September 21, 2004

Mr. Mark E. Warner, Site Vice President
c/o James M. Peschel
Seabrook Station
FPL Energy Seabrook, LLC
PO Box 300
Seabrook, NH 03874

SUBJECT: SEABROOK STATION, UNIT NO. 1 - ISSUANCE OF AMENDMENT
RE: CHANGE TO EMERGENCY POWER SYSTEMS (TAC NO. MC0635)

Dear Mr. Warner:

The Commission has issued the enclosed Amendment No. 97 to Facility Operating License No. NPF-86 for the Seabrook Station, Unit No. 1 (Seabrook). This amendment consists of changes to the Technical Specifications (TSs) in response to your application dated August 25, 2003, as supplemented by letters dated February 9, February 23, March 25, April 15, May 20, and July 29, 2004.

The amendment modifies the Seabrook TSs to extend the Emergency Diesel Generator allowed outage time from 72 hours to a period of 14 days and to allow extension of the current 2-hour time requirement to 4 hours for verification of redundant component operability. These changes are in support of installing a non-safety-related supplemental emergency power system. The Bases of the affected TSs will be modified to address the changes.

A copy of the related Safety Evaluation is also enclosed. Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Scott P. Wall, Project Manager, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-443

Enclosures: 1. Amendment No. 97 to NPF-86
2. Safety Evaluation

cc w/encls: See next page

Mr. Mark E. Warner, Site Vice President
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FPL ENERGY SEABROOK, LLC, ET AL.*

DOCKET NO. 50-443

SEABROOK STATION, UNIT NO. 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 97
License No. NPF-86

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment filed by FPL Energy Seabrook, LLC, et al. (the licensee), dated August 25, 2003, as supplemented by letters dated February 9, February 23, March 25, April 15, May 20, and July 29, 2004, 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.

*FPL Energy Seabrook, LLC (FPLE Seabrook), is authorized to act as agent for the following: Hudson Light & Power Department, Massachusetts Municipal Wholesale Electric Company, and Taunton Municipal Light Plant. FPLE Seabrook has exclusive responsibility and control over the physical construction, operation and maintenance of the facility.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-86 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 97, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

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

FOR THE NUCLEAR REGULATORY COMMISSION

/RA by DCollins for/

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: September 21, 2004

ATTACHMENT TO LICENSE AMENDMENT NO. 97

FACILITY OPERATING LICENSE NO. NPF-86

DOCKET NO. 50-443

Replace the following pages of the Appendix A, Technical Specifications, with the attached revised pages as indicated. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
3/4 8-2	3/4 8-2
3/4 8-2a	3/4 8-2a
3/4 8-2b	3/4 8-2b
B 3/4 8-1	B 3/4 8-1
B 3/4 8-2	B 3/4 8-2
B 3/4 8-3	B 3/4 8-3
B 3/4 8-4	B 3/4 8-4
B 3/4 8-5	B 3/4 8-5
B 3/4 8-6	B 3/4 8-6
B 3/4 8-7	B 3/4 8-7
B 3/4 8-8	B 3/4 8-8
B 3/4 8-9	B 3/4 8-9
B 3/4 8-10	B 3/4 8-10
B 3/4 8-11	B 3/4 8-11
B 3/4 8-12	B 3/4 8-12
B 3/4 8-13	B 3/4 8-13
B 3/4 8-14	B 3/4 8-14
B 3/4 8-15	B 3/4 8-15
B 3/4 8-16	B 3/4 8-16
B 3/4 8-17	B 3/4 8-17
B 3/4 8-18	B 3/4 8-18
B 3/4 8-19	B 3/4 8-19

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 97 TO FACILITY OPERATING LICENSE NO. NPF-86

FPL ENERGY SEABROOK, LLC

SEABROOK STATION, UNIT NO. 1

DOCKET NO. 50-443

1.0 INTRODUCTION

By letter dated August 25, 2003, as supplemented by letters dated February 9, February 23, March 25, April 15, May 20, and July 29, 2004, FPL Energy Seabrook, LLC (FPLE or the licensee) requested changes to the Technical Specifications (TSs) for Seabrook Station, Unit No. 1 (Seabrook). The supplements dated February 9, February 23, March 25, April 15, May 20, and July 29, 2004, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the staff's original proposed no significant hazards consideration determination as published in the *Federal Register* on December 9, 2003 (68 FR 68669).

The proposed changes would modify the Seabrook TSs to extend the emergency diesel generator (EDG) allowed outage time (AOT) from 72 hours to a period of 14 days, and to allow extension of the current 2-hour time requirement to 4 hours for verification of redundant component operability. These changes are in support of installing a non-safety-related supplemental emergency power system (SEPS). The Bases of the affected TSs will be modified to address the proposed changes.

2.0 REGULATORY EVALUATION

The Nuclear Regulatory Commission (NRC or the Commission) staff determined that FPLE, in its August 25, 2003, submittal, identified the applicable regulatory requirements. The regulatory requirements on which the NRC staff based its acceptance are described below.

General Design Criterion (GDC) 17, "Electric Power Systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of structures, systems, and components (SSCs) that are important to safety. The onsite system is required to have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. The offsite power system is required to be supplied by two physically-independent circuits that are designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. In addition, this criterion requires provisions to minimize the probability of losing electric power from the remaining electric

power supplies as a result of loss of power from the unit, the offsite transmission network, or the onsite power supplies.

GDC 18, "Inspection and Testing of Electric Power Systems," of Appendix A requires that electric power systems that are important to safety must be designed to permit appropriate periodic inspection and testing.

Section 50.36 of 10 CFR, "Technical Specifications," requires a licensee's TSs to establish a limiting condition for operation (LCO), which include an AOT for equipment that is required for safe operation of the facility. In the Seabrook TSs, LCO 3/4.8.1.1 deals with the EDG AOT. In March 2004, the NRC issued NUREG-1431, "Standard Technical Specifications [STSs], Westinghouse Plants," Revision 3. The STSs were developed based on the criteria outlined in 10 CFR 50.36. NUREG-1431 was established as a general model for developing potential TSs for Westinghouse plants. The generic Bases presented in NUREG-1431 provide information regarding application of the TS criteria and reflect detailed system configurations and operating characteristics for all reactor designs.

Section 50.63 of 10 CFR, "Loss of All Alternating Current Power," requires that all nuclear power plants have the capability to withstand a station blackout (SBO), as defined in 10 CFR 50.2, for an established period of time.

The maintenance rule in 10 CFR 50.65, "Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," requires that a licensee assess and manage the increase in risk that may result from proposed maintenance activities.

The NRC staff also considered the following guidance documents in its review:

- Regulatory Guide (RG) 1.93, "Availability of Electric Power Sources," provides guidance with respect to operating restrictions (i.e., AOTs) if the number of available alternating current (AC) sources is less than that required by the TS LCO. In particular, this guide prescribes a maximum AOT of 72 hours for an inoperable AC source.

- RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," describes a risk-informed approach, acceptable to the NRC, for assessing the nature and impact of proposed licensing-basis changes by considering engineering issues and applying risk insights. RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," describes an acceptable risk-informed approach specifically for assessing proposed TS changes in AOTs. These RGs also provide acceptance guidelines for evaluating the results of such evaluations.

3.0 TECHNICAL EVALUATION

The NRC staff reviewed the proposed changes from both a deterministic perspective and probabilistic risk assessment (PRA). The staff's review and evaluation of the deterministic aspects is presented in Section 3.3. The staff's review and evaluation of the licensee's assessment of risk is presented in Section 3.4.

3.1 Description of SSCs

The offsite and onsite power systems at Seabrook are designed to comply with the requirements of GDCs 17 and 18. The offsite power system for Seabrook is connected to the New England grid via three 345 kV offsite transmission lines. The transmission lines serve as the preferred AC electrical power source of the station. The three transmission lines terminate in a switchyard that is designed and arranged so as to provide two physically independent circuits between the offsite transmission network and the onsite Class 1E Distribution System. This arrangement ensures a continuous power source to the Class 1E buses.

The onsite Class 1E Distribution System is divided into redundant trains so that the loss of any one train does not prevent the minimum safety functions from being performed. The design has each safety-related train connected to two preferred offsite power sources. Each safety-related train is connected to offsite power either via the train's unit auxiliary transformers or reserve auxiliary transformers. In addition, each safety-related train is backed by one EDG, which serves as a reliable standby power supply. The EDGs are used in situations when offsite power is unavailable. During normal plant operations (Mode 1 through 4), the EDGs are in standby condition and start automatically if there is a loss of power on their respective emergency bus or upon receipt of a safety injection (SI) signal from the engineered safety features actuation system. The EDGs can also be manually started and controlled from the main control board.

Each EDG is sufficient to supply its train's safety-related and non safety-related loads so that the unit can be placed and maintained in a safe shutdown condition with only one EDG. The capacity of one EDG is capable of producing 6083 kW continuously and is sufficient to satisfy power requirements for the design basis event, i.e., loss-of-coolant accident coincident with a loss of electrical power, given failure of the other EDG to start.

The EDGs are designed to rapidly start from standby conditions and attain rated voltage and frequency, as well as energizing the emergency buses with permanently connected loads, within 10 seconds (SI signal) or 12 seconds (Loss-of-offsite power (LOOP) - only signal). Following each start, they are rapidly loaded with either shutdown or emergency loads through an automatic sequencer within 108 seconds.

During normal plant operations, the EDGs are tested monthly to verify operability, as required by the TSs. The monthly TS surveillance verifies start capability and the capability to operate at a pre-determined load while synchronized to the grid.

3.1.1 SEPS Design

The licensee has indicated that Seabrook will add a non-safety-related SEPS. The SEPS is designed to serve as a reliable backup standby AC power supply to either emergency bus whenever one of the EDGs is out of service. Once operational, the SEPS will be capable of supplying the required safety-related and non-safety-related safe shutdown loads during a total LOOP event where, additionally, both EDGs fail to start and load. The extended EDG AOT will only be utilized when the SEPS is available. The licensee stated that the SEPS operational availability will be monitored by performance of monthly, quarterly, and yearly surveillances, as specified in the Seabrook Technical Requirements Manual and as recommended by the vendor. Additionally, the SEPS would be verified available and an operational readiness status check

would be performed when it is anticipated that one of the EDGs will be inoperable for longer than the AOT of 72 hours. The SEPS can be manually aligned to supply the applicable safety-related bus with operator action.

With regards to SEPS design criteria, the licensee stated the following:

- The SEPS will include two diesel generator units (gensets) for a size that will handle the required LOOP loads (approximately 4.5 MW).
- The SEPS will be permanently installed south of the cooling tower within the plant's protected area. The SEPS genset(s), switchgear, and load bank will be housed in individual weather enclosures.
- The SEPS will include a 24-hour fuel oil supply.
- The SEPS will automatically start on loss of power condition.
- The SEPS gensets will connect to the essential switchgear room via an underground duct bank.
- The SEPS will include a resistive/reactive electrical load bank for testing, which will be sized to accommodate the full load of a SEPS genset.
- SEPS components and subsystems will be protected by enclosure and temperature control against the effects of likely weather-related events, such as high winds, ice, snow, tornado, and lightning that may initiate a LOOP event.
- The SEPS gensets and local switchgear will not be designed to meet Class 1E or safety system requirements.
- The SEPS will meet the Updated Final Safety Analysis Report (UFSAR) separation requirements.
- The SEPS generators will have electrical separation from the Class 1E power system by at least two circuit breakers and one transfer switch in series, one of which will be a Class 1E breaker at the Class 1E bus.
- The SEPS genset output will not normally be connected to the onsite or offsite power systems.
- The SEPS will be capable of carrying the loads required for safe shutdown for a LOOP event, including maintaining adequate voltage and frequency such that the performance of safety systems is not degraded.
- Emergency operating procedures will be modified to incorporate the SEPS design. This will require manual closure of the SEPS safety-related breaker onto the emergency bus. It is expected that this can be completed in approximately 30 minutes.

- Extending the EDG AOT will only be done when the SEPS is available. The AOT reverts back to 72 hours if the SEPS is not available.

- The SEPS will meet US Environmental Protection Agency and the State of New Hampshire requirements for emergency power systems, including requirements for diesel fuel oil engines.

3.2 TS Changes

TS 3.8.1.1, ACTIONs b, c, and f currently require that if one of the EDGs becomes inoperable, the inoperable EDG be restored to operable status within 72 hours. If the EDG cannot be restored to an operable status within 72 hours, the TS actions require that the plant be placed in hot standby within the following six hours and in cold shutdown within the following 30 hours. The proposed TSs provides an AOT extension for each EDG from the current 72 hours to 14 days based on the availability of the SEPS. The licensee has proposed the following changes to TS 3.8.1.1, ACTIONs b, c, and f:

b. With a diesel generator inoperable:

1) Demonstrate the OPERABILITY of the remaining A.C. sources by performing Specification 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter. Perform ACTION d. Demonstrate the OPERABILITY of the remaining diesel generator by performing Specification 4.8.1.1.2a.5) within 24 hours.*

2) Restore at least two diesel generators to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, unless the following condition exists:

(a) The requirement for restoration of the diesel generator to OPERABLE status within 72 hours may be extended to 14 days if the Supplemental Emergency Power System (SEPS) is available, as specified in the Bases, and

(b) If at any time the SEPS availability cannot be met, either restore the SEPS to available status within 72 hours (not to exceed 14 days from the time the diesel generator originally became inoperable), or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With one offsite circuit and one diesel generator of the above required A.C. electrical power sources inoperable:

1) Demonstrate the OPERABILITY of the remaining A.C. source by performing Specification 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter. Perform ACTION d. Demonstrate the OPERABILITY of the remaining diesel generator by performing Specification 4.8.1.1 .2a.5) within 8 hours.*

2) Restore at least one of the inoperable sources to OPERABLE status within 12 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

3) Restore at least two offsite circuits and two diesel generators to OPERABLE status within 72 hours from the time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, unless the following condition exists:

   (a) The requirement for restoration of the diesel generators to OPERABLE status within 72 hours may be extended to 14 days if the Supplemental Emergency Power System (SEPS) is available, as specified in the Bases, and

   (b) If at any time the SEPS availability cannot be met, either restore the SEPS to available status within 72 hours (not to exceed 14 days from the time the diesel generator originally became inoperable), or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

f. With two of the above required diesel generators inoperable:

1) Demonstrate the OPERABILITY of two offsite A.C. circuits by performing Specification 4.8.1.1.1 a within 1 hour and at least once per 8 hours thereafter.

2) Restore at least one diesel generator to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours,

3) Restore at least two diesel generators to OPERABLE status within 72 hours from the time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours, unless the following condition exists:

   (a) The requirement for restoration of the diesel generators to OPERABLE status within 72 hours may be extended to 14 days if the Supplemental Emergency Power System (SEPS) is available, as specified in the Bases, and

(b) If at any time the SEPS availability cannot be met, either restore the SEPS to available status within 72 hours (not to exceed 14 days from the time the diesel generator originally became inoperable), or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

The licensee contends that the proposed EDG AOT of 14 days would provide adequate time to perform normal EDG maintenance and inspections requiring disassembly of the EDG and performance of post-maintenance and operability tests required to return the EDG to operable status. The licensee indicated that Seabrook intends to limit the use of the proposed 14-day EDG AOT for planned maintenance with a frequency of no more than once per operating cycle for each of the two EDGs. The licensee stated that Seabrook will manage the risk of such evolutions with its on-line maintenance program and procedures in place to implement 10 CFR 50.65(a)(4) and its implementation guidance, Regulatory Guide 1.182, "Assessing and Managing Risks Before Maintenance Activities at Nuclear Power Plants." This program provides additional assurance that these maintenance activities are performed with no significant increase in the risk of a severe accident.

Additionally, TS 3.8.1.1, ACTION d currently requires that, in addition to the requirements of Actions b or c, all required systems, subsystems, trains, components and devices (required redundant features), that depend on the remaining Operable EDG as a source of emergency power, as well the steam-driven auxiliary feedwater pump, be Operable within two hours. The proposed TS provides an AOT extension to four hours.

The licensee contends that the proposed four-hour AOT would provided the operator sufficient and realistic time to evaluate and perform minor repair on any identified inoperable equipment before subjecting the plant to transients associated with shutdown. The increase in time from two hours to four hours is also based on the completion time presented in NUREG-1431, Revision 3.

3.3 Deterministic Evaluation

3.3.1 EDG Reliability and Unavailability

The NRC staff evaluated the proposed EDG AOT change to ensure that the overall availability of the EDG will not be significantly reduced as a result of the increased on-line preventive maintenance activities, and that the proposed 14-day AOT will be consistent with the objective of the Maintenance Rule, 10 CFR 50.65. In the August 25, 2003, submittal, the licensee stated that the Seabrook Station Maintenance Rule Program would identify maintenance activities and minimize scheduling of unnecessary, non-corrective maintenance. If the licensee's pre-established reliability or availability goals are not met for the EDGs, procedures will require corrective actions and increased management attention to restore EDG quality performance. Frequent use of the extended AOT would become evident through the "Emergency AC Power" NRC Performance Indicator crossing the threshold from "Green" to "White." Approximately 4 seven-day entries in 36 months would result in reaching the "Green" to "White" threshold. Therefore, use of the extended AOT should be minimized. In general, the licensee's expectation is that the 14-day AOT would yield added efficiency in maintenance and thereby reduce total unavailability of the EDGs.

The licensee's maintenance unavailability is monitored monthly using a 24-month rolling average. The historical average of this indicator, August 1996 to April 2003, is 135 hours for the "A" EDG and 154 hours for the "B" EDG. This average is within the administrative limit of 300 hours per train. The licensee noted that an overall upward trend is evident in EDG unavailability due to an increase in corrective maintenance, in combination with performing some activities during power operation instead of during a refueling outage. Recent actions to improve EDG reliability, such as changing to 40 wt. oil, in combination with a pipe coupling failure and a rectifier bank failure, have led to the "B" EDG unavailability trending slightly higher than that of the "A" EDG unavailability.

Additionally, as part of compliance with the Station Blackout Rule, 10 CFR 50.63, the licensee's target EDG reliability level is 0.975. This target reliability level is currently being satisfied. Based on the information provided by the licensee, the NRC staff considers the Seabrook EDGs to demonstrate sufficient reliability, and that the licensee adequately controls EDG unavailability.

3.3.2 Offsite Power System

The licensee noted that there has been no instance of total 345 kV transmission grid unavailability at Seabrook. Furthermore, the licensee stated that, as system configuration warrants, and on a periodic basis, the New England Power Pool (NEPOOL) will review the performance of the New England Bulk Power Supply System. Additionally, the Northeast Power Coordinating Council (NPCC) conducts annual reviews as part of their Reliability Assessment Program, such as reliability of the planned bulk power transmission system of each area of NPCC and the transmission interconnections to other areas. The NPCC Reliability Assessment Program includes, in part, load flow studies, stability studies, review of special protection and dynamic control systems, as well as contingency assessments. These operational and planning reviews are performed in accordance with both NEPOOL standards and NPCC criteria. The NRC staff considers that these review processes provide assurance that operating procedures will be kept current and that a reliable source of offsite power will be maintained to Seabrook.

3.3.3 SBO

Section 50.63 of 10 CFR requires that each light water-cooled nuclear power plant be able to withstand and recover from a loss of all AC power or SBO (loss of both offsite power and onsite emergency power). RG 1.155, "Station Blackout," provides a method for complying with 10 CFR 50.63. RG 1.155 states that NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," also provides acceptable guidance for meeting the requirements of 10 CFR 50.63. The licensee followed NUMARC 87-00 except where RG 1.155 took precedent. Currently, Seabrook responds to SBO as an AC-independent plant relying on the station batteries as a source of electrical power for the coping duration specified in the UFSAR Section 8.4.2 (four hours). The SEPS will not be credited to support response as an alternate AC plant. However, should an SBO event occur, the SEPS would be used to supply vital loads. The SEPS is intended to supply defense-in-depth during EDG online maintenance and at other times when it is available and is not intended to be used to change the Seabrook licensing basis for compliance with SBO.

3.3.4 Compensatory Measures

The licensee indicated that the risk impact of performing maintenance of up to 14 days would be managed through the licensee's on-line maintenance program and procedures in place to implement 10 CFR 50.65(a)(4) and its implementation guidance, RG 1.182.

The licensee's program and procedures for on-line maintenance activities provide assurance that voluntary entries into LCO action statements to perform maintenance are based on the determination that the impact on plant safety is small enough and the level of risk is acceptable for the maintenance period. The licensee performs quantitative and/or qualitative reviews to assess the risk impact of removing safety systems and important non-safety equipment from service during maintenance outages. The administrative procedures for on-line maintenance activities at Seabrook provide assurance that removal of safety systems and important non-safety equipment from service will be controlled during scheduled maintenance outages. The licensee's procedures provide assurance that component testing or maintenance that significantly increases the likelihood of a plant transient would be avoided before voluntarily entering an LCO action to perform on-line maintenance. The procedures and practices at Seabrook are such that they will ensure that the plant does not experience significant power or equipment configuration changes.

Before voluntarily entering the LCO action to perform extended EDG maintenance and during the outage, the licensee will evaluate grid and environmental conditions to ensure that sufficient time is available for restoration. The licensee stated that pre-planned maintenance will not be scheduled when adverse weather is expected. The intent will be to minimize the time when the EDG is out of service under conditions that could significantly challenge the offsite power sources.

The licensee's procedures for performing on-line maintenance activities require quantitative and/or qualitative reviews to be performed on equipment out of service and combinations of equipment out of service. The reviews include considering items such as the potential for a plant trip, the potential to affect generation, radiation exposure as low as reasonably achievable concerns while online, environmental conditions, and workforce availability.

The licensee implements a "Protected Train" concept to administratively control pre-planned maintenance to avert the potential of accidentally causing standby/required safety equipment to be inoperable/unavailable due to scheduling or personnel errors. In addition, the current TS 3.8.1.1 ACTION Statement d., which is linked by ACTIONS b. and c., ensures that required systems, subsystems, trains, components, and devices that depend on the remaining operable EDG as a source of emergency power are also verified operable within a two-hour window whenever an EDG is inoperable. The proposed TS provides an AOT extension to four hours.

The Protected Train concept would ensure that prior to removing an EDG from service for performance of pre-planned maintenance, the licensee will not concurrently perform maintenance activities associated with required systems, subsystems, trains, components, and devices that depend on the remaining operable EDG as a source of emergency power or the scope of such maintenance will be limited to assure rapid return to operable status. The licensee's administrative controls and guidelines reinforce the TS requirement to ensure

systems, subsystems, trains, components, and devices on the opposite train (Protected Train) are operable before removing the EDG from service and preclude subsequent testing or maintenance activities on these systems, subsystems, trains, components, and devices while the EDG is inoperable.

Other systems or components may be removed from service to address unanticipated deterioration of component or system conditions that create emergent maintenance requirements, require plant shutdown within 72 hours, or significantly jeopardize continued power operation. These activities would be considered emergent work and would be reviewed for risk impact, either qualitatively or quantitatively via Seabrook's on-line maintenance evaluation tool, the Safety Monitor. If these emergent work activities increase risk, steps would be taken to restore any equipment that affects plant safety as described below.

Seabrook uses the Nuclear Energy Institute (NEI)/NUMARC 93-01, Revision 3, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," as overall guidance for complying with 10 CFR 50.65 (a)(4). NEI/NUMARC 93-01, Revision 3, Chapter 11 defines the PRA as an appropriate mechanism to define the assessment scope. The licensee stated that the PRA model at Seabrook fulfills the entire scope of the assessment, since the Maintenance Rule Expert Panel has not identified risk-significant SSCs beyond the PRA model scope. The PRA model and the on-line maintenance evaluation tool, i.e., the Safety Monitor, meet the recommendations in NEI/NUMARC 93-01, Revision 3, Chapter 11 for quantitative evaluation of maintenance activities.

NEI/NUMARC 93-01, Revision 3, Chapter 11 considers the following activities to be "risk management actions." The licensee stated that these activities are part of the normal work control process at Seabrook:

- Obtain operator awareness and approval of the planned evolution,
- Conduct pre-job briefing of maintenance personnel,
- Pre-stage parts and materials,
- Walk down tagout and maintenance activity prior to conducting maintenance,
- Perform maintenance around the clock (where appropriate),
- Minimize other work in areas that could affect initiators,
- Minimize other work in areas that could affect redundant systems.

The licensee stated that, in accordance with the provisions 10 CFR 50.65(a)(4), the following compensatory measures would be implemented when utilizing the extended 14-day AOT:

- Elective maintenance will not be performed on the SEPS. Personnel will be made aware of the dedication of the SEPS to the unit.

- No elective maintenance will be performed on the 345 KV system that would challenge the availability of offsite power to the emergency buses.

- The condition of the grid will be evaluated prior to entering the extended EDG AOT for TS 3.8.1.1 ACTIONs b, c, and f, for elective maintenance. The system dispatcher will be contacted prior to removing the EDG from service. An extended EDG AOT will not be entered to perform elective maintenance when the grid stress conditions are considered high as indicated per licensee procedure.

3.3.5 Conclusion for Deterministic Review

Based on the information presented by the licensee, the NRC staff finds that Seabrook operating procedures and compensatory measures provide reasonable assurance that remaining sources of AC power will be available during a 14-day AOT. Furthermore, the staff finds that the proposed changes will not affect the compliance of Seabrook with the requirements of GDCs 17 and 18. Therefore, the NRC staff finds that revisions to TS 3.8.1.1 to extend the AOT for an inoperable EDG from the current 72 hours to 14 days acceptable.

3.4 Probabilistic Evaluation

The licensee has evaluated its proposed EDG AOT changes to determine that current regulations continue to be met and guidelines followed, and that adequate defense-in-depth provisions are maintained and that any increases in the “at power” core damage frequency (CDF) and large early release frequency (LERF) are small and consistent with the NRC staff’s Safety Goal Policy Statement. Additionally, the licensee states that the changes may result in a risk decrease during a refueling outage. The NRC staff evaluated the impact on risk of the proposed 14-day AOT according to the guidelines in RG 1.174 and RG 1.177.

3.4.1 PRA Insights

3.4.1.1 PRA Quality

The licensee maintains a living PRA with an internal process and procedures that establish the programmatic requirements for PRA update and review. The current PRA model of record, SB2002X, is based on plant data and modifications through May 2002. The SB2002X model was modified to estimate the risk impact of the SEPS.

A peer review of the Seabrook PRA was conducted in October 1999, as part of the Westinghouse Owner’s Group (WOG) industry review process, and completed in December 1999, PRA Model SB1999, using the WOG methodology. The peer review team was comprised of six full-time members and two part-time special focus members. The peer review team’s PRA experience ranged from 12 to 20 years, with nuclear industry experience ranging from 13 to 30 years. That review identified a total of 74 critical comments, including 34 significant ("A" or "B" level) comments, as well as 11 "superior" (excellent in the positive sense) comments. All significant comments were addressed by either making model changes, performing sensitivity analyses (e.g., human reliability analyses (HRA) comments), or documenting that the comment is not significant for most applications (e.g., Level 2 comments).

The most significant comments from the peer review team were in the area of HRA. In response, the licensee first performed a simplified success likelihood index method (SLIM) analysis to look for outliers–actions that may be quantified optimistically relative to other actions. The SLIM analysis did not identify any optimistic results. The licensee performed an operator action dependency analysis, and also undertook a multi-year effort to investigate HRA methods and provide HRA training. The licensee has selected an Electric Power Research Institute HRA tool as, in its judgment, the best implementation of an available, reasonable, and reproducible methodology. The licensee has updated several action analyses using the HRA tool and plans to update many others over the next two years.

3.4.1.2 Scope of the PRA

The Seabrook PRA is an integrated, all-modes PRA (i.e., modeling power operation, mode transition, and shutdown within a single PRA model). The power operation portions of the model are full scope (internal and external events), and Level 2 (i.e., containment performance) modeling. The shutdown operation portions of the model are currently Level 1 (internal events only).

3.4.1.3 PRA Modeling

The licensee's PRA model is a large event tree-type, which uses linked event trees to develop core damage sequences and fault trees to develop equations modeling the interaction of components within the systems analysis. Selected initiating events are also modeled via fault trees. In general, plant equipment is modeled at the component level, with multiple basic events representing various failure modes.

Dependencies within a system are modeled using the parametric Multiple Greek Letter method to account for unspecified dependencies. Dependencies between and among systems are modeled via logic rules in the event trees.

Component availability models include contributions from random failure, test, and maintenance unavailability. Common cause failures are included where appropriate. The SB2002X model uses average maintenance data for components. Failure rates for the current EDGs are developed using Seabrook-specific performance data acting upon generic industry data using a Bayesian update process. EDG unavailability data is based on actual licensee plant data through May 2002. Common cause failures between the existing EDGs and SEPS (two air-cooled Cummins DGs) are not modeled because they are of different types (water-cooled vs. air-cooled), from different manufacturers, have different configurations, and require different maintenance procedures. A new model was created on the model of record (SB2002X) to estimate the risk impacts of extending the AOT from 3 days to 14 days combined with adding the SEPS diesels as an additional power source. Several modifications were made to the existing model to account for the addition of the SEPS. SEPS fault trees were added to model hardware failure and human error probabilities associated with aligning and powering the emergency buses. In addition, some structural changes were made to restructure a large AC power fault tree into smaller fault trees. These changes improved the event tree logic modeling the SEPS.

The proposed 72-hour to 14-day EDG AOT change, as well as SEPS implementation, is judged by the licensee to have no impact on initiating event frequencies. Initiating event frequencies resulting from support system failures are calculated using fault trees. All other initiating event frequencies use point estimates.

For the licensee's evaluation, the system fault trees had no truncation limits (i.e., all possible cutsets were generated). The event tree core damage sequences were truncated below 1E-14. One of the characteristics of the linked event tree methodology is that the sum of the truncated sequence frequencies can be determined. At the 1E-14 truncation level, the unaccounted-for frequency is no more than about 0.2% of the total CDF. Based on the information presented by the licensee, the NRC finds that the licensee's determination that the adequacy of the truncation value used for the 14-day EDG AOT is reasonable and acceptable.

3.4.1.4 SEPS Reliability

The SEPS power source consists of two air-cooled DGs (gensets) that synchronize automatically. The system fault tree models a failure of one diesel to start, run, or synchronize as a failure of the SEPS system. The existing emergency diesel start and run failure data was used for each of the SEPS gensets. Using the EDG failure rate data is believed, by the licensee, to be conservative. The SEPS data will be updated to manufacturer-specific data when it is made available. The SEPS gensets are skid-mounted units and are expected by the licensee to have reliability comparable or better than the existing EDGs. This is based on improvements in diesel reliability in recent years and the benefit of a long commercial operating history. Based on the information presented by the licensee, the NRC staff finds that the licensee's justification for using the existing emergency failure parameters for the SEPS is reasonable, conservative, and acceptable.

3.4.1.5 SEPS Support

The licensee stated that it has examined the SEPS support system failures and has determined that failures of those systems do not appreciably contribute to the failure probability of the system and are thus not included in the SEPS hardware fault tree. Most support system failures do not result in an immediate loss of function. Support power comes from a transformer fed from either Bus E5 or Bus E6 that supplies a 480 V electrical power panel located at the SEPS gensets. This power is used for the battery chargers, lighting, and heating on loss-of-power to support systems, such as a transformer failure, the SEPS gensets will start and auto-synchronize. The loss of other support functions is discernible by means of a control room alarm indicating SEPS difficulties. A local alarm panel shows the specific parameter(s) that is triggering the alarm. A battery low-power alarm is provided that allows a safety margin for replacing batteries before starting capacity is lost. Operator rounds will also provide an additional level of protection against lost support systems and monitor overall SEPS conditions. Based on the information presented by the licensee, the NRC staff finds the licensee's conclusion that the probability of failures of support systems will not appreciably contribute to the probability of SEPS system failure and, therefore, do not need to be modeled in the fault tree, to be reasonable and acceptable.

3.4.1.6 EDG Reliability

The EDG reliability remains unchanged for the licensee's evaluation. The EDG failure rate data is based on the licensee's Bayesian update which combines generic data with plant-specific data, and was last updated in 2002. Based on the information presented by the licensee, the NRC staff finds the licensee's approach to be reasonable and acceptable.

3.4.1.7 Seismic Fragility

The licensee stated that it had no definitive information available regarding the seismic capacity of the SEPS; therefore, limited capacity, equivalent to that of offsite power, was assumed. This was modeled by the licensee by using the same seismic top event as that for offsite power. The licensee considers this assumption to be conservative. The NRC staff considers the likelihood of seismic failure of the mechanically robust SEPS to be less than that of the structures, components and equipment of offsite power. As such, the staff concurs that the seismic capacity of offsite power should bound the capacity of the small and compact SEPS. Based on

the information presented by the licensee, the NRC staff finds the licensee's approach to be reasonable and acceptable.

3.4.2 Three-Tiered Approach to Assessing Risk

RG 1.177 presents a three-tiered approach to assess risk associated with proposed TS AOT changes. Tier 1 involves an evaluation of the impact on plant risk of the proposed TS change as expressed by the change in CDF, the incremental conditional core damage probability (ICCDP), and when appropriate, the change in LERF, and the incremental conditional large early release probability (ICLERP). Tier 2 involves an identification of potentially high-risk configurations that could exist during the AOT. Tier 3 involves the implementation of an overall configuration risk management program to ensure that potential configurations resulting from other maintenance or operational activities are identified, and that actions are taken to compensate for such configurations.

3.4.2.1 Tier 1: PRA Calculational Insights

Risk-informed support for the proposed changes is based on an evaluation of PRA calculations performed to quantify the changes in CDF and LERF, as well as the ICCDP and the ICLERP resulting from the proposed 14-day EDG AOT.

The upper bound increase in CDF is computed by the PRA to be 1.9E-06/year. The upper bound increase in LERF is computed to be 9.0E-10/year. Both of these quantities are computed with the SEPS included and normal expected unavailabilities. The NRC staff finds these quantities to be within the RG 1.177 guideline values and, therefore, are acceptable.

The at-power, internal events ICCDP for the 14-day AOT (one EDG and SEPS diesel available, one EDG unavailable) is 5.8E-07. The corresponding at-power, internal events ICLERP is 1.29E-09. The NRC staff finds these quantities to be within the RG 1.177 guideline values, and therefore, are acceptable.

The licensee stated that, given a 14-day AOT, routine EDG maintenance will not be performed during refueling outages. As such, the small ICCDP is generally offset by a decrease in ICCDP at shutdown. The licensee also stated that the very low ICLERP is expected since the LERF at Seabrook is dominated by containment bypass events, and not strongly influenced by AC power availability.

The full-power portion of the Seabrook integrated PRA model is a full-scope, Level 2 model. External events are evaluated through probabilistic modeling. There are a total of 32 specific external initiating events included in the Seabrook PRA model, including seismic events, internal fires, external flooding, and transportation/chemical events. Weather-related LOOP is grouped with internal initiating events. The initiators not included in the model are judged by the licensee to have a conservatively-estimated CDF contribution of < 1E-07/r-year, therefore, they will not have a significant impact on the risk assessment results.

3.4.2.2 Tier 2: Avoidance of Risk-Significant Plant Configurations

The configuration risk threshold corresponding to the NEI-recommended "establish risk management actions" level in NEI/NUMARC 93-01, Revision 3, Chapter 11, is equivalent to an

Incremental Core Damage Probability (ICDP) configuration of 1E-06. The licensee's Operations Manager must approve any configurations that are scheduled to exceed the 1E-06 threshold.

The configuration risk threshold corresponding to the "configuration which should not normally be entered voluntarily" is equivalent to an ICDP of 1E-05. The Operations Manager and the Station Director must approve any configurations whose ICDPs are scheduled to exceed the 1E-05 threshold. The licensee states that the normal Seabrook practice is to avoid configurations of this ICDP magnitude unless they are driven by TS-required surveillance tests. The Station Director is also required to approve all configurations that are scheduled to exceed a large instantaneous CDF before such a configuration is allowed.

LERF is not a significant maintenance concern at Seabrook, since the station LERF is dominated by containment bypass events unrelated to maintenance. The NRC staff considers the station LERF value of 9.8E-08/year to be very low.

3.4.2.3 Tier 3: Risk-Informed Configuration Management

Based on the information presented by the licensee, the NRC staff finds that the Seabrook PRA model and the on-line maintenance evaluation tool (i.e., the Safety Monitor) satisfy the licensee's need for quantitative evaluation of maintenance activities and meet the requirements of 10 CFR 50.65(a)(4).

3.4.3 Conclusion for Probabilistic Review

The licensee's risk assessment concluded that the increases in plant CDF and LERF, as well as the ICCDP and ICLERP magnitudes, are small and consistent with the NRC staff's guidance as stated in RGs 1.174 and 1.177. Based on information contained in the risk-informed assessment, subject to the installation and successful testing of the SEPS, the NRC staff finds that revisions to TS 3.8.1.1 to extend the AOT for an inoperable EDG from the current 72 hours to 14 days are acceptable.

3.5 Other TS Changes

TS 3.8.1.1, ACTION d currently requires that, in addition to the requirements of Actions b or c, all required systems, subsystems, trains, components and devices (required redundant features), that depend on the remaining Operable EDG as a source of emergency power, as well the steam-driven auxiliary feedwater pump, be Operable within two hours. In the context of these actions, verification means to administratively check, by examining logs or other information, to determine if certain components are out-of-service for maintenance or other reasons. The required TS verification is intended to ensure that a LOOP event will not result in a complete loss of safety function of any critical systems.

The licensee has proposed changing the above current two-hour TS requirement to a four-hour requirement. The licensee stated that the current two-hour requirement is overly restrictive based on the following:

- Consideration of the capacity and capability of the remaining AC sources;
- The redundant counterpart to the inoperable required feature, in all likelihood, is operable, even though it may not be backed up by its emergency power supply; and
- The probability of occurrence of a design basis event during the proposed four-hour period is very low.

The NRC staff believes that increasing the TS requirement to four hours would reduce potential human error rates, and provide operators sufficient time to evaluate and perform minor repair on any identified inoperable equipment before subjecting the plant to transients associated with shutdown. Additionally, the staff considers the change to have only a very small risk impact. Therefore, the NRC staff finds that revisions to TS 3.8.1.1 Action d. to extend the AOT four hours are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the New Hampshire and Massachusetts State officials were notified of the proposed issuance of the amendment. The State officials had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes 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 amendment involves 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 amendment involves no significant hazards consideration, and there has been no public comment on such finding (68 FR 68669). Accordingly, the amendment meets 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 amendment.

6.0 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 amendment will not be inimical to the common defense and security or to the health and safety of the public.

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