the basis for continued operation or shutdown will be documented."

The staff noted that the Brunswick Individual Plant Examination Of External Events (IPEEE), dated June 30, 1995, provides risk insights from potential accident initiators such as fires, and should be used in the EDG work planning and plant configuration control. The licensee indicated that, based on the IPEEE for fire events, portions of the fire suppression system have been identified as high safety significant systems and are controlled in accordance with the Maintenance Rule. Additionally, the licensee informed the staff that hot work is scheduled in accordance with OAP-25 such that work in multiple high safety significant systems and work in multiple divisions of a single system is not performed concurrently.

The staff also noted that, historically, the Brunswick Units have shutdown due to the approach of a hurricane. OAP-25 provides direction to delay a scheduled EDG system outage until plant conditions are favorable. Additionally, OAOP-13.0, Revision 22, "Operation During Hurricane, Flood Conditions, Tornado, or Earthquake" provides actions to ensure the EDGs will be available for arrival of a hurricane, and provides guidance for plant operation during flood conditions, a tornado, or an earthquake.

Shutdown risk management is controlled by OAP-022, "BNP OUTAGE RISK MANAGEMENT", Revision 2, dated October 13, 1997, and includes guidance on shutdown outage activities to assure that the required decay heat removal capability is available. This procedure also requires a risk assessment of work during shutdown which may affect the opposite Unit. In the case that both Units are shutdown, TS 3.8.1.2 provides assurance that adequate EDG capability is maintained with both units shutdown. Thus, the staff notes that the requested TS amendment does not impact previously established shutdown controls.

For this requested TS amendment, the staff's Tier 2 review recognizes, given the licensee's commitment to revise OAP-025, that the licensee has in place controls on equipment outages to reduce the likelihood of risk significant plant configurations during the 7 day EDG LCO.

Tier 3: Risk Informed Plant Configuration Management

For this requested TS amendment, the staff finds that the licensee's work scheduling and control process, mentioned in the Tier 2 discussion, encompasses the requirements for Tier 3. The process includes provisions for performing a proceduralized risk-informed assessment of both planned and unplanned maintenance activities.

Based on the three-tiered approach in DG-1061 and DG-1065, the staff finds the following for this requested TS amendment:

- The annual average risk associated with the requested TS amendment is small, with the SBO CDF still expected to meet the Station Blackout Rule goal of $1E-5$ /yr CDF contribution.
- Given the licensee's revision to OAP-025, the licensee has in place controls on equipment outages to reduce the likelihood of risk significant plant configurations during the 7 day EDG LCO.
- The licensee has implemented a risk-informed plant configuration management program to assess the risk associated with the removal of equipment from service during the 7 day EDG LCO.

Based on the three-tiered approach, the staff finds the risk associated with the requested TS amendment to be low.

Conclusion of the EDG On-line SRs

Based on the above deterministic and risk evaluations, the staff finds that on-line performance of SR 4.8.1.1.2.d.1, SR 4.8.1.1.2.d.4, and SR 4.8.1.1.2.d.5 represents low risk, and that the performance of SR 4.8.1.1.2.d.1, SR 4.8.1.1.2.d.4, and SR 4.8.1.1.2.d.5, during power operations, would not adversely affect overall EDG availability or electrical distribution system reliability.

b) SR 4.8.1.1.2.d.2, SR 4.8.1.1.2.d.3, SR 4.8.1.1.2.d.6, and SR 4.8.1.1.2.d.7

Brunswick's engineered safety features (ESF) system is designed and operated with a shared configuration of the four EDGs. Thus, the current TS requires that those four EDGs be operable when either one or both units are operating and the performance of the 18-month EDG SRs requires shutdown of both units. To avoid dual unit shutdown, on May 10, 1990, the NRC issued a safety evaluation for a change to Bases Section 3/4.8 which added, the following statement:

The requirement of Specification 4.8.1.1.2.d to demonstrate the OPERABILITY of each diesel generator at least once per 18 months during shutdown may be satisfied by performing the required surveillance on diesel generators number 1 and 2 while Brunswick Unit 1 is shutdown, and diesel generators number 3 and 4 while Brunswick Unit 2 is shutdown.

To incorporate the above change to SR 4.8.1.1.2.d, the licensee proposed to modify SR 4.8.1.1.2.d by adding a footnote (**) to indicate that SR 4.8.1.1.2.d.2, SR 4.8.1.1.2.d.3, SR 4.8.1.1.2.d.6, and SR 4.8.1.1.2.d.7 be performed for EDG 1 or 2 while Unit 1 is in operational condition 4 or 5 and for EDG 3 or 4 with Unit 2 is in operational condition 4 or 5.

According to the TS-defined five plant operating conditions at Brunswick, three operational conditions (i.e., power operation, startup, and hot shutdown) are applicable to power operation; the remaining two conditions (i.e., cold shutdown and refueling) are applicable to shutdown. Thus, the licensee states that limiting these SRs to the unit operational condition 4 or 5 is having equivalent meaning as the unit "during shutdown." Therefore, the footnote (**) in the proposed SRs clarifies when (and which) these SRs are performed on EDGs and this is consistent with the current TS requirement of "during shutdown" in SR 4.8.1.1.2.d.

The staff finds the clarification to SR 4.8.1.1.2.d by adding a footnote (**) regarding SR 4.8.1.1.2.d.2, SR 4.8.1.1.2.d.3, SR 4.8.1.1.2.d.6, and SR 4.8.1.1.2.d.7 to be consistent with previously approved Bases Section 3/4.8 and to be acceptable.

Overall Conclusion to Modification of SR 4.8.1.1.2.d

Based on the above, the staff concludes that the proposed TS amendment will not affect the ability of EDGs to perform their intended safety function; therefore, the proposed changes to SR 4.8.1.1.2.d are acceptable.

2. Clarification of TS Bases Section 3/4.8

In order to be consistent with all the changes made in the proposed SR 4.8.1.1.2.d, the licensee proposed to modify TS Bases Section 3/4.8 by making appropriate changes where applicable. The staff has reviewed all the proposed bases changes, in the licensee's submittal and January 27, 1998 supplement, and finds them to be consistent with the changes submitted with this proposed TS, and therefore, acceptable.

3. Deletion of expired footnote on Brunswick Unit 2

On August 13, 1991, the staff granted a footnote to SR 4.8.1.1.2.d for Unit 2, which allowed a one-time-only extension to the 18-month surveillance interval for Brunswick Unit 2. Since the time requirement for the footnote has expired, the proposed submittal replaces it. The staff has

reviewed the deletion of the footnote and finds it an administrative change; therefore, no review is required. Therefore, the deletion of the expired footnote is acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the State of North Carolina official was notified of the proposed issuance of the amendments. The State official had no comments.

4.0 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 change surveillance requirements. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (62 FR 63971). 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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