FPL Energy
Seabrook Station

FPL Energy Seabrook Station
P.O. Box 300
Seabrook, NH 03874
(603) 773-7000

August 25, 2003

Docket No. 50-443

NYN-03069

United States Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555-0001

Seabrook Station
License Amendment Request 03-01
"Changes to Electrical Power Systems – A.C. Sources Technical Specifications –
Inclusion of the Supplemental Emergency Power System"

FPL Energy Seabrook, LLC (FPLE Seabrook) has enclosed herein License Amendment Request (LAR) 03-01. License Amendment Request 03-01 is submitted pursuant to the requirements of 10 CFR 50.90 and 10 CFR 50.4.

FPLE Seabrook is currently in the process of permanently installing a non safety-related supplemental emergency power system (SEPS). The SEPS is designed to serve as a reliable backup standby AC power supply to either emergency bus whenever one of the emergency diesel generators (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 loss of offsite power (LOOP) event and if both emergency diesel generators fail to start and load. Installation of the SEPS is in keeping with FPLE Seabrook and NRC philosophy to provide and ensure defense-in-depth to protect the health and safety of the public.

The results of the probabilistic risk assessment (PRA), utilizing the guidance of Regulatory Guide 1.174, performed to quantitatively assess the risk impact when one EDG is out of service with the SEPS available indicate a significant decrease in core damage frequency (CDF) by up to 30 percent. To further reduce operational risks and increase EDG reliability and availability, particularly during shutdown operations, FPLE Seabrook proposes to perform selected outage-related EDG maintenance on-line. It has been recognized that shutdown conditions pose risks. The risk of performing EDG maintenance on-line is offset by the risk averted by removing the work from outages.

Performance of on-line EDG maintenance outages would increase the availability of emergency onsite power during shutdown operations and allow for a more focused effort on EDG preventive maintenance to avert forced outages.

A001

Outage-related EDG inspection and maintenance, particularly those recommended by the manufacturer to ensure overall EDG reliability which are more intensive and intrusive in nature, require significantly more time to complete. Performance of selected EDG outage-related inspection and maintenance activities on-line would necessitate an extension of the currently licensed Technical Specification (TS) Allowed Outage Time (AOT) specified in TS 3/4.8.1.1. FPLE Seabrook proposes to amend the AOT for TS 3/4.8.1.1 ACTIONs b., c. and f. from 72 hours to a period of 14 days.

The AOT extension would permit more economic and efficient conduct of maintenance activities by providing flexibility in the performance of both corrective maintenance (CM) and preventive maintenance (PM) activities during power operation. Furthermore, adoption of the proposed AOT extension reduces the risk of unscheduled plant shutdowns. It is expected that performance of selected maintenance on-line will produce enhancements to the maintenance process such as:

- Allow for increased flexibility in the scheduling and performance of PMs.

- Reduce the number of individual entries into limiting conditions for operation (LCO) action statements by providing sufficient time to perform related maintenance tasks within a single entry.

- Allow better control of resource allocation, particularly during refueling outages. During outage maintenance windows, plant personnel and resources are spread across a large number and a wide variety of maintenance activities. Allowing on-line maintenance gives the plant the flexibility to focus more quality resources on any required or elected EDG maintenance.

- Avert unplanned plant shutdown and minimize the potential for notice of enforcement discretion requests. Risks incurred by unexpected plant shutdowns can be comparable to and often exceed those associated with continued power operation.

- Improve EDG availability during shutdown modes.

In addition, a change is proposed to revise ACTION d. to allow extension of the current 2-hour time requirement to 4 hours for verification of redundant component Operability. The increase in time from 2 hours to 4 hours is based on the completion time presented in the improved Standard Technical Specifications (ITS) for Westinghouse Plants, NUREG-1431, Revision 2.

FPLE Seabrook has evaluated the proposed License Amendment Request using both deterministic and probabilistic methodologies. These evaluations have determined that with the permanent installation of a supplemental emergency power source to serve as a backup standby power supply to the emergency busses in conjunction with administrative controls there are adequate compensatory measures to ensure plant safety is not adversely affected during extended EDG maintenance while on-line.

The Station Operation Review Committee and the Company Nuclear Review Board have reviewed LAR 03-01.

As discussed in the enclosed LAR Section IV, the proposed changes do not involve a significant hazard consideration pursuant to 10 CFR 50.92. A copy of this letter and the enclosed LAR has been forwarded to the New Hampshire State Liaison Officer pursuant to 10 CFR 50.91(b). FPLE Seabrook requests NRC Staff review of LAR 03-01, and issuance of a license amendment by August 27, 2004 (see Section V enclosed).

FPLE Seabrook has determined that LAR 03-01 meets the criteria of 10 CFR 51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement (see Section VI enclosed).

Should you have any questions regarding this letter, please contact Mr. James M. Peschel, Regulatory Programs Manager, at (603) 773-7194.

Very truly yours,

FPL Energy Seabrook, LLC.

Mark E. Warner
Site Vice President

cc: H. J. Miller, NRC Region I Administrator
V. Nerses, NRC Project Manager, Project Directorate I-2
G.T. Dentel, NRC Senior Resident Inspector

Mr. Bruce Cheney, Director
New Hampshire Office of Emergency Management
State Office Park South
107 Pleasant Street
Concord, NH 03301

FPL Energy
Seabrook Station

SEABROOK STATION UNIT 1

Facility Operating License NPF-86
Docket No. 50-443

License Amendment Request 03-01,
"Changes to Electrical Power Systems – A.C. Sources Technical Specifications –
Inclusion of the Supplemental Emergency Power System"

FPL Energy Seabrook, LLC pursuant to 10 CFR 50.90, submits this License Amendment Request. The following information is enclosed in support of this License Amendment Request:

- **Section I - Introduction, Background, and Safety Assessment for Proposed Changes**
- **Section II - Markup of Proposed Changes**
- **Section III - Retype of Proposed Changes**
- **Section IV - Determination of Significant Hazards for Proposed Changes**
- **Section V - Proposed Schedule for License Amendment Issuance And Effectiveness**
- **Section VI - Environmental Impact Assessment**

I, Mark E. Warner, Site Vice President of FPL Energy Seabrook, LLC hereby affirm that the information and statements contained within this License Amendment Request are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

JAMES W. CONNOLLY
MY COMMISSION EXPIRES SEPT. 4, 2007
NOTARY PUBLIC
NEW HAMPSHIRE

Sworn and Subscribed
before me this
25th day of August, 2003

James W. Connolly
Notary Public

Mark E. Warner
Site Vice President

Section I

Introduction, Background, and Safety Assessment for Proposed Changes

I. INTRODUCTION, BACKGROUND, AND SAFETY ASSESSMENT FOR PROPOSED CHANGES

A. INTRODUCTION

FPLE Seabrook is currently in the process of permanently installing a non safety-related supplemental emergency power system (SEPS). The SEPS is designed to serve as a reliable backup standby AC power supply to either emergency bus whenever one of the emergency diesel generators (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 loss of offsite power (LOOP) event and if both emergency diesel generators fail to start and load. Installation of the SEPS is in keeping with FPLE Seabrook and NRC philosophy to provide and ensure defense-in-depth to protect the health and safety of the public.

The results of the probabilistic risk assessment (PRA), utilizing the guidance of Regulatory Guide 1.174, performed to quantitatively assess the risk impact when one EDG is out of service with the SEPS available indicate a significant decrease in core damage frequency (CDF) by up to 30 percent. To further reduce operational risks and increase EDG reliability and availability, particularly during shutdown operations, FPLE Seabrook proposes to perform selected outage-related EDG maintenance on-line. It has been recognized that shutdown conditions pose risks. The risk of performing EDG maintenance on-line is offset by the risk averted by removing the work from outages.

Performance of on-line EDG maintenance outages would increase the availability of emergency onsite power during shutdown operations and allow for a more focused effort on EDG preventive maintenance to avert forced outages.

Outage-related EDG inspection and maintenance, particularly those recommended by the manufacturer to ensure overall EDG reliability which are more intensive and intrusive in nature, require significantly more time to complete. Performance of selected EDG outage-related inspection and maintenance activities on-line would necessitate an extension of the currently licensed Technical Specification (TS) Allowed Outage Time (AOT) specified in TS 3/4.8.1.1. FPLE Seabrook proposes to amend the AOT for TS 3/4.8.1.1 ACTIONs b., c. and f. from 72 hours to a period of 14 days.

The AOT extension would permit more economic and efficient conduct of maintenance activities by providing flexibility in the performance of both corrective maintenance (CM) and preventive maintenance (PM) activities during power operation. Furthermore, adoption of the proposed AOT extension reduces the risk of unscheduled plant shutdowns. It is expected that performance of selected maintenance on-line will produce enhancements to the maintenance process such as:

- Allow for increased flexibility in the scheduling and performance of PMs.
- Reduce the number of individual entries into limiting conditions for operation (LCO) action statements by providing sufficient time to perform related maintenance tasks within a single entry.
- Allow better control of resource allocation, particularly during refueling outages. During outage maintenance windows, plant personnel and resources are spread across a large number and a wide variety of maintenance activities. Allowing on-line maintenance gives the plant the flexibility to focus more quality resources on any required or elected EDG maintenance.

- Avert unplanned plant shutdown and minimize the potential for notice of enforcement discretion requests. Risks incurred by unexpected plant shutdowns can be comparable to and often exceed those associated with continued power operation.

- Improve EDG availability during shutdown modes.

In addition, a change is proposed to revise ACTION d. to allow extension of the current 2-hour time requirement to 4 hours for verification of redundant component Operability. The increase in time from 2 hours to 4 hours is based on the completion time presented in the improved Standard Technical Specifications (ITS) for Westinghouse Plants, NUREG-1431, Revision 2.

FPLE Seabrook has evaluated the proposed License Amendment Request using both deterministic and probabilistic methodologies. These evaluations have determined that with the permanent installation of a supplemental emergency power source to serve as a backup standby power supply to the emergency busses in conjunction with administrative controls there are adequate compensatory measures to ensure plant safety is not adversely affected during extended EDG maintenance while on-line.

B. BACKGROUND

Seabrook Station Offsite and Onsite Power Source Design

Seabrook Station is connected to the New England grid via three 345 kV offsite transmission lines. The transmission lines serve as the preferred A.C. electrical power source to the station. The three transmission lines terminate in a switchyard that is designed and arranged so as to provide two physically independent circuits (SF_6 design) between the offsite transmission network and the onsite Class 1E Distribution System. This arrangement ensures a continuous power source to the Class 1E busses.

The onsite Class 1E Distribution System is divided into redundant load groups (trains) so that the loss of any one load group does not prevent the minimum safety functions from being performed. The design has each safety-related train connected to two preferred offsite power sources, which is more than the minimum. Each safety-related train is connected to offsite power either via the train's unit auxiliary transformers (UAT) or reserve auxiliary transformers (RAT). In addition, each safety-related train is backed by one emergency diesel generator (EDG), which serves as a reliable standby power supply. The EDGs are used in situations when offsite power is unavailable. During normal plant operations, 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 (ESFAS). The emergency diesel generators can also be 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 emergency diesel generator. 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 (LOCA) coincident with a loss of offsite electrical power, given failure of the other emergency diesel generator to start.

The EDGs are designed to rapidly start from standby conditions and attain rated voltage and frequency, as well as energizing the emergency busses with permanently connected loads, within 10 seconds (safety injection signal) or 12 seconds (LOOP-only signal). Following which, they are rapidly

loaded with either shutdown or emergency (accident) loads through an automatic sequencer within 108 seconds.

During normal operations (Mode 1 through 4) the EDGs are tested monthly to verify operability, as required by Technical Specifications (TS). The monthly TS surveillance tests verify start capability and capability to operate at a pre-determined load while synchronized to the grid.

Discussion

Whenever maintenance activities must be performed on the EDGs during Modes 1 through 4 the Technical Specifications limits the AOT to 72 hours. Other inspection and maintenance activities, particularly those recommended by the manufacturer to ensure overall EDG reliability which are more intensive and intrusive in nature, require significantly more time to complete. Thus, those certain inspection and maintenance activities that usually cannot be accomplished within the 72-hour AOT requirements during normal plant operation are performed during cold shutdown and refueling conditions when only one EDG is required by TS to be Operable. Generally, this has required that one or both EDGs be removed from service during refueling outages to perform these certain inspections and maintenance activities. This greatly complicates and can lengthen outages unnecessarily and removes the level of defense provided by having both EDGs available.

Many plants, including Seabrook Station, limit planned equipment unavailability to approximately half of the applicable AOT. Thus, a 72-hour AOT provides a scheduled work and retest window of approximately 36 hours. Whether the maintenance is of an emergent nature or there is opportunity for pre-planning, this is a very tight work window. This limited work window can create time pressure that is inconsistent with good human performance. The proposed 14-day AOT provides a 7-day work window, which is long enough to accomplish the planned preventive maintenance activities. In addition, performing a larger scope of work in a single work window reduces overall unavailability compared with breaking the work scope into several smaller jobs. Each work activity requires a certain amount of unavailability "overhead" due to processes such as removal from service/return to service, equipment staging, equipment assembly/disassembly, etc.

The 72-hour completion time is often very limiting in terms of corrective maintenance that can be accomplished without a plant shutdown. Seabrook Station has experienced events on previous occasions where corrective maintenance has challenged the 72-hour window. On these occasions, Seabrook Station did begin the process of requesting enforcement discretion to avoid an unnecessary shutdown, which in it self expends considerable resources. The longer AOT will afford performance of maintenance activities while on-line, thus reducing the probability that enforcement discretion will be needed in the future and minimize the potential for requiring relief where there would not be an opportunity for public comment. Therefore, this change would reduce the potential administrative burden associated with the enforcement discretion process for both the utility and the NRC.

It is generally accepted that higher quality work can often be accomplished during on-line system outages where the focus of support organizations and management can be more clearly directed at a single ongoing activity. Additionally, it has been recognized that shutdown conditions also pose risks though events are generally slower moving. Therefore, the risk of performing EDG maintenance on-line is offset by the risk averted by removing the work from outages.

To further reduce the risk of performing extended EDG maintenance activities of up to 14 days while on-line FPLE Seabrook is in the process of permanently installing a non safety-related supplemental emergency power system (SEPS). The SEPS is designed to provide back up power to either

emergency bus whenever one of the emergency diesel generators is out of service, particularly during Modes 1 through 4 operation[1]. The SEPS is verified available and an operational readiness status check is performed when it is anticipated that one of the EDGs will be inoperable for longer than the allowable outage time of 72 hours. The design of the SEPS is capable of providing the required safety-related and non safety-related safe shutdown loads in the event of a total loss of offsite power and if both emergency diesel generators fail to start and load. During these events it is assumed that there is no seismic event or an event that requires safeguards actuation, e.g., safety injection, containment building spray, etc.

SEPS Design Description

The design of the SEPS will meet the criteria set out below:

- The SEPS will include two diesel generator units (gensets) for a size that will handle the required loss of offsite power (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 an undervoltage condition sensed on the emergency bus that it is aligned to.
- 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. It will be sized to accommodate the full load of a SEPS genset.
- SEPS components and subsystems will be protected against the effects of likely weather-related events that may initiate a loss of offsite power 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.
- Failure of the SEPS components will not adversely affect Class 1E power systems.
- 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 be normally connected to the onsite or offsite power systems.

---

[1] FPLE Seabrook anticipates that the SEPS will be available at all times, excluding its preventive maintenance.

- The SEPS will be capable of carrying the loads required for safe shutdown for a loss of offsite power 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 utilized 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 (EPA) and the State of New Hampshire requirements for emergency power systems, including requirements for diesel fuel oil engines.

C. SAFETY ASSESSMENT OF THE PROPOSED CHANGE

The following changes are proposed to the Limiting Condition for Operation (LCO) 3.8.1.1, ACTIONs b., c., and f. to include the provision for use of the SEPS whenever it is available.

Whenever one diesel generator is inoperable (with both offsite power circuits available) ACTION b. requires, in part, that the inoperable diesel generator be returned to Operable status within an allowed outage time of 72 hours. FPLE Seabrook proposes to add additional wording to ACTION b. to allow the 72-hour AOT to be extended to 14 days to restore the inoperable EDG to Operable status whenever the SEPS is available. The latter part of ACTION b. will now state: (additional wording in italics)

> "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."*

As a result of the change to ACTION b., FPLE Seabrook proposes to modify BASES Section 3/4.8.1, 3/4.8.2, and 3/4.8.3 A.C. SOURCES, D.C. SOURCES, and ONSITE POWER DISTRIBUTION SYSTEMS to include the following for ACTION b.:

The requirement for restoring the EDG to OPERABLE status within 72 hours may be extended to 14 days to perform either extended preplanned maintenance (both preventive and corrective) or extended unplanned corrective maintenance work. Prior to exceeding the 72-hour AOT the SEPS must be available in accordance with Technical Requirement (TR) 31. When applying this AOT extension, the risk impact of this activity is managed through Seabrook Station's programs and procedures in place to implement 10 CFR 50.65(a)(4) and its implementation guidance, NRC

Regulatory Guide 1.182, "Assessing and Managing Risks Before Maintenance Activities at Nuclear Power Plants."

During normal operation, with both EDGs Operable, SEPS availability is demonstrated by performance of the periodic surveillance requirements specified in TR 31. When an EDG is inoperable and the SEPS is relied upon as a backup power source, an operational readiness status check of the SEPS must be performed in addition to the periodic surveillances. The operational readiness status check is considered a just-in-time check to ensure continued SEPS availability. The operational readiness status check is also specified in TR 31 and consists of: (1) verifying the SEPS is operationally ready for automatic start and energization of the selected emergency bus; (2) verifying 24-hour onsite fuel supply; and (3) verifying alignment to the selected 4160 volt emergency bus and associated 480 volt bus. In addition, the operational readiness status check must continue to be performed at least once every 72 hours following the initial SEPS availability verification. Should the SEPS become unavailable during the 14-day AOT and cannot be restored to available status, the EDG AOT reverts back to 72 hours. The 72 hours begins with the discovery of the SEPS unavailability, not to exceed a total of 14 days from the time the EDG initially became inoperable.

The extended 14-day AOT is based on the Probabilistic Risk Analysis (PRA) evaluation to perform on-line maintenance of the EDGs when the SEPS is available. The results of the PRA evaluation demonstrate that the SEPS is capable of mitigating the dominant core damage sequences and provides a significant overall risk reduction for station operation. Additionally, the remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Furthermore, should a loss of offsite power occur and both EDGs are unable to energize their respective emergency bus, the SEPS alone is adequate to supply electrical power to effect a safe shutdown of the unit.

Whenever one diesel generator and one offsite power circuit are inoperable concurrently, ACTION c. requires, in part, the restoration of one of these AC power sources to Operable status within an AOT of 12 hours. Following the 12-hour AOT, ACTION c. requires that both diesel generators and both offsite circuits be restored to Operable status within 72 hours. FPLE Seabrook proposes to add additional wording, similar to that proposed for ACTION b., to allow the ACTION c. 72-hour AOT to be extended to 14 days to restore the inoperable EDG to Operable status whenever the SEPS is available. The latter part of ACTION c. will state the same wording as proposed in ACTION b. The Bases for ACTION c. has been revised to refer to ACTION b. with regard to the 14-day AOT extension for the inoperable EDG.

Whenever both diesel generators are inoperable ACTION f. requires, in part, the restoration of one diesel generator to Operable status within an AOT of 2 hours. Following the 2-hour AOT, ACTION f. requires that both diesel generators be restored to Operable status within 72 hours. FPLE Seabrook proposes to add additional wording, similar to that proposed for ACTION b., to allow the ACTION f. 72-hour AOT to be extended to 14 days to restore the inoperable EDG to Operable status whenever the SEPS is available. The latter part of ACTION f. will state the same wording as proposed in ACTION b. The Bases for ACTION f. has been revised to refer to ACTION b. with regard to the 14-day AOT extension for the inoperable EDG.

In addition to the aforementioned Bases changes, other minor changes have been made to the A.C. Sources Bases mentioning the SEPS where appropriate (refer to Bases mark-up).

A change is also proposed to revise ACTION d. to extend the current 2-hour requirement to 4 hours for verification of redundant component Operability. The increase in time from 2 hours to 4 hours is based on the completion time presented in the improved Standard Technical Specifications (ITS) for Westinghouse Plants, NUREG-1431, Revision 2. FPLE Seabrook believes 4 hours is a more realistic time to perform minor repairs before subjecting the plant to transients associated with shutdown.

Deterministic Evaluation

The proposed wording to ACTION b. and its associated Bases address the extension of the inoperable EDG 72-hour AOT to 14 days provided that the SEPS is available. Other conditions / constraints are also imposed to ensure that if at anytime the SEPS becomes unavailable during the extended 14-day AOT the SEPS must be restored to available status within 72 hours, otherwise the plant must be placed in Cold Shutdown within the stated time constraints. In addition, ACTION b. notes that the total AOT of 14 days from the time the EDG originally became inoperable is not to be exceeded. These additional constraints are to ensure that the impact to overall plant risk is managed and maintained within the assumptions used to derive and justify extending the inoperable EDG AOT whenever the SEPS is available.

When the SEPS is available it essentially serves as a backup onsite power source and its availability is verified at least once every 72 hours when an EDG is inoperable during Modes 1 through 4. Additionally, the Operability of offsite power sources will be continually surveilled at a frequency of at least once every 8 hours as required in ACTION b. Though the SEPS would not be available to immediately reenergize an emergency bus during a LOOP event, the emergency bus would be reenergized in less than one hour. This time frame is well below Seabrook Station's Blackout coping duration of four hours.

The SEPS will be verified available and an operational readiness status check performed before removing the permanent plant EDG from service for the extended preplanned maintenance work or before exceeding the 72-hour AOT for the extended unplanned corrective maintenance work. The administrative requirements to assure availability and operational readiness of the SEPS will be controlled as a Technical Requirement (see Attachment 1). Technical Requirements reside in Seabrook Station's Technical Requirement (SSTR) Manual. The SSTR is a licensee-controlled document that contains certain technical requirements, is referenced in the Seabrook Station Updated Final Safety Analysis Report, and is the implementing manual for the Technical Specification Improvement Program. Changes to these requirements are reviewed and approved in accordance with Seabrook Station Technical Specifications, Section 6.7.1.i, and as specified in the SSTR. Specifically, changes to the SSTR are evaluated pursuant to 10 CFR 50.59, reviewed by the Station Operations Review Committee (SORC), and approved by the Station Director, or designee, prior to implementation.

SEPS operational availability will be monitored by performance of monthly, quarterly and yearly surveillances, as specified in the Technical Requirement and as recommended by the vendor. Other programmatic requirements associated with the SEPS, such as Fire Protection and environmental matters, will be addressed and controlled in other FPLE Seabrook controlled documents.

The risk impact of performing maintenance of up to 14 days would be managed through FPLE Seabrook's on-line maintenance program and procedures in place to implement 10 CFR 50.65(a)(4) and its implementation guidance, NRC Regulatory Guide 1.182, "Assessing and Managing Risks Before Maintenance Activities at Nuclear Power Plants."

FPLE Seabrook'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 decrease in plant safety is small enough and the level of risk is acceptable for the maintenance period. FPLE Seabrook's administrative procedures for on-line maintenance activities provide assurance that removal of safety systems and important non-safety equipment from service will be controlled during scheduled maintenance outages. Quantitative and/or qualitative reviews are performed to assess the risk impact of removing safety systems and important non-safety equipment from service during maintenance outages. These procedures provide assurance that component testing or maintenance that significantly increases the likelihood of a plant transient be avoided before voluntarily entering an LCO Action to perform on-line maintenance. Station procedures and practices are such that they will ensure that plant operation is kept stable as much as possible during the extended outage of the EDG.

Before voluntarily entering the LCO Action to perform extended EDG maintenance and during the outage, grid and environmental conditions will be evaluated to ensure that sufficient time is available for restoration, when needed. The intent will be to minimize the time when the EDG is out of service under conditions that could significantly threaten the offsite power sources.

FPLE Seabrook'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 (ALARA) concerns while on-line, environmental conditions, and workforce availability.

FPLE Seabrook 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, current TS 3.8.1.1 ACTION Statement d., which is linked by ACTION b. (and c.), ensures that required systems, subsystems, trains, components, and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also verified OPERABLE within a 2-hour (proposed 4-hour) window whenever an EDG is inoperable.

The Protected Train concept would ensure that prior to removing an EDG from service for performing preplanned maintenance, maintenance activities associated with required systems, subsystems, trains, components, and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are either not performed or limited in scope to assure rapid return to Operability status. Thus, positive measures exist in the form of administrative controls and guidelines that 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 an emergency, 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 the Safety Monitor. If these emergent work activities increase risk, steps would be taken to restore any equipment that affects plant safety.

Seabrook Station uses NEI/NUMARC 93-01, Rev. 3, chapter 11 (hereafter, "the NEI document") as overall guidance for complying with section (a)(4). The NEI document defines the probabilistic safety assessment (also known as PRA) as an appropriate mechanism to define the assessment scope. For Seabrook Station, the PRA model fulfills the entire scope of the assessment since the Maintenance Rule Expert Panel has not identified risk-significant structures, systems and components beyond the PRA model scope. The PRA model and, by extension, the on-line maintenance evaluation tool, i.e., the Safety Monitor, meet the recommendations in the NEI document for quantitative evaluation of maintenance activities.

The NEI document considers the following activities to be "risk management actions." These activities are part of the normal work control process at Seabrook Station:

- Obtain operator awareness and approval of 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 configuration risk threshold at Seabrook Station corresponding to the "establish risk management actions" level in the NEI document is equivalent to an Incremental Core Damage Probability (ICDP) of 1E-06. The Operations Manager must approve any configurations that are scheduled to exceed the 1E-06 threshold.

The configuration risk threshold corresponding to the "configuration should not normally be entered voluntarily" is equivalent to an Incremental Core Damage Probability (ICDP) of 1E-05. The Operations Manager and the Station Director must approve any configurations that are scheduled to exceed the 1E-05 threshold. The normal practice at Seabrook Station is to avoid configurations in this region unless they are driven by Technical Specifications required surveillance tests.

The Station Director must approve all configurations that are scheduled to exceed an instantaneous 1E-03 core damage frequency.

Large Early Release Frequency (LERF) is not a significant maintenance concern at Seabrook Station since the LERF is dominated by containment bypass events unrelated to maintenance. In addition, the LERF for Seabrook Station is extremely low (9.8E-08).

<u>EDG On-line Post Maintenance Testing</u>

Routine inspections (e.g., 18-month inspections) expected to be accomplished during an extended maintenance outage normally do not require comprehensive post-maintenance testing to verify EDG Operability. For example, a full load rejection test is not performed to verify Operability if EDG disassembly was primarily for access and not for overhaul of major components. Normally, EDG Operability is satisfactorily assured through performance of TS 4.8.1.1.2.a.5) and TS 4.8.1.1.2a.6) surveillance tests that demonstrate the EDG is capable of performing its intended safety functions. However, should a particular maintenance activity necessitate performance of a full load rejection test to verify EDG Operability such testing will be performed in a manner to ensure that plant risk exposure is minimized, such as ensuring that an unsafe transient condition on the emergency bus does not occur.

To ensure that an unsafe transient condition on the emergency bus (i.e., load swing or voltage transient) does not occur, post-maintenance testing on the EDG is performed in progressive steps to verify that maintenance or repair was properly performed. For example, to determine if maintenance or repair of a governor was performed satisfactorily, post-maintenance testing would first include several unloaded EDG runs prior to synchronizing onto the emergency bus. These unloaded runs are used to verify proper operation of the electrical and mechanical governors and the voltage regulator. This testing is designed to identify maintenance-induced problems while the EDG is separated from the electrical system, thus preventing system transients from occurring.

Following the unloaded runs, the initial loaded run of the EDG is performed by synchronizing the EDG with offsite power then slowly loading the EDG in accordance with Seabrook Station's normal operating procedures to support the manufacturer's recommended post-maintenance testing. Proper frequency and voltage response is verified prior to connecting the EDG to the emergency bus and again while loading the EDG. Once the EDG is fully loaded (5600-6100 kW) the EDG would be operated for a minimum of 1 hour per TS 4.8.1.1.2a.6) or up to 24 hours per TS 4.8.1.1.2.f.7), depending on the type of governor/engine maintenance. Normally, EDG Operability would be declared following the surveillance tests. If the type of maintenance or repair was significant, a full load rejection test per TS 4.8.1.1.2f.3) may be additionally necessary (when required by procedures) to ensure proper governor performance.

A full load rejection test requires the EDG to be operating in parallel with offsite power and at 100% load. The EDG output breaker is then opened, which strips the EDG of its load and isolates it from the 4160-Volt emergency bus. The load is simultaneously picked up by the offsite power source. The major transient is experienced by the EDG itself.

Reliability and Performance Monitoring

Equipment relied upon for supplying electric power and mitigating loss of power events is included in the Seabrook Station Maintenance Rule Program and is monitored for equipment unavailability. If the performance or condition of these systems does not meet established performance criteria, appropriate corrective action is taken. FPLE Seabrook will include the SEPS in the Maintenance Rule Program, since the SEPS is designed to support accident mitigation during a LOOP, concurrently with a loss of the normal onsite power sources. This is in conformance with NRC Regulatory Guide 1.160, Regulatory Position 1.1.2, "SSCs Relied Upon To Mitigate Accidents or Transients or Used in Emergency Operating Procedures."

FPLE Seabrook reviewed the number of planned and unplanned outages the have occurred at Seabrook Station over the last 12 years. The review is summarized in Table 1 (see Attachment 2), which lists the 34 events that led to a plant trip or shutdown at Seabrook Station over this period. Table 2 summarizes this data in three outage types - RF, HSD, and CSD - as well as PWR (at-power operation). For 83.0% of the time, Seabrook Station was at-power. For the rest of the time, it was in one of the following outages:

- RF - Typical Refueling Outage. This outage includes a full core offload and midloop evolution after the core has been reloaded ("cold" midloop). There have been 8 refueling outages, averaging 66.1 days. Time in refuelings account for 12.3% of the calendar time.
- HSD - Unplanned Outage, Hot Shutdown. This unplanned plant shutdown requires the plant to go to Mode 3 (hot standby), but does not require Mode 5. This includes both controlled shutdowns

and plant trips. HSD typically involves secondary side issues that require the plant to be off-line, but do not require cold shutdown conditions. There have been 20 hot shutdowns at Seabrook Station, averaging 3.4 days, and accounting for 1.6% of the calendar time.

- CSD - Unplanned Outage, Cold Shutdown. This unplanned plant shutdown requires the plant to go to Mode 5 (cold shutdown). This includes both controlled shutdowns and plant trips. This could be required by TS or by the nature of the work that required the shutdown. There have been 5 cold shutdowns at Seabrook Station, averaging 22.1 days, and accounting for 3.1% of the calendar time.

Of the 34 events identified in Table 1, eight events (Events 1, 2, 4, 12, 18, 24, 25 & 31) were associated with some form of loss of power to station busses. Of those eight events, three events (Events 4, 25 & 31) were associated with switchyard equipment. Only one event (Event 31) resulted in a condition that, even though one line of offsite power was available, required reliance on both EDGs to supply their respective emergency busses for a period of time because of switchyard breaker alignment[2]. Event 31 was weather-related because of heavy snow/ice buildup on the offsite line bushings causing a power arc flashover across the "B" phase 345 kV transmission line bushings. In addition, switchyard breaker alignment prevented immediate repowering of the station busses. Subsequent to this event significant modifications were made to the offsite line bushings. FPLE Seabrook believes that this type of event recurring is highly unlikely, even with the same snowfall conditions.

Transmission Grid Availability and Stability

There has been no instance of total 345-kV transmission grid unavailability. Transmission lines making up the grid are subject to occasional forced outages due to lightning, relay misoperations, or clearance problems (i.e., outage due to trees or other grounded objects coming too close to or in contact with a transmission line).

Forced outages of 345 kV transmission lines with at least one terminal under Public Service of New Hampshire (PSNH) control were analyzed to determine the actual forced-outage rate. Based on operating history from December 1972 through September 1990 (5466.8 circuit mile years) the total forced-outage rate was 1.97 outages per 100 circuit miles per year.
Outage rates by causes were:

- Lightning and unknown .49/100mi/yr.
- Relay-related problems .55/100mi/yr.
- Clearance problems .33/100mi/yr.
- All other problems .60/100mi/yr.

Site-specific weather data were used to evaluate the reliability of offsite power relative to weather-caused outages.

Power flow and transient stability studies demonstrate that Seabrook Station and the Seabrook - Scobie, Seabrook - Timber Swamp - Newington, and Seabrook - Ward Hill - Tewksbury 345 kV transmission lines meet the New England Power Pool (NEPOOL) "Reliability Standards For the New

[2] Refer to NYN-01041, Licensee Event Report (LER) 01-002-00 – Reactor Trip Due to Power Arc Flashover Across the "B" Phase 345 kV Transmission Line Bushings, dated May 4, 2001.

England Power Pool" and the Northeast Power Coordinating Council (NPCC) "Basic Criteria for the Design and Operation of Interconnected Power Systems." By meeting these standards and criteria, the studies affirm that adherence to proper system operating procedures will result in stable operation of the interconnected power system.

As system configuration warrants and on a periodic basis, NEPOOL will review the performance of the New England Bulk Power Supply System. In addition, 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. These review processes assure that operating procedures are kept current and Seabrook Station continues to have a reliable source of offsite power.

It is important to note that it is FPLE Seabrook's expectation that the extended AOT will not be utilized on a frequent basis. Frequent use of the extended AOT would adversely impact the system availability and likely cause the EDGs to become "(a)(1)" per the Seabrook Station Maintenance Rule Program. The Seabrook Station Maintenance Rule Program would identify such activities and minimize scheduling of unnecessary, non-corrective maintenance. If the pre-established reliability or availability goals are not met for the EDGs, the procedure will require corrective actions and increased management attention to restore EDG performance. Frequent use of the extended AOT would also become evident through the "Emergency AC Power" NRC Performance Indicator crossing the threshold from "Green" to "White."

Seabrook Station's Maintenance Rule Unavailability is monitored monthly utilizing 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, well within the administrative limit of 300 hours per train. An overall upward trend is evident in EDG unavailability, this is due to an increase in corrective maintenance in combination with the movement of some activities normally performed in a refueling outage to on-line performance. Recent actions to improve EDG reliability, such as the change to 40wt oil, in combination with a pipe coupling failure and a rectifier bank failure have lead to the 'B' EDG unavailability trending higher than the 'A'.

In addition, as part of compliance with the Station Blackout (SBO) Rule, 10 CFR 50.63, Seabrook Station's target EDG reliability is 0.975, which is currently being satisfied.

10 CFR 50.63 requires that each light-water-cooled nuclear power plant be able to withstand and recover from a loss of all alternating current power or station blackout (loss of both offsite power and onsite emergency power). Regulatory Guide 1.155 (RG 1.155), "Station Blackout," provided a method for complying with 10 CFR 50.63. RG 1.155 stated that NUMARC 87-00, "Guidelines and Technical Bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," also provided acceptable guidance for meeting the requirements of 10 CFR 50.63. Seabrook Station followed NUMARC 87-00 except where the Regulatory Guide took precedence.

Currently, Seabrook Station responds to Station Blackout as an AC Independent plant relying only on the station batteries as a source of electrical power for the coping duration specified in UFSAR Section 8.4.2. The SEPS is not credited to support response as an Alternate AC (AAC) plant, though it is recognized that should an SBO event occur the SEPS would be used to supply vital loads.

Seabrook Station's Blackout coping duration is four (4) hours. This is based on evaluation of the offsite power design characteristics, emergency AC power system configuration and emergency diesel generator (EDG) reliability. The offsite power design characteristics included the expected frequency of grid-related loss of offsite power, the estimated frequency of loss of offsite power from severe and extremely severe weather, the number of switchyards and the type of bus transfers. Site-specific weather data were used to evaluate the reliability of offsite power relative to weather-caused outages.

One out of two emergency diesel generators is required to operate safe shutdown equipment following a loss of offsite power. Station procedures utilizes guidance from NUMARC 87-00, Appendix D, and Regulatory Guide 1.155, "Station Blackout," to ensure that the assumptions in Seabrook Station's SBO Coping Assessment are maintained. The procedures address the actions necessary to cope with a Station Blackout (loss of all AC power) including actions such as battery load shedding and opening cabinet doors. Also, as required by RG 1.155, procedures address AC power restoration and severe weather conditions.

Weather Related Information

The SEPS components that are located outside will be designed for outdoor use for the following environmental conditions:

Elevation Above Sea Level	20 ft
Maximum Ambient Temperature	102°F
Minimum Ambient Temperature	-23°F
Maximum Wind Velocity	110 miles/hour
Maximum Ice Loading	1-in radial
Maximum Snow Loading	50 lbs./sq. ft
Humidity	0-100%
Environment	Coastal Sea Air

The outdoor equipment will also be subjected to the effects of solar radiation and saltwater spray. The equipment enclosures can also be subjected to other weather related conditions for this area, such as hurricanes. Inlet dampers and louvers will be designed to withstand hurricane forces.
The above values are nominal ambient conditions and ranges. The SEPS diesel generators are expected to satisfactorily provide their rated output under these ambient conditions.

With consideration to severe weather: though Seabrook Station is in an area affected occasionally by hurricanes, the relatively slow approach of hurricanes affords time in which to take precautions, such as a plant shutdown, before the potential for a LOOP occurs. The National Weather Service will generally issue a hurricane or tropical storm watch to an area projected to be in the path of a hurricane or a tropical storm 48 to 36 hours before landfall and a warning issued within 24 hours of landfall. The Seabrook Station procedure for severe weather requires monitoring of weather using available sources such as the Internet sites, National Weather Service or other available means.

In the event the National Weather Service issues a watch or warning for hurricane, tropical storm, high winds, blizzard, or tornado for the Seabrook Station area, further actions would be taken to isolate buildings and tie down or remove loose outdoor equipment and debris. In other words "batten-down the hatches." Actions taken would be dependent on the type of storm and its forecasted severity. A risk evaluation would be performed to consider the combination of severe weather and ongoing maintenance to determine if further actions are required to expeditiously restore plant systems and components to service, particularly any equipment needed to support decay heat removal should a

LOOP or blackout event occur. In addition, FPLE Seabrook may elect load testing of the EDGs several hours before the anticipated hurricane/tornado arrival, depending on projected grid stability to support the duration of load testing. Additional staff may also be brought on site as required.

Control Room Habitability

The SEPS system is classified as a standby system and satisfies the requirements of US Environmental Protection Agency (EPA) / State of New Hampshire Title V Permit. In addition, FPLE Seabrook evaluated the impact of pollutant emissions on control room habitability from operating diesel generators in the vicinity of the control room west air intake (closest air intake to the cooling tower). Results of the study were used to locate equipment in areas that will ensure pollutant levels in the control room are maintained within the U.S. Department of Labor Occupational Safety & Health Administration (OSHA) Permissible Exposure Limits (PELs).

Proposed ACTION d. Change

Presently TS 3.8.1.1 ACTION b. specifies the required actions to be taken in the event one EDG becomes inoperable. Also, TS 3.8.1.1 ACTION c. specifies required actions to be taken should one offsite AC circuit and one EDG become inoperable. For either of these conditions of inoperable equipment, the TS 3.8.1.1 ACTIONs require demonstration that the remaining AC sources are OPERABLE. In addition, both ACTION b. and c. require the performance of ACTION d.

ACTION d. requires verification within 2 hours that all required systems, subsystems, trains, components and devices (required redundant features), which depend on the remaining Operable EDG as a source of emergency power are also Operable, as well as verification that the steam-driven auxiliary feedwater pump is Operable. 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 loss of offsite power event will not result in a complete loss of safety function of critical systems.

FPLE Seabrook believes the current 2-hour requirement is overly restrictive particularly in light of: (1) consideration of the capacity and capability of the remaining AC sources; (2) 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 (3) the probability of occurrence of a design basis event during the 4-hour period is very low. The proposed TS change to specify a 4-hour time period to verify that required redundant features are Operable is acceptable because it allows the operator sufficient time (more realistic) to evaluate and perform minor repair on any identified inoperable equipment before subjecting the plant to transients associated with shutdown. In addition, the 4-hour completion time is based on the time presented in the improved Standard Technical Specifications (ITS) for Westinghouse Plants, NUREG-1431, Revision 2.

Conclusion of Deterministic Review

Based on the evaluation of the proposed change to extend the EDG AOT from 72 hours to 14 days, FPLE Seabrook concludes that, from a deterministic aspect, the request for the 14-day EDG AOT to perform major maintenance is acceptable. FPLE Seabrook's conclusion is based on the following: (1) availability of the SEPS with a capacity to support required safe-shutdown loads, (2) it is expected that

the 14-day EDG AOT will reduce the number of entries into the LCO thereby reducing wear and tear on the EDG because of multiple starts for Operability verification, and (3) there has been no complete LOOP at Seabrook Station since commercial operation began (refer to previous footnote 2).

Further, FPLE Seabrook believes that precluding testing and maintenance of other electrical systems during the extended outage and not scheduling preplanned maintenance when adverse weather is expected will compensate for the impact of the longer AOT.

PRA Evaluation

Regulatory Guide 1.174 Items/Issues

Quality of the PRA

Seabrook Station 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.

Historically the Seabrook Station PRA received significant review from Lawrence Livermore National Laboratory and Brookhaven National Laboratory in the 1980's in conjunction with a submittal for a reduced emergency planning zone.

A Peer Review of the Seabrook Station PRA Review was conducted in October 1999, as part of the Westinghouse Owner's Group (WOG) industry 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 2 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" comments. All significant comments were addressed by either making model changes (see below), 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 were in the area of HRA. In response, Seabrook Station first performed a simplified SLIM (success likelihood index method) analysis to look for outliers – actions that may be quantified optimistically relative to other actions. The SLIM analysis did not identify any "optimistic" results. An operator action dependency analysis was performed. Seabrook Station also undertook a multi-year effort to investigate methods and provide HRA training to the group. Seabrook Station has settled on the EPRI HRA tool as the best implementation of an available, reasonable, and reproducible methodology. Seabrook Station has updated several action analyses using the HRA tool and plan to update a number of others over the next two years.

Of the 74 comments, 27 peer review comments were fully resolved by model updates in the SB1999 model and an additional 17 peer review comments in the SB2002X model. A total of 30 peer review comments remain to be closed out, including 12 "B" level comments. Of the significant comments, seven are related to Level 2 Analysis. The others: HRA, Success Criteria, Uncertainty Analysis, and Methodology are expected to be completed within the next three years. Three of these previous five

comments deal with documentation and programmatic issues and would not be expected to impact results for an AOT change (i.e., they would equally impact the base case and the AOT change case).

Scope of the PRA

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

PRA Modeling

The Seabrook Station PRA model is a linked event tree model (also called "large event tree"). This type of analysis 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 place of point estimates). In general, plant equipment is modeled at the component level, with multiple basic events representing various failure modes.

Dependencies are modeled in a variety of ways. Dependencies within a system are modeled using a parametric MGL (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 (see dependencies, above). The SB2002X model uses average maintenance data for components. Failure rates for the current emergency diesel generators (EDG) are developed using Seabrook Station specific performance data combined with generic industry data using a Bayesian update process. EDG unavailability data is based on actual Seabrook Station data through May 2002. Common cause failures (CCF) between the existing EDGs and SEPS are not modeled because these units are of different manufacturers, have different configurations, and require different maintenance procedures. Common cause between the SEPS units is not modeled because the SEPS units are modeled as a single genset within the PRA.
A new model was created based on the model of record (SB2002X) to estimate the risk impact of extending the AOT from 3 days to 14 days combined with adding the SEPS 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 and human error probabilities associated with aligning and powering the emergency buses. In addition, some structural changes were made to break up a large AC power fault tree into smaller fault trees. These changes improved the event tree logic for modeling the SEPS.

The proposed AOT change, as well as SEPS implementation, is judged 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 this evaluation, the system fault trees had no truncation limits (i.e., generated all possible cut-sets). The core damage sequences from the event trees were truncated below 1E-14. One of the characteristics of the linked event tree method is that the sum of the truncated sequence frequencies can be determined. At the 1E-14 level, the "unaccounted" frequency is no more than about 0.2% of the total CDF. This truncation value is judged to be more than adequate for this application.

The proposed AOT change is judged not to significantly change the uncertainties associated with the results because uncertainties associated with AOT changes generally affect the base case in a similar fashion. A number of sensitivity cases were developed to understand the impact of various modeling assumptions. These cases and the results are described in the following sections.

Quantitative Assessment

Model Used

Seabrook Station uses a fault-tree-linked-event-tree-model to analyze plant risk. The quantitative assessment for this AOT submittal is based on a living PRA. The Seabrook Station PRA was last updated in 2002. The SSPSS-2002 is a Level 2 analysis of full power operation, low power operations, hot shutdowns, and cold shutdowns, including planned and unplanned outages. The SSPSS-2002 was modeled and quantified using the suite of computer codes contained in RISKMAN for Windows, Release 6.0. The model used to analyze the risk associated with the extended AOT was designated SB2003C and is based on the model of record (SB2002X). This model was modified to account for the addition of the SEPS.

Model Alterations

Structural modifications were made to the Seabrook Station PRA model to support the addition of the SEPS. These modifications improve the risk analysis of the SEPS and provide the foundation for adding the SEPS to the on-line risk-monitoring program using Safety Monitor. The following table is a brief overview of the changes made to the PRA model. Details on specific modification modifications are stored in a model change tracking database in the Risk Management department.

The following top events (fault trees) were added to the PRA model to support the addition of the SEPS.

Top Event Fault Tree	**Description**
SYAB	This top event models switchyard, RATs and UATs, and the connecting breakers to busses E5 and E6. Prior to this update these failures were modeled in top event E5E6. Top event E5E6 now consists of failures that directly fail the emergency bus.
DGAB	This top event models the EDGs and the connecting breakers to busses E5 and E6. Prior to this update these failures were modeled in top event E5E6. Top event E5E6 now consists of failures that directly fail the emergency bus.
SEPSHW	This top event models the SEPS hardware (diesel, breakers, synchronizer and transfer switch)
SEPSAL	SEPS human error probabilities and connecting breakers to busses E5 and E6

Modeling Assumptions

The SEPS was added to the Seabrook Station PRA using a set of assumptions that are somewhat conservative. Assumptions were biased toward conservative values due to a lack of detailed information for some of the SEPS parameters. Assumptions were also based on the present SEPS design specification package, currently out for bid. This section outlines some of these assumptions and the basis behind them.

SEPS Reliability

The SEPS power source consists of two diesel generators (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 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 to be more mechanically reliable than the existing emergency diesel generators. This is based on advances made in diesel reliability and the benefit of a long commercial operating history.

SEPS Availability

The SEPS system will be added to the Maintenance Rule program. Contract personnel are expected to maintain the SEPS gensets. Five days of unavailability was assumed for this analysis. Load run testing will occur once per month for no more than 4 hours. The SEPS gensets will be loaded to 50% rated capacity using a load bank adjacent to the SEPS gensets. While in test the SEPS will be fully functional and require minimal additional operator action to exit the test. These additional operator actions were not modeled due to their low overall contribution to risk. The SEPS will be made functional before any scheduled entry into the extended EDG AOT.

SEPS Support

The SEPS support system failures are not critical to the success of the SEPS and are not included in the SEPS hardware fault tree. Support system failures are readily apparent and do not represent an immediate loss of function. Support power comes from a transformer fed from either bus E5 or bus E6 that supplies a 480-volt electrical power panel located at the SEPS gensets. The power is used for the battery chargers, lighting, and heating. The loss of a support function is discernable by a control room alarm that indicates SEPS trouble. A local alarm panel shows the specific parameter(s) that are in alarm. A battery low alarm is provided that allows a safety margin for replacing batteries before starting capability is lost. On loss of power to support systems, such as a transformer failure, the SEPS gensets will start and auto-synchronize. Loss of power to support systems is of particular concern during freezing conditions, thus this provision will ensure the SEPS maintains adequate temperatures. Operator rounds will also provide an additional level of protection against lost support systems and monitor overall SEPS condition.

EDG Reliability

EDG reliability remains unchanged for this evaluation. The EDG failure data is based on a Bayesian update that combines generic data with station specific data and was last updated in 2002.

EDG Unavailability

This risk assessment assumes no EDG scheduled maintenance during Modes 2 through 6. All scheduled maintenance is assumed performed in Mode 1. The 14-day AOT is expected to yield some efficiency in maintenance and thereby reduce total unavailability of the EDGs. However, no maintenance scheduling efficiency was assumed for this evaluation. The following Mode 1 maintenance was added to the PRA model.

- Preventive Maintenance - 7 days every 18 months. This is equivalent to the normal scheduled unavailability in Modes 5 and 6
- Corrective Maintenance - 14 days every 10 years. This is non-common cause corrective maintenance. A common cause maintenance event would require a plant shutdown.

The additional yearly maintenance is as follows: 7/1.5 + 14/10 = 6.1 days (146 hours).

Seismic Fragility

Because there is no information available regarding the seismic capacity of the SEPS, it is assumed that it has modest capacity, equivalent to offsite power. This is modeled by using the same seismic top event as offsite power (QY, median fragility of 0.3g) in the SEPS rules. This assumption is considered to be conservative.

Reactor Coolant Pump Seal LOCA

Reactor Coolant Pump Seal LOCA is assumed to occur during station black out. Currently, the SEPS is not capable of restoring power to the charging pump or thermal barrier cooling (PCCW) within 13 minutes. However, a stable reactor coolant system (RCS) state is reached when safety injection and/or the charging pump restores RCS level and emergency feedwater (EFW) is successful in removing decay heat. The most probable seal leak rate is less than or equal to 84 GPM.

Human Reliability

The SEPS requires human intervention to energize and load an emergency bus. Normally the SEPS will be aligned to emergency bus E6. In this alignment the breaker for bus E6 is racked onto the bus and in the open position. The control for the breaker is located on the breaker cubicle. The transfer switch, located in Train B essential switchgear, will be pre-positioned to bus E6. On station black out the SEPS gensets will auto-start and come up to rated speed and voltage and synchronize automatically. The emergency operating procedure (ECA 0.0, Loss of All AC Power) for loss of power will be entered directing the operators to manually strip bus E6 loads. Once stripped, an operator dispatched to the Train B switchgear room closes the SEPS breaker per control room direction which energizes bus E6. The control room operator will load the emergency bus based on a predetermined loading schedule per ECA 0.0.

The EPRI Human Reliability Analysis (HRA) calculator was used to document the human actions required to restore power to an emergency bus using the SEPS using the Human Cognitive Reliability (HCR) / Operator Reliability Experiments (ORE) / Techniques for Human Error Prediction (THERP) methodology. This methodology considers timing dependency and stress on the operators to determine probabilities of the operator failing to load the SEPS properly. The total Human Error Probability (HEP) for failing to load the SEPS was calculated as .055 (5.5E-02).

In very rare cases an additional operator action is required to realign the SEPS to the opposite train (bus E5). One such case is a failure of bus E6. In addition to the above operator actions, the operator in the switchgear room must obtain tools, procedure and protective gear to rack out the breaker at bus E6 and rack in the breaker at bus E5. The operator must then position the transfer switch to bus E5 and switch the SEPS 480 V support power supply to bus E5 as well. The probability of failure for this set of human actions has been conservatively set to 0.5 (5E-01).

Common Cause

Dependencies between component failures were considered when modeling the SEPS. The following details where common cause was considered and modeled in the Seabrook Station PRA.

SEPS and Emergency Diesel Generators

Due to physical separation, different manufacturers, different design, and different maintenance crews, common cause was not modeled between the SEPS and the EDGs

Supply Breakers to Bus E5 and E6

Common cause is modeled for the breakers that connect the SEPS to bus E5 and E6. These breakers are similar in manufacturer, design and maintenance.

EDG A and EDG B

Common cause is modeled for the emergency diesel generators. These engines are similar in manufacturer, design and maintenance.

SEPS Genset Pair

Any one SEPS genset failure fails the SEPS hardware fault tree. No credit is given for partial power from the SEPS. Therefore, modeling common cause is not necessary for the SEPS genset pair. This also applies to the SEPS genset output breakers.

Initiating Events that Influence SEPS Availability

SEPS does not create any new initiating events or impact the frequency of existing initiating events. However, some initiators directly influence SEPS availability. The initiators in the table below impact AC power sources and were reviewed for their applicability to the SEPS.

Initiator	Description and Frequency	Applicability to SEPS
LOOPW	Loss of Offsite Power due to Weather – Modes 1, 2, 3. Frequency: 1.01E-02	This initiator is for weather events that disable offsite power. The bid spec for SEPS calls for a hurricane proof enclosure that will withstand 110-mph wind speeds. The fuel tank, controls and breakers are located inside the enclosure. The enclosure will be anchored to the ground. Wiring is run underground to the essential switchgear. Snow removal procedures are expected to be available to remove any drifting snow that may impede proper airflow through the SEPS enclosure.
LOOPW4	Loss of Offsite Power due to Weather – Modes 4, 5, 6. Frequency: 1.01E-02	Same as LOOPW above.
FLSW	Ocean storm tidal surge that results in flooding entire site causing a loss of all Service Water. Frequency: 1.61E-06	This is an external flooding event (tidal surge) that is also assumed to fail SEPS
FL1SG	Flood in Turbine Building - LOOP and loss of one vital switchgear room. Frequency: 3.52E-06	This flood introduces salt water from the circulating water system into the emergency switchgear Train A and fails bus E5. SEPS alignment to bus E5 is assumed failed. The SEPS transfer switch is located in bus E6 and remains functional. Normal SEPS alignment is to bus E6 therefore this flood will not require entry into the flooded switchgear Train A. Therefore alignment to bus E6 remains successful.
FL2SG	Flood in Turbine Building - LOOP and loss of both vital switchgear rooms. Frequency: 1.21E-07	This flood introduces salt water from the circulating water system into the Emergency switchgear Train A and B and therefore fails SEPS alignment to bus E5 and E6.
FLLP	Flood in Turbine Building - LOOP. Frequency: 8.75E-04	This flood only disables the relay room (offsite power) SEPS remains functional.
FCRAC	Fire in main control board – loss of offsite power and loss of diesel generator control. Frequency: 1.71E-05	This fire disables the controls necessary to maintain the EDG and Offsite power. SEPS controls are not on the MCB therefore SEPS remains functional
FTBLP	Fire in Turbine Building – LOOP. Frequency: 3.32E-03	This fire disables the relay room (offsite power) and allows recovery. SEPS remains functional.
FTBBLK	Fire in Turbine Building – unrecoverable LOOP. Frequency: 7.95E-05	This fire disables the relay room (offsite power) and does not allow recovery. SEPS remains functional.

Results Summary

The results in the table below were generated using an updated model based on the assumptions outlined in the previous section. Sequence truncation was set to 1.0 E-14 to ensure an adequate number of sequences were generated for LERF frequency. Negative numbers represent a risk reduction. Numbers in parenthesis are a percent change from the base case CDF.

Case number	Description	CDF Mode 1,2,3	CDF Mode 4,5,6	CDF Mode 1-6	LERF Mode 1,2,3
1	Base Case: 3-day AOT with no SEPS. With normal expected unavailabilites	4.55E-05	2.34E-05	6.85E-05	9.80E-08
2	Partial Case: 14 day AOT with no SEPS	5.23E-05 (15%)	1.69E-05 (-28%)	6.95E-05 (1%)	9.94E-08 (0%)
3	Best Estimate Case: 14 day AOT with SEPS	3.13E-05 (-31%)	1.63E-05 (-30%)	4.78E-05 (-30%)	9.75E-08 (0%)
N/A	ΔCDF and ΔLERF = (Case 3 – Case 1)	-1.42E-05	-7.10E-6	-2.07E-05	-5.00E-10

Case Number	Description	Conditional CDF Mode 1,2,3	Percent Difference CDF Mode 1,2,3	
			Best Estimate Case	Base Case
4	Assume greater weather fragility SEPS fragility equal to offsite power fragility.	4.07E-05	29%	-11%
5	Assume greater reliability of SEPS diesels. SEPS Reliability 2 time better than EDGS. (Failure to start and run terms divided by 2).	3.04E-05	-3%	-33%
6	Assume auto sequencing added. Human Error probability set to 0. Sequencer hardware failure probability added to SEPS fault tree. No guaranteed seal LOCA.	2.97E-05	-6%	-35%
7	Assume SEPS Aligned to E5 100%.	3.49E-05	11%	-23%

Sensitivity Results Discussion

Case 4 assumes that the SEPS has the same weather fragility as offsite power. The design calls for a hurricane proof enclosure. Given this enclosure, SEPS was modeled as surviving a weather event that would fail offsite power. Without a robust enclosure CDF increases by 29% over the best estimate case. This case shows that weather proofing is an important feature of the SEPS design.

Case 5 assumes the SEPS has greater mechanical reliability. The best estimate case assumes the SEPS diesels are as reliable as Seabrook Station's emergency diesel generators. This is a conservative estimate used for this analysis. The PRA will be updated with improved data when available.

Increase reliability was modeled by dividing the basic event equations (failure rates) for SEPS by two. This resulted in a risk reduction of 3% over the best estimate case.

Case 6 models adding an emergency power sequencer to the design. Human actions to load the emergency bus were replaced by sequencing hardware failures. The human action to realign the SEPS to the other emergency bus was not replaced and remained at a conservative probability of 0.5. The EDG Sequencer failure probabilities were applied to SEPS fault tree. Event tree logic was altered so that seal LOCA was not guaranteed. This change is based on timely restoration of charging and/or thermal barrier cooling. Adding sequencer hardware reduced risk by 6% over the best estimate case.

Case 7 aligns SEPS to bus E5 100% of the year. Risk increases by 11% over the best estimate case. Aligning SEPS to bus E6 provides an additional power source for the motor driven emergency feedwater pump. Bus E5 does not have a motor driven EFW pump and therefore SEPS is less effective when aligned to bus E5.

Change in plant risk relative to guidelines

Transferring maintenance activities from shutdown to on-line without the addition of the SEPS shows essentially no change in overall risk (see case 2). The addition of the SEPS reduces core damage risk in all modes as shown by the negative delta CDF and falls well below Region III of figure 3 of Regulatory Guide 1.174.

LERF frequency remains relatively unchanged given the extended AOT and the addition of the SEPS. Containment bypass and isolation failures dominate LERF results. The addition of the SEPS combined with a 14-day AOT does not play a significant role in mitigating these events. Delta LERF is well inside region III of figure 4 of Regulatory Guide 1.174 criteria.

Conclusion

Given a 14-day AOT with the SEPS installed, there is an overall risk reduction of 30% as measured by delta CDF Modes 1-6. LERF is dominated by containment bypass and containment isolation failures and remains relatively unchanged by the addition the SEPS combined with a 14-day AOT. This risk reduction satisfies Regulatory Guide 1.174 limits by maintaining the risk at or below region III as shown in figure 3 and 4. Sensitivity cases show that a robust, weatherproof enclosure is a significant part of the 30% risk reduction and therefore is an important design factor. Without a robust enclosure, overall risk reduction is 11% with the SEPS installed and a 14-day AOT.

Overall Safety Assessment Conclusion

The results of the deterministic evaluation and PRA evaluation demonstrate that the SEPS is capable of mitigating the dominant core damage sequences and, in conjunction with administrative controls, provides a significant overall risk reduction for station operation. Therefore, FPLE Seabrook concludes that the above discussion as well as the Determination of Significant Hazards for Proposed Changes, presented in Section IV, that the proposed changes do not adversely affect or endanger the health or safety of the general public or involve a significant safety hazard.

SECTION II

MARKUP OF PROPOSED CHANGES

Refer to the attached markup of the proposed changes to the Technical Specifications. The attached markup reflects the currently issued revision of the Technical Specifications listed below. Pending Technical Specifications or Technical Specification changes issued subsequent to this submittal are not reflected in the enclosed markup.

The following Technical Specification is included in the attached markup:

Technical Specification	Title	Page
3.8.1.1 Actions b, c, d & f	Electrical Power Systems A.C. Sources - Operating	3/4 8-2 & 8-2a
B 3/4.8.1.1	Electrical Power Systems A.C. Sources – Operating	B 3/4 8-2, B 3/4 8-5, B 3/4 8-6, B 3/4 8-7 and B 3/4 8-17

3.8.1.1 (Continued)

ACTION:

INSERT (A)

b. With a diesel generator inoperable, 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.* 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.

INSERT (B)

c. With one offsite circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. 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.* 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. 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.

* The OPERABILITY of the remaining diesel generator need not be verified if it has been successfully operated within the last 24 hours, or if currently operating, or if the diesel generator became inoperable due to:

1. Preplanned preventive maintenance or testing,
2. An inoperable support system with no potential common mode failure for the remaining diesel generator, or
3. An independently testable component with no potential common mode failure for the remaining diesel generator.

ELECTRICAL POWER SYSTEMS

A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 (Continued)

ACTION:

d. With one diesel generator inoperable in addition to ACTION b. or c. above, verify that:

1. All required systems, subsystems, trains, components, and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE, and

2. When in MODE 1, 2, or 3, the steam-driven emergency feedwater pump is OPERABLE.

If these conditions are not satisfied within 2 hours be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With two of the above required offsite A.C. circuits inoperable; restore at least one of the inoperable offsite sources to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours. With only one offsite source restored, restore at least two offsite circuits to OPERABLE status within 72 hours from 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.

f. With two of the above required diesel generators inoperable, demonstrate the OPERABILITY of two offsite A.C. circuits by performing the requirements of Specification 4.8.1.1.1a. within 1 hour and at least once per 8 hours thereafter; restore at least one of the inoperable diesel generators 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. Restore at least two diesel generators to OPERABLE status within 72 hours from time of initial loss or be in least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

INSERT C

NOTE! ENTIRE 3/4.8.1 AS WELL AS 3/4.8.2, 8.3 & 8.4 BASES NEEDS TO BE REPAGINATED. ENSURE HEADERS ARE CORRECT.

3/4.8.1 AC SOURCES (Continued)

restores power to the bus, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for Train A and Train B EDGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each EDG is 6083 kW (rounded to 6100 kW) with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 4.16 kV ESF buses are listed in Reference 2.

INSERT (D)

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the UFSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. A discussion of these limits may be found in the Bases for Section 3/4.2, Power Distribution Limits; Section 3/4.4, Reactor Coolant System; and Section 3/4.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the unit. This results in maintaining at least one train of the onsite or offsite AC sources OPERABLE during Accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power and

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10 CFR 50.36.

INSERT (E)

LIMITING CONDITION FOR OPERATION (LCO)

Two qualified circuits between the offsite transmission network and the onsite Class 1E Electrical Power System and separate and independent EDGs for each train ensure availability of the required power to shutdown the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Qualified offsite circuits are those that are described in the UFSAR and are part of the licensing basis for the unit,

Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses.

The offsite circuits receive power from three 345,000 volt transmission lines which terminate in a common termination yard, which is then fed to the switchyard. The switchyard is arranged through circuit breakers and transformers to form the two qualified circuits. Each ESF bus is capable of being supplied by the offsite circuits either through the unit auxiliary transformer (UAT) or reserve auxiliary transformer (RAT). The RAT is normally the standby transformer when the UAT is unavailable.

Each EDG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be

3/4.8.1 AC SOURCES (Continued)

LCO (continued)

common cause failure no longer exists, and ACTION f. is satisfied. If the cause of the initial inoperable EDG cannot be confirmed not to exist on the remaining EDG(s), performance of SR 4.8.1.1.2a.5) suffices to provide assurance of continued OPERABILITY of the remaining EDG while the common cause possibility is evaluated under the corrective action program.

In the event the inoperable EDG is restored to OPERABLE status prior to completing the actions required in ACTION b., the plant corrective action program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in ACTION b.

According to Generic Letter 84-15 (Ref. 7), 24 hours is a reasonable time to confirm that the OPERABLE EDG is not affected by the same problem as the inoperable EDG.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue with one onsite power source inoperable for a period that should not exceed 72 hours. The remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 72-hour AOT takes into account the capacity and capability of the remaining AC sources, a reasonable time for evaluation and repairs, and the low probability of a DBA occurring during this period.

INSERT F

c. When in ACTION c., individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this condition may appear higher than the condition of ACTION e. (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure.

ACTION c. also directs the performance of ACTION d. and demonstration of the remaining OPERABLE offsite and onsite power sources, similar to the actions specified in ACTION b., however, demonstration of OPERABILITY for the remaining EDG must be performed in 8 hours. If one power source is restored within 12 hours, power operation continues in accordance with either ACTION a. or ACTION b.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue while in ACTION c. for a period that should not exceed 12 hours. The 12-hour AOT takes into account the capacity and capability of the remaining AC sources, a reasonable time for evaluation and repairs, and the low probability of a DBA occurring during this period.

INSERT G

d. ACTION d. is intended to provide assurance that a loss of offsite power condition does not result in a complete loss of safety function of critical features during the period when either an EDG is inoperable (condition addressed in ACTION b.) or when both an EDG and an offsite power source are inoperable (condition addressed in ACTION c.) at the same time. Critical features are designed with redundant safety related trains. Thus, it is necessary to verify OPERABILITY of redundant critical features in a timely manner. The term "verify," as used in this context means to administratively check by examining logs or other information to determine of certain components are out of service for maintenance or other reasons. It does not mean to perform the Surveillance Requirements needed to demonstrate OPERABILITY of the component.

In addition, when in MODE 1, 2, or 3, the turbine driven emergency feedwater pump

3/4.8.1 AC SOURCES (Continued)

LCO (continued)

must also be verified OPERABLE as well. This requirement ensures a diverse emergency feedwater supply to the steam generators should the remaining offsite and onsite power sources subsequently become inoperable.

Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable EDG (i.e., all required systems, subsystems, trains, components and devices dependent on the remaining OPERABLE EDG must be verified OPERABLE as well). The emergency power supply for the required systems, subsystems, trains, components and devices may be used as the primary basis for determining the redundant features–train relationship. Features whose inoperability has been determined to impact both trains should be considered as Train A and Train B related. Manually operated features should use the same train designation as the electrically powered features in the same flowpath.

Discovering one required EDG inoperable coincident with one or more inoperable required support or supported features, or both, that are associated with the OPERABLE EDG, results in starting the AOT for ACTION d. The 2-hour AOT from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

While in this condition, the remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Though, on a component basis, single failure protection for the required feature's function may have been lost, however, the safety function has not been lost.

The 2-hour AOT takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature, the capacity and capability of the remaining AC sources, a reasonable time for evaluation and repairs, and the low probability of a DBA occurring during this period.

If at any time during the existence of this condition (one EDG inoperable), a required feature subsequently becomes inoperable, the 2-hour AOT would begin to be tracked.

---

e. ACTION e., which applies when two offsite circuits are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions

According to Regulatory Guide 1.93 (Ref. 6), operation may continue with two offsite AC power sources inoperable for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more EDGs inoperable. However, two factors tend to decrease the severity of this level of degradation:

1. The configuration of the redundant AC electrical power system that remains available is

3/4.8.1 AC SOURCES (Continued)

LCO (continued)

not susceptible to a single bus or switching failure, and

2. The time required to detect and restore an unavailable off site power source is generally much less than that required to detect and restore an unavailable onsite AC source.

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24-hour AOT provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Reference 6, with the available offsite AC sources, two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with ACTION a.

f. With Train A and Train B EDGs inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. For this level of degradation, the offsite electrical power system is the only source of AC power available. The risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability and inadvertent generator trip, which could result in a total loss of AC power); however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

INSERT (H)

According to Reference 6, with both EDGs inoperable, operation may continue for a period that should not exceed 2 hours. If one EDG is restored within 2 hours power operation may continue in accordance with ACTION b.

SURVEILLANCE REQUIREMENTS (SR)

The AC sources are designed to permit inspection and testing of important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the EDGs are in accordance with the recommendations of Regulatory Guide 1.9 (Ref. 3), Regulatory Guide 1.108 (Ref. 9), and Regulatory Guide 1.137 (Ref. 10), as addressed in the UFSAR including exceptions thereto.

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of 3740 Vac is 90% of the nominal 4160 Vac output voltage. This value, which is specified in ANSI C84.1 (Ref 11) allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 Vac. It also allows for voltage drops to motors and other equipment down through the 120

3/4.8.1 AC SOURCES (Continued)

SURVEILLANCE REQUIREMENTS (SR) (continued)

regulator performance.

The SR also requires that the EDGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations at keep-warm values.

The 10-year frequency is consistent with the recommendations of RG 1.108 (Ref. 9).

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. UFSAR, Chapter 8.
3. Regulatory Guide 1.9, Rev. 3.*
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 15.
6. Regulatory Guide 1.93, Rev. 0, December 1974.
7. Generic Letter 84-15, "Proposed Staff ACTIONs to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
8. 10 CFR 50, Appendix A, GDC 18.
9. Regulatory Guide 1.108, Rev. 1, August 1977.*
10. Regulatory Guide 1.137, Rev. 1, October 1979.*
11. ANSI Std. C84.1
12. IEEE Std. 387-1984**
13. Generic Letter 91-04, April 1991.
14. REGULATORY GUIDE 1.182, MAY 2000.

* Seabrook Station is only committed to demonstrating the OPERABILITY of the diesel generators in accordance with the recommendations of Regulatory Guides 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," Revision 2, December 1979; 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977, Errata September 1977; and 1.137, "Fuel-Oil Systems for Standby Generators." Revision 1, October 1979. Exceptions to these Regulatory Guides are noted in the UFSAR.

** Seabrook Station is only committed to IEEE Std. 387-1972 and 1977.

INSERT (A)

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.

INSERT (B)

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.

INSERT
Ⓒ

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

1) Demonstrate the OPERABILITY of two offsite A.C. circuits by performing Specification 4.8.1.1.1a 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.

INSERT
Ⓓ

To reduce the risk of performing extended EDG maintenance activities of up to 14 days while on-line a non-safety related supplemental emergency power system (SEPS) may be relied on when available. The SEPS is designed to provide back up power to either emergency bus whenever one of the emergency diesel generators (EDG) is out of service, particularly during Modes 1 through 4 operation. The SEPS is verified available and an operational readiness status check is performed when it is anticipated that one of the EDGs will be inoperable for longer than the allowable outage time of 72 hours. The design of the SEPS is capable of providing the required safety and non-safety related loads in the event of a total loss of offsite power and if both emergency diesel generators fail to start and load. During these events it is assumed that there is no seismic event or an event that requires safeguards actuation, e.g., safety injection, containment building spray, etc.

INSERT
(E)

The SEPS is not designed for DBA loads and is not credited in the accident analyses.

INSERT
(F)

The requirement for restoring the EDG to OPERABLE status within 72 hours may be extended to 14 days to perform either extended preplanned maintenance (both preventive and corrective) or extended unplanned corrective maintenance work. Prior to exceeding the 72-hour AOT the SEPS must be available in accordance with Technical Requirement (TR) 31. When applying this AOT extension, the risk impact of this activity is managed through Seabrook Station's programs and procedures in place to implement 10 CFR 50.65(a)(4) and its implementation guidance, NRC Regulatory Guide 1.182, "Assessing and Managing Risks Before Maintenance Activities at Nuclear Power Plants" (Ref. 14).

During normal operation, with both EDGs Operable, SEPS availability is demonstrated by performance of the periodic surveillance requirements specified in TR 31.

When an EDG is inoperable and the SEPS is relied upon as a backup power source, an operational readiness status check of the SEPS must be performed in addition to the periodic surveillances. The operational readiness status check is considered a just-in-time check to ensure continued SEPS availability. The operational readiness status check is also specified in TR 31 and consists of: (1) verifying the SEPS is operationally ready for automatic start and energization of the selected emergency bus; (2) verifying 24-hour onsite fuel supply; and (3) verifying alignment to the selected 4160 volt emergency bus and associated 480 volt bus. In addition, the operational readiness status check must continue to be performed at least once every 72 hours following the initial SEPS availability verification. Should the SEPS become unavailable during the 14-day AOT and cannot be restored to available status, the EDG AOT reverts back to 72 hours. The 72 hours begins with the discovery of the SEPS unavailability, not to exceed a total of 14 days from the time the EDG initially became inoperable.

The extended 14-day AOT is based on the Probabilistic Risk Analysis (PRA) evaluation to perform on-line maintenance of the EDGs when the SEPS is available. The results of the PRA evaluation demonstrate that the SEPS is capable of mitigating the dominant core damage sequences and provides a significant overall risk reduction for station operation. Additionally, the remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Furthermore, should a loss of offsite power occur and both EDGs are unable to energize their respective emergency bus, the SEPS alone is adequate to supply electrical power to effect a safe shutdown of the unit.

INSERT
(G)

Following the 12-hour AOT, ACTION c. requires that both diesel generators and both offsite circuits be restored to Operable status within 72 hours. The requirement for restoring both diesel generators to OPERABLE status within 72 hours may be extended to 14 days to perform either extended preplanned maintenance (both preventive and corrective) or extended unplanned corrective maintenance work. Prior to exceeding the 72-hour AOT the SEPS must be available and an operational readiness status check performed in accordance with Technical Requirement (TR) 31. Refer to Bases for ACTION b. for additional information and requirements.

INSERT
(H)

Following the 2-hour AOT, ACTION f. requires that both diesel generators be restored to Operable status within 72 hours. The requirement for restoring both diesel generators to OPERABLE status within 72 hours may be extended to 14 days to perform either extended preplanned maintenance (both preventive and corrective) or extended unplanned corrective maintenance work. Prior to exceeding the 72-hour AOT the SEPS must be available and an operational readiness status check performed in accordance with Technical Requirement (TR) 31. Refer to Bases for ACTION b. for additional information and requirements.

SECTION III

RETYPE OF PROPOSED CHANGES

Refer to the attached retype of the proposed changes to the Technical Specifications. The attached retype reflects the currently issued version of the Technical Specifications. Pending Technical Specification changes or Technical Specification changes issued subsequent to this submittal are not reflected in the enclosed retype. The enclosed retype should be checked for continuity with Technical Specifications prior to issuance.

3.8.1.1 (Continued)

ACTION:

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.

* The OPERABILITY of the remaining diesel generator need not be verified if it has been successfully operated within the last 24 hours, or if currently operating, or if the diesel generator became inoperable due to:

1. Preplanned preventive maintenance or testing,
2. An inoperable support system with no potential common mode failure for the remaining diesel generator, or
3. An independently testable component with no potential common mode failure for the remaining diesel generator.

LIMITING CONDITION FOR OPERATION

3.8.1.1 (continued)

ACTION:

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.

* The OPERABILITY of the remaining diesel generator need not be verified if it has been successfully operated within the last 24 hours, or if currently operating, or if the diesel generator became inoperable due to:

1. Preplanned preventive maintenance or testing,
2. An inoperable support system with no potential common mode failure for the remaining diesel generator, or
3. An independently testable component with no potential common mode failure for the remaining diesel generator.

3.8.1.1 (continued)

ACTION:

d. With one diesel generator inoperable in addition to ACTION b. or c. above, verify that:

1. All required systems, subsystems, trains, components, and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE, and

2. When in MODE 1, 2, or 3, the steam-driven emergency feedwater pump is OPERABLE.

If these conditions are not satisfied within 4 hours be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With two of the above required offsite A.C. circuits inoperable; restore at least one of the inoperable offsite sources to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours. With only one offsite source restored, restore at least two offsite circuits to OPERABLE status within 72 hours from 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.

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

1) Demonstrate the OPERABILITY of two offsite A.C. circuits by performing Specification 4.8.1.1.1a 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.

3/4.8.1 AC SOURCES

BACKGROUND

The Seabrook Station Class 1E AC Electrical Power Distribution System AC sources consist of the offsite power sources (preferred power sources, normal and alternate(s)), and the onsite standby power sources (Train A and Train B emergency diesel generators (EDGs)). As required by 10 CFR 50, Appendix A, GDC 17 (Ref 1), the design of the AC electrical power system provides independence and redundancy to ensure an available source of power to the Engineered Safety Feature (ESF) systems.

The onsite Class 1E AC Distribution System is divided into redundant load groups (trains) so that the loss of any one group does not prevent the minimum safety functions from being performed. Each train has connections to two preferred offsite power sources and a single EDG.

Offsite power is supplied to the unit switchyard from the transmission network by three transmission lines. From the switchyard, two electrically and physically separated circuits provide AC power, through the generator step up transformer and/or step down station auxiliary transformers, to the 4.16 kV ESF buses. A detailed description of the offsite power network and the circuits to the Class 1E ESF buses is found in the UFSAR, Chapter 8 (Ref. 2).

An offsite circuit consists of breakers, transformers, switches, interrupting devices, cabling, and controls, required to transmit power from the offsite transmission network to the onsite Class 1E ESF buses.

The onsite standby power source for each 4.16 kV ESF bus is a dedicated EDG (DG-1A and DG-1B). DG-1A and DG-1B are dedicated to ESF buses E5 and E6, respectively. An EDG starts automatically on a safety injection (SI) signal (i.e., low pressurizer pressure or high containment pressure signals) or on an ESF bus undervoltage signal. After the EDG has started, it will automatically tie to its respective bus after offsite power is tripped as a consequence of ESF bus undervoltage, or degraded voltage coincident with an SI signal. The EDGs will also start and operate in the standby mode without tying to the ESF bus on a SI signal alone. Following the trip of offsite power, an undervoltage signal strips nonpermanent loads from the ESF bus. When the EDG is tied to the ESF bus, loads are then sequentially connected to its respective ESF bus by the emergency power sequencer timer. The sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading the EDG by automatic load application.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the EDGs in sufficient time to provide for safe reactor shutdown and to mitigate the consequences of a Design Basis Accident (DBA) such as a loss of coolant accident (LOCA).

Certain required unit loads are returned to service in a predetermined sequence in order to prevent overloading the EDG in the process. Within 108 seconds after the EDG restores power to the bus, all loads needed to recover the unit or maintain it in a safe condition are returned to service.

Ratings for Train A and Train B EDGs satisfy the requirements of Regulatory Guide 1.9 (Ref. 3). The continuous service rating of each EDG is 6083 kW (rounded to 6100 kW) with 10% overload permissible for up to 2 hours in any 24 hour period. The ESF loads that are powered from the 4.16 kV ESF buses are listed in Reference 2.

---

* Seabrook Station is only committed to demonstrating the OPERABILITY of the diesel generators in accordance with the recommendations of Regulatory Guides 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," Revision 2, December 1979; 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977, Errata September 1977; and 1.137, "Fuel-Oil Systems for Standby Generators." Revision 1, October 1979. Exceptions to these Regulatory Guides are noted in the UFSAR.

** Seabrook Station is only committed to IEEE Std. 387-1972 and 1977.

3/4.8.1 AC SOURCES (Continued)

To reduce the risk of performing extended EDG maintenance activities of up to 14 days while on-line a non-safety related supplemental emergency power system (SEPS) may be relied on when available. The SEPS is designed to provide back up power to either emergency bus whenever one of the emergency diesel generators (EDG) is out of service, particularly during Modes 1 through 4 operation. The SEPS is verified available and an operational readiness status check is performed when it is anticipated that one of the EDGs will be inoperable for longer than the allowable outage time of 72 hours. The design of the SEPS is capable of providing the required safety and non-safety related loads in the event of a total loss of offsite power and if both emergency diesel generators fail to start and load. During these events it is assumed that there is no seismic event or an event that requires safeguards actuation, e.g., safety injection, containment building spray, etc.

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the UFSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. A discussion of these limits may be found in the Bases for Section 3/4.2, Power Distribution Limits; Section 3/4.4, Reactor Coolant System; and Section 3/4.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the Accident analyses and is based upon meeting the design basis of the unit. This results in maintaining at least one train of the onsite or offsite AC sources OPERABLE during Accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power and

b. A worst case single failure.

The AC sources satisfy Criterion 3 of 10 CFR 50.36.

The SEPS is not designed for DBA loads and is not credited in the accident analyses.

LIMITING CONDITION FOR OPERATION (LCO)

Two qualified circuits between the offsite transmission network and the onsite Class 1E Electrical Power System and separate and independent EDGs for each train ensure availability of the required power to shutdown the reactor and maintain it in a safe shutdown condition after an anticipated operational occurrence (AOO) or a postulated DBA.

Qualified offsite circuits are those that are described in the UFSAR and are part of the licensing basis for the unit,

Each offsite circuit must be capable of maintaining rated frequency and voltage, and accepting required loads during an accident, while connected to the ESF buses.

The offsite circuits receive power from three 345,000 volt transmission lines which terminate in a common termination yard, which is then fed to the switchyard. The switchyard is arranged through circuit breakers and transformers to form the two qualified circuits. Each ESF bus is capable of being supplied by the offsite circuits either through the unit auxiliary transformer (UAT) or reserve auxiliary transformer (RAT). The RAT is normally the standby transformer when the UAT is unavailable.

3/4.8.1 AC SOURCES (Continued)

LIMITING CONDITION FOR OPERATION (LCO) (continued)

Each EDG must be capable of starting, accelerating to rated speed and voltage, and connecting to its respective ESF bus on detection of bus undervoltage. This will be accomplished within 10 to 12 seconds, depending on the type of event (12 seconds for loss of power only event, and 10 seconds for events requiring safety injection). Each EDG must also be capable of accepting required loads within the assumed loading sequence intervals, and continue to operate until offsite power can be restored to the ESF buses. These capabilities are required to be met from a variety of initial conditions such as EDG in standby with the engine hot and EDG in standby with the engine at ambient (keep-warm temperature) conditions. Additional EDG capabilities must be demonstrated as well to other required surveillances, e.g., capability of the EDG to revert to standby status on an ECCS signal while operating in parallel test mode.

In addition, though not specifically mentioned in the LCO, one required emergency power sequencer timer per train must be OPERABLE as well. The sequencer is an essential support system to the EDG associated with a given ESF bus. Furthermore, the sequencer is on the primary success path for most major AC electrically powered safety systems powered from the associated ESF bus. Therefore, loss of an ESF bus sequencer affects every major ESF system in the train. Thus, the proper sequencing of loads, including tripping of nonessential loads is a required support function for EDG OPERABILITY.

The AC sources in one train must be separate and independent (to the extent possible) of the AC sources in the other train (Ref. 1). For the EDGs, separation and independence are complete.

For the offsite AC sources, separation and independence are to the extent practical. A circuit may be connected to more than one ESF bus, with fast transfer capability to the other circuit OPERABLE, and not violate separation criteria. A circuit that is not connected to an ESF bus is required to have OPERABLE fast transfer capability to at least one ESF bus to support OPERABILITY of that circuit. Both offsite power circuits are designed to be connected or available via fast transfer to both ESF buses. However, the minimum regulatory requirements are met and the two offsite power circuits can be considered OPERABLE with each offsite power circuit connected or available via fast transfer to only one ESF bus as long as the two offsite power circuits are connected or available via fast transfer to opposite ESF buses.

APPLICABILITY

The AC sources are required to be OPERABLE in MODES 1, 2, 3, and 4 to ensure that:

a. Acceptable fuel design limits and reactor coolant pressure boundary limits are not exceeded as a result of AOOs or abnormal transients and

b. Adequate core cooling is provided and containment OPERABILITY and other vital functions are maintained in the event of a postulated DBA.

The AC power requirements for MODES 5 and 6 are covered in LCO 3/4.8.2, "AC Sources – Shutdown."

ACTIONS

For all of the following ACTIONs, if the inoperable AC electric power sources cannot be restored to OPERABLE status within the required AOT, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least HOT STANDBY within 6 hours and to COLD SHUTDOWN within the following 30 hours.

3/4.8.1 AC SOURCES (Continued)

LIMITING CONDITION FOR OPERATION (LCO) (continued)

The AOTs are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging plant systems.

The term, "verify," as used in this context means to administratively check by examining logs or other information to determine if certain components are out of service for maintenance or other reasons. It does not mean to perform the Surveillance Requirements needed to demonstrate the OPERABILITY of the component.

a. ACTION a. is to ensure a highly reliable power source remains with one offsite circuit inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis, i.e., within 1 hour of discovery and at least once every 8 hours thereafter. However, if a second required circuit fails Surveillance Requirement (SR) 4.8.1.1.1a, the second offsite circuit is inoperable, and ACTION e., for two offsite circuits inoperable, would have to be entered.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue with one offsite power source inoperable for a period that should not exceed 72 hours. With one offsite circuit inoperable, the reliability of the offsite system is degraded, and the potential for a loss of offsite power is increased, with attendant potential for a challenge to the unit safety systems. In this condition, however, the remaining OPERABLE offsite circuit and EDGs are adequate to supply electrical power to the onsite Class 1E Distribution System.

The 72-hour allowed outage time (AOT) takes into account the capacity and capability of the remaining AC sources, a reasonable time for repairs, and the low probability of a DBA occurring during this period.

---

b. When one EDG is inoperable it is necessary to verify the availability of the offsite circuits on a more frequent basis to ensure a highly reliable power source remains. Since the required ACTION only specifies "perform," a failure of SR 4.8.1.1.1a acceptance criteria does not result in a required ACTION being not met. However, if a circuit fails to pass SR 4.8.1.1.1a, it is inoperable. Upon offsite circuit inoperability, additional conditions and required ACTIONs must then be entered.

ACTION b. requires performance of ACTION d., which is intended to provide assurance that a loss of offsite power, during the period that a EDG is inoperable, does not result in a complete loss of safety function of critical features/systems. While in this condition (one EDG inoperable), the remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Refer to ACTION d. basis for further discussion.

ACTION b. also requires starting the remaining EDG per SR 4.8.1.1.2a.5) within 24 hours to demonstrate OPERABILITY. The associated * footnote provides an allowance to avoid unnecessary testing of the remaining EDG to verify OPERABLITY. If the inoperable EDG has been successfully operated within the last 24 hours, if currently operating or if it can be determined that the cause of the inoperable EDG does not exist on the OPERABLE EDG, SR 4.8.1.1.2a.5) does not have to be performed. If the cause of inoperability exists on the remaining EDG, the remaining EDG would be declared inoperable upon discovery and ACTION f. would be entered for two EDGs inoperable. Once the failure is repaired, the common cause failure no longer exists, and ACTION f. is satisfied. If the cause of the initial inoperable EDG cannot be confirmed not to exist on the remaining EDG(s), performance of SR 4.8.1.1.2a.5) suffices to provide assurance of continued OPERABILITY of the remaining EDG while the common cause possibility is evaluated under the corrective action program.

3/4.8.1 AC SOURCES (Continued)

LIMITING CONDITION FOR OPERATION (LCO) (continued)

In the event the inoperable EDG is restored to OPERABLE status prior to completing the actions required in ACTION b., the plant corrective action program will continue to evaluate the common cause possibility. This continued evaluation, however, is no longer under the 24 hour constraint imposed while in ACTION b.

According to Generic Letter 84-15 (Ref. 7), 24 hours is a reasonable time to confirm that the OPERABLE EDG is not affected by the same problem as the inoperable EDG.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue with one onsite power source inoperable for a period that should not exceed 72 hours. The remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. The 72-hour AOT takes into account the capacity and capability of the remaining AC sources, a reasonable time for evaluation and repairs, and the low probability of a DBA occurring during this period.

The requirement for restoring the EDG to OPERABLE status within 72 hours may be extended to 14 days to perform either extended preplanned maintenance (both preventive and corrective) or extended unplanned corrective maintenance work. Prior to exceeding the 72-hour AOT the SEPS must be available in accordance with Technical Requirement (TR) 31. When applying this AOT extension, the risk impact of this activity is managed through Seabrook Station's programs and procedures in place to implement 10 CFR 50.65(a)(4) and its implementation guidance, NRC Regulatory Guide 1.182, "Assessing and Managing Risks Before Maintenance Activities at Nuclear Power Plants" (Ref. 14).

During normal operation, with both EDGs Operable, SEPS availability is demonstrated by performance of the periodic surveillance requirements specified in TR 31.

When an EDG is inoperable and the SEPS is relied upon as a backup power source, an operational readiness status check of the SEPS must be performed in addition to the periodic surveillances. The operational readiness status check is considered a just-in-time check to ensure continued SEPS availability. The operational readiness status check is specified in TR 31 and consists of: (1) verifying the SEPS is operationally ready for automatic start and energization of the selected emergency bus; (2) verifying 24-hour onsite fuel supply; and (3) verifying alignment to the selected 4160 volt emergency bus and associated 480 volt bus. In addition, the operational readiness status check must continue to be performed at least once every 72 hours following the initial SEPS availability verification. Should the SEPS become unavailable during the 14-day AOT and cannot be restored to available status, the EDG AOT reverts back to 72 hours. The 72 hours begins with the discovery of the SEPS unavailability, not to exceed a total of 14 days from the time the EDG initially became inoperable.

The extended 14-day AOT is based on the Probabilistic Risk Analysis (PRA) evaluation to perform on-line maintenance of the EDGs when the SEPS is available. The results of the PRA evaluation demonstrate that the SEPS is capable of mitigating the dominant core damage sequences and provides a significant overall risk reduction for station operation. Additionally, the remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Furthermore, should a loss of offsite power occur and both EDGs are unable to energize their respective emergency bus, the SEPS alone is adequate to supply electrical power to effect a safe shutdown of the unit.

3/4.8.1 AC SOURCES (Continued)

LIMITING CONDITION FOR OPERATION (LCO) (continued)

c. When in ACTION c., individual redundancy is lost in both the offsite electrical power system and the onsite AC electrical power system. Since power system redundancy is provided by two diverse sources of power, however, the reliability of the power systems in this condition may appear higher than the condition of ACTION e. (loss of both required offsite circuits). This difference in reliability is offset by the susceptibility of this power system configuration to a single bus or switching failure.

ACTION c. also directs the performance of ACTION d. and demonstration of the remaining OPERABLE offsite and onsite power sources, similar to the actions specified in ACTION b., however, demonstration of OPERABILITY for the remaining EDG must be performed in 8 hours. If one power source is restored within 12 hours, power operation continues in accordance with either ACTION a. or ACTION b.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue while in ACTION c. for a period that should not exceed 12 hours. The 12-hour AOT takes into account the capacity and capability of the remaining AC sources, a reasonable time for evaluation and repairs, and the low probability of a DBA occurring during this period.

Following the 12-hour AOT, ACTION c. requires that both diesel generators and both offsite circuits be restored to Operable status within 72 hours. The requirement for restoring both diesel generators to OPERABLE status within 72 hours may be extended to 14 days to perform either extended preplanned maintenance (both preventive and corrective) or extended unplanned corrective maintenance work. Prior to exceeding the 72-hour AOT the SEPS must be available and an operational readiness status check performed in accordance with Technical Requirement (TR) 31. Refer to Bases for ACTION b. for additional information and requirements.

---

d. ACTION d. is intended to provide assurance that a loss of offsite power condition does not result in a complete loss of safety function of critical features during the period when either an EDG is inoperable (condition addressed in ACTION b.) or when both an EDG and an offsite power source are inoperable (condition addressed in ACTION c.) at the same time. Critical features are designed with redundant safety related trains. Thus, it is necessary to verify OPERABILITY of redundant critical features in a timely manner. The term "verify," as used in this context means to administratively check by examining logs or other information to determine if certain components are out of service for maintenance or other reasons. It does not mean to perform the Surveillance Requirements needed to demonstrate OPERABILITY of the component.

In addition, when in MODE 1, 2, or 3, the turbine driven emergency feedwater pump must also be verified OPERABLE as well. This requirement ensures a diverse emergency feedwater supply to the steam generators should the remaining offsite and onsite power sources subsequently become inoperable.

Redundant required feature failures consist of inoperable features associated with a train, redundant to the train that has an inoperable EDG (i.e., all required systems, subsystems, trains, components and devices dependent on the remaining OPERABLE EDG must be verified OPERABLE as well). The emergency power supply for the required systems, subsystems, trains, components and devices may be used as the primary basis for determining the redundant features–train relationship. Features whose inoperability has been determined to impact both trains should be considered as Train A and Train B related. Manually operated features should use the same train designation as the electrically powered features in the same flowpath.

Discovering one required EDG inoperable coincident with one or more inoperable required

3/4.8.1 AC SOURCES (Continued)

LIMITING CONDITION FOR OPERATION (LCO) (continued)

support or supported features, or both, that are associated with the OPERABLE EDG, results in starting the AOT for ACTION d. The 4-hour AOT from the discovery of these events existing concurrently is acceptable because it minimizes risk while allowing time for restoration before subjecting the unit to transients associated with shutdown.

While in this condition, the remaining OPERABLE EDG and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Though, on a component basis, single failure protection for the required feature's function may have been lost, however, the safety function has not been lost.

The 4-hour AOT takes into account the OPERABILITY of the redundant counterpart to the inoperable required feature, the capacity and capability of the remaining AC sources, a reasonable time for evaluation and repairs, and the low probability of a DBA occurring during this period.

If at any time during the existence of this condition (one EDG inoperable), a required feature subsequently becomes inoperable, the 4-hour AOT would begin to be tracked.

---

e. ACTION e., which applies when two offsite circuits are inoperable, is intended to provide assurance that an event with a coincident single failure will not result in a complete loss of redundant required safety functions.

According to Regulatory Guide 1.93 (Ref. 6), operation may continue with two offsite AC power sources inoperable for a period that should not exceed 24 hours. This level of degradation means that the offsite electrical power system does not have the capability to effect a safe shutdown and to mitigate the effects of an accident; however, the onsite AC sources have not been degraded. This level of degradation generally corresponds to a total loss of the immediately accessible offsite power sources.

Because of the normally high availability of the offsite sources, this level of degradation may appear to be more severe than other combinations of two AC sources inoperable that involve one or more EDGs inoperable. However, two factors tend to decrease the severity of this level of degradation:

1. The configuration of the redundant AC electrical power system that remains available is not susceptible to a single bus or switching failure, and

2. The time required to detect and restore an unavailable off site power source is generally much less than that required to detect and restore an unavailable onsite AC source.

With both of the required offsite circuits inoperable, sufficient onsite AC sources are available to maintain the unit in a safe shutdown condition in the event of a DBA or transient. In fact, a simultaneous loss of offsite AC sources, a LOCA and a worst case single failure were postulated as a part of the design basis in the safety analysis. Thus, the 24-hour AOT provides a period of time to effect restoration of one of the offsite circuits commensurate with the importance of maintaining an AC electrical power system capable of meeting its design criteria.

According to Reference 6, with the available offsite AC sources, two less than required by the LCO, operation may continue for 24 hours. If two offsite sources are restored within 24 hours, unrestricted operation may continue. If only one offsite source is restored within 24 hours, power operation continues in accordance with ACTION a.

3/4.8.1 AC SOURCES (Continued)

LIMITING CONDITION FOR OPERATION (LCO) (continued)

f. With Train A and Train B EDGs inoperable, there are no remaining standby AC sources. Thus, with an assumed loss of offsite electrical power, insufficient standby AC sources are available to power the minimum required ESF functions. For this level of degradation, the offsite electrical power system is the only source of AC power available. The risk associated with continued operation for a very short time could be less than that associated with an immediate controlled shutdown (the immediate shutdown could cause grid instability and inadvertent generator trip, which could result in a total loss of AC power); however, the time allowed for continued operation is severely restricted. The intent here is to avoid the risk associated with an immediate controlled shutdown and to minimize the risk associated with this level of degradation.

According to Reference 6, with both EDGs inoperable, operation may continue for a period that should not exceed 2 hours. If one EDG is restored within 2 hours power operation may continue in accordance with ACTION b.

Following the 2-hour AOT, ACTION f. requires that both diesel generators be restored to Operable status within 72 hours. The requirement for restoring both diesel generators to OPERABLE status within 72 hours may be extended to 14 days to perform either extended preplanned maintenance (both preventive and corrective) or extended unplanned corrective maintenance work. Prior to exceeding the 72-hour AOT the SEPS must be available and an operational readiness status check performed in accordance with Technical Requirement (TR) 31. Refer to Bases for ACTION b. for additional information and requirements.

SURVEILLANCE REQUIREMENTS (SR)

The AC sources are designed to permit inspection and testing of important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions). The SRs for demonstrating the OPERABILITY of the EDGs are in accordance with the recommendations of Regulatory Guide 1.9 (Ref. 3), Regulatory Guide 1.108 (Ref. 9), and Regulatory Guide 1.137 (Ref. 10), as addressed in the UFSAR including exceptions thereto.

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of 3740 Vac is 90% of the nominal 4160 Vac output voltage. This value, which is specified in ANSI C84.1 (Ref. 11) allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 Vac. It also allows for voltage drops to motors and other equipment down through the 120 Vac level where minimum operating voltage is also usually specified as 90% of nameplate rating. The specified maximum steady state output voltage of 4580 Vac is equal to the nominal bus voltage plus 10%. The specified minimum and maximum frequencies of the EDG are 58.8 Hz and 61.2 Hz, respectively. These values are equal to ±2% of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.9 (Ref. 3).

SR 4.8.1.1.1a

This SR ensures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The 7-day frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

3/4.8.1 AC SOURCES (Continued)

SURVEILLANCE REQUIREMENTS (SR) (continued)

SR 4.1.1.1b

Transfer of each 4.16 kV ESF bus power supply from the normal offsite circuit to the alternate offsite circuit demonstrates the OPERABILITY of the alternate circuit distribution network to power the shutdown loads. The transfer circuit is only required to be OPERABLE when the offsite circuit to which it transfers is credited as being OPERABLE. The 18-month frequency of the Surveillance is based on engineering judgment, taking into consideration the unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18-month frequency. Therefore, the frequency was concluded to be acceptable from a reliability standpoint.

SR 4.8.1.1.1.b is modified by footnote * prohibiting performance during MODE 1 or 2. The reason for the Note is that, during operation with the reactor critical, performance of this SR could cause perturbations to the electrical distribution systems that could challenge continued steady state operation and, as a result, unit safety systems.

SR 4.8.1.1.2a through 2.g

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

SR 4.8.1.1.2 is modified by footnote ** to indicate that all planned EDG starts for the purposes of these surveillances may be preceded by an engine prelube period. This allowance is to minimize wear on moving parts since the EDG does not get lubricated when the engine is not running.

The term “standby condition” used throughout these SRs mean that the diesel engine coolant and oil are being continuously circulated and engine temperature is being maintained consistent with manufacturer recommendations at keep-warm values.

SR 4.8.1.1.2a

Activities to demonstrate EDG OPERABILITY under this SR are to be performed on a STAGGERED TEST BASIS at least once every 31 days. Performance of surveillances on a staggered test basis provides an added measure of assurance that the redundant onsite power sources are OPERABLE and any detected failure during surveillance testing is promptly evaluated to determine if the failure has a common failure mode component to it.

SR 4.8.1.1.2a.1) provides verification that the level of fuel oil in the day tank is at or above the level at which fuel oil is automatically added. The level is expressed as an equivalent volume in gallons, and is selected to ensure adequate fuel oil for a minimum of 1 hour of EDG operation at full load plus 10%. The 31-day frequency is adequate to assure that a sufficient supply of fuel oil is available, since low level alarms are provided and facility operators would be aware of any large uses of fuel oil during this period.

SR 4.8.1.1.2a.2) provides verification that there is an adequate inventory of fuel oil in the storage tanks to support each EDG's operation for 7 days. The 7-day period is sufficient time to place the unit in a safe shutdown condition and to bring in replenishment fuel from an offsite location. The 31-day frequency is adequate to ensure that a sufficient supply of fuel oil is available, since low level alarms are provided and unit operators would be aware of any large uses of fuel oil during this period.

3/4.8.1 AC SOURCES (Continued)

SURVEILLANCE REQUIREMENTS (SR) (continued)

SR 4.8.1.1.2a.3) demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from its associated storage tank to its associated day tank. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for automatic fuel transfer systems are OPERABLE. The 31-day frequency is appropriate since proper operation of fuel transfer systems is an inherent part of EDG OPERABILITY.

SR 4.8.1.1.2a.4) ensures that sufficient lube oil inventory is available to support at least 7 days of operation for each EDG. The 275 gal minimum requirement is based on the EDG manufacturer consumption values for the run time of the EDG. Implicit in this SR is the requirement to verify the capability to transfer the lube oil from its storage location to the EDG, when the EDG lube oil sump does not hold adequate inventory for 7 days of operation without the level reaching the manufacturer recommended minimum level. A 31-day frequency is adequate to ensure that a sufficient lube oil supply is onsite, since EDG starts and run time are closely monitored by the unit staff.

SR 4.8.1.1.2a.5) ensures that the EDG is capable of starting from standby conditions and attaining rated voltage and frequency. The SR is modified by footnote *** which requires the EDG to be gradually loaded per SR 4.8.1.1.2a.6) immediately following the performance of this SR. In addition, footnote *** allows a modified start procedure to be used in lieu of the 10-12 seconds "fast start" for the EDG. In order to reduce stress and wear on diesel engines, the manufacturer recommends a modified start in which the starting speed of the EDG is limited, warmup is limited to this lower speed, and the EDG is gradually accelerated to synchronous speed prior to loading. Use of the modified start method requires the diesel governor system to be capable of engine idling and gradual acceleration to synchronous speed. When the modified start is not used footnote *** requires that the time, voltage, and frequency tolerances of SR 4.8.1.1.2e) (10 second start) be met. The 31-day frequency for SR 4.8.1.1.2a.5) is consistent with Regulatory Guide 1.9 (Ref. 3), though Seabrook Station is not committed to Regulatory Guide 1.9.

SR 4.8.1.1.2a.6) verifies that the EDG is capable of synchronizing with the offsite electrical system and accepting loads greater than or equal to the equivalent of the maximum expected accident loads. A minimum run time of 60 minutes is required to stabilize engine temperatures, while minimizing the time that the EDG is connected to the offsite source.

To minimize mechanical stress and wear on the diesel engine SR 4.8.1.1.2a.6) is modified by footnote **** that allows EDG loading per the manufacturers recommendations, including a warmup period. In addition, footnote **** states that momentary transients outside the load range, due to changing bus conditions do not invalidate the test. Footnote **** also stipulates a prerequisite requirement for performance of this SR whereby this SR must be preceded by and immediately follow a successful EDG start per SR 4.8.1.1.2a.5) or SR 4.8.1.1.2e to credit satisfactory performance.

Note that although no power factor requirements are established by SR 4.8.1.1.2a.6), the EDG is normally operated at a power factor between 0.8 lagging and 1.0. The 0.8 value is the design rating of the machine, while the 1.0 is an operational limitation to ensure circulating currents are minimized. The load band is provided to avoid routine overloading of the EDG. Routine overloading may result in more frequent tear down inspections in accordance with vendor recommendations in order to maintain EDG OPERABILITY. Similarly, though not stated in footnote ****, momentary kvar transients above the limit do not invalidate the test.

The 31-day frequency for SR 4.8.1.1.2a.6) is consistent with Regulatory Guide 1.9 (Ref. 3).

3/4.8.1 AC SOURCES (Continued)

SURVEILLANCE REQUIREMENTS (SR) (continued)

SR 4.8.1.1.2a.7) ensures that following EDG testing per SR 4.8.1.1.2a.5) and SR 4.8.1.1.2a.6) that the EDG is returned to ready to standby status when offsite power is restored. It also ensures that the auto-start logic is reset to allow the EDG to reload if a subsequent loss of offsite power occurs. The EDG is considered to be in ready to load status when the EDG is at rated speed and voltage, the output breaker is open and can receive an autoclose signal on bus undervoltage, and the load sequence timers are reset.

SR 4.8.1.1.2b and SR 4.8.1.1.2c

Removal of water from the fuel oil day and storage tanks once every 31 days eliminates the necessary environment for bacterial survival. Microbiological fouling is a major cause of fuel oil degradation. There are numerous bacteria that can grow in fuel oil and cause fouling, but all must have a water environment in order to survive. Removal of water is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during EDG operation. Water may come from any of several sources, including condensation, ground water, rain water, contaminated fuel oil, and breakdown of the fuel oil by bacteria. Frequent checking for and removal of accumulated water minimizes fouling and provides data regarding the watertight integrity of the fuel oil system. The Surveillance frequencies are established by Regulatory Guide 1.137 (Ref. 10). This SR is for preventative maintenance. The presence of water does not necessarily represent failure of this SR, provided the accumulated water is removed during the performance of this Surveillance.

SR 4.8.1.1.2d

For proper operation of the standby EDGs, it is necessary to ensure the proper quality of the fuel oil. Regulatory Guide 1.137 (Ref. 10) addresses the recommended fuel oil practices as supplemented by ANSI Standards. The SR refers to the Diesel Fuel Oil Testing Program (Specification 6.7.6i) for the verification of new and stored fuel oil properties. The fuel oil properties governed by Specification 6.7.6i are water and sediment content, kinematic viscosity, specific gravity (or API gravity), and impurity level. Technical Requirements Program (TRP) 5.1 implements the requirements of Specification 6.7.6i. The 31-day frequency is acceptable because the fuel oil properties of interest, even if they were not within stated limits, would not have an immediate effect on EDG operation. This Surveillance ensures the availability of high quality fuel oil for the EDGs.

SR 4.8.1.1.2e

This surveillance requires that, at a 184-day frequency, the EDG starts from standby conditions and achieves required voltage and frequency within 10 seconds (a.k.a, "fast start"). The 10-second start requirement supports the assumptions of the design basis LOCA analysis in the UFSAR, Chapter 15 (Ref. 5).

Upper limits for voltage and frequency are not specified during the initial EDG start in order to account for potential overshoot in voltage and frequency because of governor control system characteristics when testing the EDG in an unloaded condition.

Since this SR requires a 10 second start, it is more restrictive than SR 4.8.1.1.2a.5), and it may be performed in lieu of SR 4.8.1.1.2a.5). Associated footnote # allows crediting of this SR for SR 4.8.1.1.2a.5). Additionally, footnote # stipulates that gradual loading per SR 4.8.1.1.2a.6) must immediately follow this surveillance.

In addition to the SR requirements, the time for the EDG to reach steady state operation, unless the modified EDG start method is employed, is periodically monitored and the trend evaluated to identify degradation of governor and voltage regulator performance.

3/4.8.1 AC SOURCES (Continued)

SURVEILLANCE REQUIREMENTS (SR) (continued)

This SR in combination with SR 4.8.1.1.2a.5) help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

The 184-day frequency is consistent with Generic Letter 84-15 (Ref. 7) and provides adequate assurance of EDG OPERABILITY, while minimizing degradation resulting from testing.

SR 4.8.1.1.2f

Surveillances carried out under SR 4.8.1.1.2f are activities normally conducted during shutdown at a refueling frequency of every 18 months. The SR is modified by footnote ## which provides a dispensation from the 'during shutdown' requirement provided an evaluation supports the safe conduct of a particular surveillance in a condition or mode that is consistent with safe operation of the plant. This disposition is consistent with Generic Letter 91-04 (Ref. 13).

Note: SR 4.8.1.1.2f.1), SR 4.8.1.1.2f.2), and SR 4.8.1.1.2.2f.13) are Not Used.

SR 4.8.1.1.2f.2) demonstrates the EDG load response characteristics and capability to reject the largest single load without exceeding predetermined voltage and frequency limits. This surveillance may be accomplished by either:

a. Tripping the EDG output breaker with the EDG carrying greater than or equal to its associated single largest post-accident load while paralleled to offsite power, or while solely supplying the bus, or

b. Tripping its associated single largest post-accident load with the EDG solely supplying the bus.

If method a. is used the EDG power factor must be in the range of 0.9 which is representative of actual design basis inductive loading.

The voltage and frequency specified are consistent with the design range of the equipment powered by the EDG and are the steady state voltage and frequency values to which the system must recover following load rejection. The 18-month frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9).

SR 4.8.1.1.2f.3) demonstrates the DG's capability to reject a full load without overspeed tripping or exceeding the predetermined voltage limits. The DG full load rejection may occur because of a system fault or inadvertent breaker tripping. This Surveillance ensures proper engine generator load response under the simulated test conditions. This test simulates the loss of the total connected load that the DG experiences following a full load rejection and verifies that the DG does not trip upon loss of the load. These acceptance criteria provide for DG damage protection. While the DG is not expected to experience this transient during an event and continues to be available, this response ensures that the DG is not degraded for future application, including reconnection to the bus if the trip initiator can be corrected or isolated.

As required by IEEE-387 (Ref. 12), the load rejection test is acceptable if the increase in diesel speed does not exceed 75% of the difference between synchronous speed and the overspeed trip setpoint, or 15% above synchronous speed, whichever is lower.

The 18 month frequency is consistent with the recommendation of Regulatory Guide 1.108 (Ref. 9) and is intended to be consistent with expected fuel cycle lengths.

3/4.8.1 AC SOURCES (Continued)

SURVEILLANCE REQUIREMENTS (SR) (continued)

SR 4.8.1.1.2f.4) demonstrates the as designed operation of the standby power sources during loss of the offsite source, as required by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1). This test verifies all actions encountered from the loss of offsite power, including shedding of the nonessential loads and energization of the emergency buses and respective loads from the EDG. It further demonstrates the capability of the EDG to automatically achieve the required voltage and frequency within the specified time.

The EDG auto-start time of 12 seconds is derived from requirements of the accident analysis to respond to a loss of offsite power event. The Surveillance must be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

The requirement to verify the connection and power supply of permanent and auto-connected shutdown loads is intended to satisfactorily show the relationship of these loads to the EDG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. In lieu of actual demonstration of connection and loading of loads, testing and analysis that adequately show the capability of the EDG systems to perform these loading functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified. Similarly, pumps need not be operated at design basis flows since the purpose of the SR is only to verify correct loading sequence.

This SR is modified by footnote ### to allow starting of the diesel engine at or near normal operating temperature in lieu of standby conditions. The reason for the footnote is to minimize wear and tear on the EDGs during testing. Repeated fast starts with the diesel engine starting at a standby condition temperature still contribute to accelerated engine degradation. Starting of the diesel generator from standby conditions, equivalent to the keep-warm systems temperature, would continue to be performed per SR 4.8.1.1.2f.6) (the loss-of-offsite power in conjunction with a SI actuation test signal) which would meet the spirit of Generic Letter 84-15 (Ref. 7). This allowance would also benefit outage planning and scheduling to shorten the length of the outage by not needing to wait for the engine to cool down before starting the next test. In addition, this capability would continue to be verified several times during the 18-month operating cycle when performing the 184-day fast start test per SR 4.8.1.1.2e.

The 18-month frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(1), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

SR 4.8.1.1.2f.5) demonstrates that the EDG automatically starts and reaches the minimum voltage and frequency requirements within the specified time (10 seconds) from the design basis (LOCA) actuation signal (SI signal) without loss of offsite power, maintains steady-state voltage and frequency within prescribed limits, and operates on standby for at least 5 minutes. The 5-minute period provides sufficient time to demonstrate stability. Upper limits for voltage and frequency are not specified during the initial EDG start in order to account for potential overshoot in voltage and frequency because of governor control system characteristics when testing the EDG in an unloaded condition. The time, voltage and frequency for the EDG to reach steady state operation is periodically monitored and the trend evaluated to identify degradation of governor and voltage regulator performance.

The 18-month frequency takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18-month frequency. The frequency is also consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9) for other EDG surveillance requirements. Therefore, the frequency was concluded to be

3/4.8.1 AC SOURCES (Continued)

SURVEILLANCE REQUIREMENTS (SR) (continued)

acceptable from a reliability standpoint.

This SR is modified by footnote ###, as described in SR 4.8.1.1.2f.4), to minimize wear and tear on the EDGs during testing.

SR 4.8.1.1.2f.6) demonstrates the EDG operation, as discussed in the Bases for SR 4.8.1.1.2f.4), during a loss of offsite power actuation test signal in conjunction with a SI actuation signal. In the event of a DBA coincident with a loss of offsite power, the EDGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded. The basis for the EDG auto-start is as discussed in the Bases for SR 4.8.1.1.2f.5). The basis for the EDG loading is as discussed in the Bases for SR 4.8.1.1.2f.4).

The surveillance must be continued for a minimum of 5 minutes in order to demonstrate that all starting transients have decayed and stability is achieved.

The SR is performed with the EDG initially at standby condition, i.e., equivalent to the keep-warm systems temperature. This requirement is consistent with Generic Letter 84-15 (Ref. 7) which notes that the design basis for the plant, i.e., large LOCA coincident with loss of offsite power requires the EDG to be capable of starting from ambient conditions (keep-warm system temperature).

The SR also demonstrates that all automatic protective trip functions (e.g., high jacket water temperature) except, engine overspeed, 4160 volt bus fault, generator differential current, and low lube oil pressure, are bypassed on a loss of voltage signal concurrent with a SI actuation test signal. The noncritical trips are bypassed during DBAs and provide an alarm on an abnormal engine condition. This alarm provides the operator with sufficient time to react appropriately. The EDG availability to mitigate the DBA is more critical than protecting the engine against minor problems that are not immediately detrimental to emergency operation of the EDG.

The 18-month frequency takes into consideration unit conditions required to perform the Surveillance, is intended to be consistent with an expected fuel cycle length of 18 months, and is consistent with the frequency of SR 4.8.1.1.2f.4). Operating experience has shown that these components usually pass the SR when performed at the 18-month frequency. The frequency is also consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9) for other EDG surveillance requirements. Therefore, the frequency was concluded to be acceptable from a reliability standpoint.

SR 4.8.1.1.2f.7) demonstrates that the EDGs can start and run continuously at full load capability for an interval of not less than 24 hours at a load equivalent to 92 - 100 percent of the continuous duty rating of the EDG. The EDG starts for this SR can be performed either from standby or hot conditions. The load band is provided to avoid routine overloading of the EDG. Routine overloading may result in more frequent tear down inspections in accordance with vendor recommendations in order to maintain EDG OPERABILITY.

Should auto-connected loads be added in the future such that the load on the bus reach or exceed the EDG continuous load rating, the EDG must run for a minimum of 2 hours at a load equivalent to 105 – 110 percent the continuous duty rating of the EDG. The remaining hours of the 24-hour run are to be at 92 – 100 percent full load. In addition, the SR requires verification that the auto-connected loads do not exceed the short term rating of the EDG.

Note that although no power factor requirements are established by SR 4.8.1.1.2f.7), the EDG is normally operated at a power factor between 0.8 lagging and 1.0. The 0.8 value is the design rating of the machine, while the 1.0 is an operational limitation to ensure circulating currents are minimized. The load band is provided to avoid routine overloading of the EDG. Routine

3/4.8.1 AC SOURCES (Continued)

SURVEILLANCE REQUIREMENTS (SR) (continued)

overloading may result in more frequent tear down inspections in accordance with vendor recommendations in order to maintain EDG OPERABILITY.

To minimize mechanical stress and wear on the diesel engine SR 4.8.1.1.2f.7) is modified by footnote [####] that allows EDG loading per the manufacturers recommendations, including a warmup period. In addition, the footnote states that momentary transients outside the load range, due to changing bus conditions do not invalidate the test. Similarly, though not stated in footnote [####], momentary kvar transients above the limit do not invalidate the test.

The 18-month frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref 9), paragraph 2.a.(3), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

SR 4.8.1.1.2f.8) demonstrates that the diesel engine can restart within 5 minutes from a hot condition, such as subsequent to shutdown from normal surveillances, and achieve the minimum required voltage and frequency within 10 seconds and steady-state conditions thereafter. The time, voltage and frequency for the EDG to reach steady state operation is periodically monitored and the trend evaluated to identify degradation of governor and voltage regulator performance.

The requirement that the diesel has operated for at least 2 hours at sufficiently loaded conditions prior to performance of this Surveillance is based on manufacturer recommendations for achieving hot conditions. The load band is provided to avoid routine overloading of the EDG.

The SR is modified by footnote + noting that momentary transients outside the load range, due to changing bus loads, do not invalidate the test.

The 18-month frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(5).

SR 4.8.1.1.2f.9) ensures, as recommended by Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), that the manual synchronization and load transfer (emergency loads) from the EDG to the offsite source can be made and the EDG can be returned to standby status when offsite power is restored. It also ensures that the auto-start logic is reset to allow the EDG to reload if a subsequent loss of offsite power occurs. The EDG is considered to be in standby status when the EDG is aligned for auto-start, the EDG circuit breaker is available for automatic closure, and the emergency power sequencer timer(s) are reset and available for automatic operation.

The three sub-steps do not need to be performed sequentially. It is acceptable to delay performance of sub-step c) to support optimum scheduling of maintenance and surveillance activities so long as the requisite test criteria are met when it is performed.

The 18-month frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(6), and takes into consideration unit conditions required to perform the Surveillance.

SR 4.8.1.1.2f.10) is a demonstration of the test mode override which ensures that EDG availability under accident conditions will not be compromised as a result of testing the EDG while connected to its bus. The EDG is verified to return to standby operation and the emergency loads are automatically energized with offsite power if a SI actuation signal is received during operation in the test mode. Ready to load operation is defined as the EDG running at rated speed and voltage with the EDG output breaker open.

The requirement to automatically energize the emergency loads with offsite power is intended

3/4.8.1 AC SOURCES (Continued)

SURVEILLANCE REQUIREMENTS (SR) (continued)

to show that the emergency loading was not affected by the EDG operation in test mode. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, ECCS injection valves are not desired to be stroked open, or high pressure injection systems are not capable of being operated at full flow, or RHR systems performing a decay heat removal function are not desired to be realigned to the ECCS mode of operation. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows the capability of the emergency loads to perform these functions is acceptable. This testing may include any series of sequential, overlapping, or total steps so that the entire connection and loading sequence is verified.

The 18-month frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(8), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

SR 4.8.1.1.2f.11) demonstrates that each required fuel oil transfer pump operates and transfers fuel oil from each storage tank to each EDG day tank via the installed cross-connection lines. This is required to support continuous operation of standby power sources. This Surveillance provides assurance that the fuel oil transfer pump is OPERABLE, the fuel oil piping system is intact, the fuel delivery piping is not obstructed, and the controls and control systems for fuel transfer systems are OPERABLE.

The 18-month frequency for this SR is appropriate to verify this capability since both EDG and associated fuel oil trains are independent and are normally not cross-connected. The cross-connect provision is an installed feature for an enhanced defense-in-depth capability should, in the unlikely event, it become necessary to cross-connect the fuel oil trains.

SR 4.8.1.1.2f.12) ensures that under loss of offsite power conditions, with or without an accident, loads are sequentially connected to the bus by the emergency power sequencer timer. The sequencing logic controls the permissive and starting signals to motor and other load breakers to prevent overloading of the EDGs due to high inrush starting currents. The 10% load sequence time interval tolerance ensures that sufficient time exists for the EDG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated. Reference 2 provides a summary of the automatic loading of ESF buses.

The 18-month frequency is consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9), paragraph 2.a.(2), takes into consideration unit conditions required to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

SR 4.8.1.1.2f.14) demonstrates that when a Tower Actuation (TA) signal is generated, while the EDG is loaded with its permanently connected loads and auto-connected emergency accident loads, the associated operating service water pump automatically trips and the corresponding cooling tower pump starts and after energization that voltage and frequency of the emergency bus remains within steady-state limits.

The 18-month frequency takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18-month frequency. The frequency is also consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9) for other EDG surveillance requirements. Therefore, the frequency was concluded to be acceptable from a reliability standpoint.

3/4.8.1 AC SOURCES (Continued)

SURVEILLANCE REQUIREMENTS (SR) (continued)

SR 4.8.1.1.2f.15) demonstrates that while EDG 1A is loaded with its permanently connected loads and auto-connected emergency loads, that emergency bus E5 voltage and frequency remain within steady-state limits after manual energization of the 1500 hp startup feedwater pump (the largest manually-connected load).

The 18-month frequency takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths. Operating experience has shown that these components usually pass the SR when performed at the 18-month frequency. The frequency is also consistent with the recommendations of Regulatory Guide 1.108 (Ref. 9) for other EDG surveillance requirements. Therefore, the frequency was concluded to be acceptable from a reliability standpoint.

SR 4.8.1.1.2g

This surveillance demonstrates that the EDG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper voltage and frequency within 10 seconds then steady-state condition when the EDGs are started simultaneously. The time, voltage and frequency for the EDG to reach steady state operation is monitored and the trend evaluated to identify degradation of governor and voltage regulator performance.

The SR also requires that the EDGs must be started from standby conditions, that is, with the engine coolant and oil continuously circulated and temperature maintained consistent with manufacturer recommendations at keep-warm values.

The 10-year frequency is consistent with the recommendations of RG 1.108 (Ref. 9).

REFERENCES

1. 10 CFR 50, Appendix A, GDC 17.
2. UFSAR, Chapter 8.
3. Regulatory Guide 1.9, Rev. 3. *
4. UFSAR, Chapter 6.
5. UFSAR, Chapter 15.
6. Regulatory Guide 1.93, Rev. 0, December 1974.
7. Generic Letter 84-15, "Proposed Staff ACTIONs to Improve and Maintain Diesel Generator Reliability," July 2, 1984.
8. 10 CFR 50, Appendix A, GDC 18.
9. Regulatory Guide 1.108, Rev. 1, August 1977.*
10. Regulatory Guide 1.137, Rev. 1, October 1979.*
11. ANSI Std. C84.1
12. IEEE Std. 387-1984**
13. Generic Letter 91-04, April 1991.
14. Regulatory Guide 1.182, May 2000.

* Seabrook Station is only committed to demonstrating the OPERABILITY of the diesel generators in accordance with the recommendations of Regulatory Guides 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," Revision 2, December 1979; 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977, Errata September 1977; and 1.137, "Fuel-Oil Systems for Standby Generators." Revision 1, October 1979. Exceptions to these Regulatory Guides are noted in the UFSAR.

** Seabrook Station is only committed to IEEE Std. 387-1972 and 1977.

3/4.8.2 AND 3/4.8.3 DC SOURCES and ONSITE POWER DISTRIBUTION

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

The Surveillance Requirement for demonstrating the OPERABILITY of the station batteries are based on the recommendations of Regulatory Guide 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std. 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage on float charge, connection resistance values, and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates, and compares the battery capacity at that time with the rated capacity.

Table 4.8-2 specifies the normal limits for each designated pilot cell and each connected cell for electrolyte level, float voltage, and specific gravity. The limits for the designated pilot cells float voltage and specific gravity, greater than 2.13 volts and 0.015 below the manufacturer's full charge specific gravity or a battery charger current that had stabilized at a low value, is characteristic of a charged cell with adequate capacity. The normal limits for each connected cell for float voltage and specific gravity, greater than 2.13 volts and not more than 0.020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than 0.010 below the manufacturer's full charge specific gravity, ensures the OPERABILITY and capability of the battery.

Operation with a battery cell's parameter outside the normal limit but within the allowable value specified in Table 4.8-2 is permitted for up to 7 days. During this 7-day period: (1) the allowable values for electrolyte level ensures no physical damage to the plates with an adequate electron transfer capability; (2) the allowable value for the average specific gravity of all the cells, not more than 0.020 below the manufacturer's recommended full charge specific gravity, ensures that the decrease in rating will be less than the safety margin provided in sizing; (3) the allowable value for an individual cell's specific gravity, ensures that an individual cell's specific gravity will not be more than 0.040 below the manufacturer's full charge specific gravity and that the overall capability of the battery will be maintained within an acceptable limit; and (4) the allowable value for an individual cell's float voltage, greater than 2.07 volts, ensures the battery's capability to perform its design function.

3/4.8.4 ELECTRICAL EQUIPMENT PROTECTIVE DEVICES

Containment electrical penetrations and penetration conductors are protected by either deenergizing circuits not required during reactor operation or by demonstrating the OPERABILITY of primary and backup overcurrent protection circuit breakers during periodic surveillance.

The Surveillance Requirements applicable to lower voltage circuit breakers provide assurance of breaker reliability by testing at least one representative sample of each manufacturer's brand of circuit breaker. Each manufacturer's air circuit breakers, molded case circuit breakers, and overload devices are grouped into representative samples which are then tested on a rotating basis to ensure that all breakers are tested. If a wide variety exists within any manufacturer's brand of circuit breakers, it is necessary to divide that manufacturer's breakers into groups and treat each group as a separate type of breaker for surveillance purposes.

3/4.8.4 ELECTRICAL EQUIPMENT PROTECTIVE DEVICES (Continued)

The OPERABILITY of the motor-operated valves thermal overload protection ensures that the thermal overload protection will not prevent safety-related valves from performing their function. The Surveillance Requirements for demonstrating the OPERABILITY of the thermal overload protection are in accordance with Regulatory Guide 1.106, "Thermal Overload Protection for Electric Motors on Motor Operated Valves," Revision 1, March 1977.

SECTION IV

DETERMINATION OF SIGNIFICANT HAZARDS FOR PROPOSED CHANGE

IV. DETERMINATION OF SIGNIFICANT HAZARDS FOR PROPOSED CHANGES

License Amendment Request (LAR) 03-01 proposes changes to the Seabrook Station Technical Specifications 3/4.8.1.1 A.C. Sources – Operating. The proposed changes are enhancements to the Seabrook Station Technical Specifications (TS) to provide FPLE Seabrook additional operational flexibility with respect to the allowed outage times for restoration of Operability of the Emergency Diesel Generators (EDG) and operability verification of redundant features.

FPLE Seabrook is currently in the process of permanently installing a non safety-related supplemental emergency power system (SEPS). The SEPS is designed to serve as a reliable backup standby AC power supply to either emergency bus whenever one of the emergency diesel generators (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 loss of offsite power (LOOP) event and if both emergency diesel generators fail to start and load. Installation of the SEPS is in keeping with FPLE Seabrook and NRC philosophy to provide and ensure defense-in-depth to protect the health and safety of the public.

The results of the probabilistic risk assessment (PRA), utilizing the guidance of Regulatory Guide 1.174, performed to quantitatively assess the risk impact when one EDG is out of service with the SEPS available indicate a significant decrease in core damage frequency (CDF) by up to 30 percent. To further reduce operational risks and increase EDG reliability and availability, particularly during shutdown operations, FPLE Seabrook proposes to perform selected outage-related EDG maintenance on-line. It has been recognized that shutdown conditions pose risks. The risk of performing EDG maintenance on-line is offset by the risk averted by removing the work from outages.

Performance of on-line EDG maintenance outages would increase the availability of emergency onsite power during shutdown operations and allow for a more focused effort on EDG preventive maintenance to avert forced outages.

Outage-related EDG inspection and maintenance, particularly those recommended by the manufacturer to ensure overall EDG reliability which are more intensive and intrusive in nature, require significantly more time to complete. Performance of selected EDG outage-related inspection and maintenance activities on-line would necessitate an extension of the currently licensed Technical Specification (TS) Allowed Outage Time (AOT) specified in TS 3/4.8.1.1. FPLE Seabrook proposes to amend the AOT for TS 3/4.8.1.1 ACTIONs b., c. and f. from 72 hours to a period of 14 days.

The AOT extension would permit more economic and efficient conduct of maintenance activities by providing flexibility in the performance of both corrective maintenance (CM) and preventive maintenance (PM) activities during power operation. Furthermore, adoption of the proposed AOT extension reduces the risk of unscheduled plant shutdowns. It is expected that performance of selected maintenance on-line will produce enhancements to the maintenance process such as:

- Allow for increased flexibility in the scheduling and performance of PMs.

- Reduce the number of individual entries into limiting conditions for operation (LCO) action statements by providing sufficient time to perform related maintenance tasks within a single entry.

- Allow better control of resource allocation, particularly during refueling outages. During outage maintenance windows, plant personnel and resources are spread across a large number and a wide variety of maintenance activities. Allowing on-line maintenance gives the plant the flexibility to focus more quality resources on any required or elected EDG maintenance.

- Avert unplanned plant shutdown and minimize the potential for notice of enforcement discretion requests. Risks incurred by unexpected plant shutdowns can be comparable to and often exceed those associated with continued power operation.

- Improve EDG availability during shutdown modes.

In addition, a change is proposed to revise ACTION d. to allow extension of the current 2-hour time requirement to 4 hours for verification of redundant component Operability. The increase in time from 2 hours to 4 hours is based on the completion time presented in the improved Standard Technical Specifications (ITS) for Westinghouse Plants, NUREG-1431, Revision 2.

FPLE Seabrook has evaluated the proposed License Amendment Request using both deterministic and probabilistic methodologies. These evaluations have determined that with the permanent installation of a supplemental emergency power source to serve as a backup standby power supply to the emergency busses in conjunction with administrative controls there are adequate compensatory measures to ensure plant safety is not adversely affected during extended EDG maintenance while on-line.

In accordance with 10 CFR 50.92, FPLE Seabrook has concluded that the proposed changes do not involve a significant hazards consideration (SHC). The basis for the conclusion that the proposed changes do not involve a SHC is as follows:

1. *The proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.*

   The proposed changes do not involve a change in the operational limits or physical design of the electrical power systems, particularly the emergency power systems. The proposed changes do not change the function or operation of plant equipment or affect the response of that equipment if called upon to operate. The proposed AOT extensions to allow for additional operational flexibility will not cause a significant increase in the probability or consequences of an accident previously evaluated. In actuality, the installation of the SEPS will have an overall net reduction in core damage frequency. The AOT extensions will lessen the burden of time pressure to quickly determine the cause of failure and

perform corrective actions without needing to place the plant in a transient to shutdown because of a short allotted AOT.

A Probabilistic Risk Assessment (PRA) has been performed to quantitatively assess the risk impact of an increase in the Allowed Outage Time. The proposed change results in a significant decrease in core damage frequency (CDF). Large Early Release Frequency (LERF) is dominated by containment bypass and containment isolation failures and remains relatively unchanged by the addition the SEPS combined with a 14-day AOT.

Based on the above, the proposed changes will not significantly increase the probability or consequences of an accident previously evaluated.

2. *The proposed changes do not create the possibility of a new or different kind of accident from any previously evaluated.*

The proposed changes do not involve a change in the operational limits or physical design of the electrical power systems, particularly the emergency power systems. The proposed changes do not change the function or operation of plant equipment or introduce any new failure mechanisms. The SEPS and interfacing components with the safety-related busses have been designed to ensure independence and separation, particularly during faulted conditions. As such, no new failure modes are being introduced. The plant equipment will continue to respond per the design and analyses and there will not be a malfunction of a new or different type introduced by the proposed changes.

The proposed amendment extends the Allowed Outage Times for restoring an inoperable EDG to OPERABLE status and extends the period for operability verification of redundant features to allow for minor repair prior to placing the plant in a shutdown transient. The proposed amendment will not result in changes to the type of corrective or preventive maintenance activities associated with the EDGs. Plant operating procedures and the procedures used to respond to abnormal or emergency conditions will be enhanced with the option to use the SEPS when deemed necessary. Assumptions made in the safety analysis related to EDG availability will also remain unchanged. Performance of certain maintenance activities at power requires an evaluation to assure plant safety is maintained or enhanced, which would include evaluation for new or different plant conditions. Therefore, the proposed change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

3. *The proposed changes do not involve a significant reduction in the margin of safety.*

The proposed changes do not involve a change in the operational limits. The proposed changes do not change the function or operation of plant equipment or affect the response of that equipment if it is called upon to operate. The performance capability of the emergency diesel generators will not be affected. Installation of the SEPS will have an

overall net reduction in core damage frequency. Emergency diesel generator reliability and availability will be improved by implementation of the proposed changes. In addition, administrative controls will ensure there are adequate compensatory measures that can be and will be taken during extended EDG maintenance activities to reduce overall risk. The results of the PRA performed to quantitatively assess the risk impact of an increase in the Allowed Outage Time indicate the proposed change results in a significant decrease in core damage frequency (CDF) by up to 30 percent. Therefore, the proposed changes do not involve a significant reduction in the margin of safety.

Based on the above evaluation, FPLE Seabrook concludes that the proposed changes do not constitute a significant hazard.

SECTION V and VI

PROPOSED SCHEDULE FOR LICENSE AMENDMENT ISSUANCE
AND EFFECTIVENESS, AND
ENVIRONMENTAL IMPACT ASSESSMENT

V. PROPOSED SCHEDULE FOR LICENSE AMENDMENT ISSUANCE AND EFFECTIVENESS

FPLE Seabrook requests NRC review of License Amendment Request 03-01, and issuance of a license amendment by August 27, 2004, having immediate effectiveness and implementation within 90 days.

VI. ENVIRONMENTAL IMPACT ASSESSMENT

FPLE Seabrook has reviewed the proposed license amendment against the criteria of 10 CFR 51.22 for environmental considerations. The proposed changes do not involve a significant hazards consideration, nor increase the types and amounts of effluent that may be released offsite, nor significantly increase individual or cumulative occupational radiation exposures.

The SEPS system is classified as a standby system and satisfies the requirements of US Environmental Protection Agency (EPA) / State of New Hampshire Title V Permit. In addition, FPLE Seabrook evaluated the impact of pollutant emissions on control room habitability from operating diesel generators in the vicinity of the control room west air intake (closest air intake to the cooling tower). Results of the study were used to locate equipment in areas that will ensure pollutant levels in the control room are maintained within the U.S. Department of Labor Occupational Safety & Health Administration (OSHA) Permissible Exposure Limits (PELs).

Based on the foregoing, FPLE Seabrook concludes that the proposed changes meet the criteria delineated in 10 CFR 51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement.

ATTACHMENT 1

DRAFT TECHNICAL REQUIREMENT

Technical Requirement 31
Supplemental Emergency Power System
Availability Requirements

(Sheet 1 of 2)

LIMITING CONDITION FOR OPERATION

TR 31-3.1 The Supplemental Emergency Power System (SEPS) shall be available for standby service.

APPLICABILITY: At All Times

ACTION:

a. With the requirements of the LCO not satisfied, initiate corrective action to restore the SEPS to available status in a timely fashion.

b. Whenever an emergency diesel generator (EDG) is inoperable and SEPS is available perform the following additional actions:

   1) Prior to performance of any preplanned emergency diesel generator maintenance activity that is expected to extend beyond 72 hours, perform an operational readiness status check of the SEPS per ACTION b.3) within 72 hours prior to removing the selected EDG from service.

   2) During an unplanned corrective maintenance outage with an EDG inoperable and the SEPS available, perform an operational readiness status check of the SEPS per ACTION b.3) prior to exceeding 72 hours from the time the EDG initially became inoperable.

   3) The operational readiness status check shall consist of the following:

      a) Verifying the SEPS is operationally ready for automatic start and energization of the selected emergency bus;

      b) Verifying the fuel oil level in each fuel oil storage tank is greater than or equal to (TBD) percent/gallons;

      c) Verifying SEPS 5 kV and 480 V circuit breaker / transfer switch / plug alignment to the selected emergency bus; and

      d) Repeating ACTION b.3) at least once every 72 hours thereafter while an EDG is inoperable.

SURVEILLANCE REQUIREMENTS

TR 31-4.1 The SEPS shall be demonstrated available:

a. At least once every 31 days by:

   1) Verifying each diesel starts from manual initiation and attains a steady-state generator voltage and frequency of 4160 ± 420 volts and 60 ± 1.2 Hz;

   2) Verifying load-sharing capability of each generator while synchronized together;

   3) Verifying SEPS 5 kV and 480 V circuit breaker / transfer switch / plug alignment to the selected emergency bus; and

SURVEILLANCE REQUIREMENTS

TR 31-4.1 (continued)

4) Verifying the fuel oil level in each fuel oil storage tank is greater than or equal to (TBD) percent/gallon.

b. At least once every 92 days by checking for and removing accumulated water from the fuel oil storage tanks.

c. At least once every 12 months verify both diesel generator sets automatically start together on a simulated loss of emergency bus power signal, auto-synchronize together, energize the SEPS non-safety related common bus and attains a steady-state voltage and frequency of 4160 $\pm$ 420 volts and 60 $\pm$ 1.2 Hz.

d. Every 12 months each diesel generator set shall be subjected to an inspection in accordance with procedures prepared in conjunction with** its manufacturer's recommendations for this class of standby service.

** The words "prepared in conjunction with" do not mean that compulsory acceptance of all vendor recommendations is necessary.

ATTACHMENT 2

TABLES 1 AND 2

TABLE 1

SEABROOK STATION SHUTDOWN/TRIP DATA (1991 TO 2002)

	Start of Outage	Type of Outage	Type of Shutdown	REASON
1	2/12/91 08:22	HSD1	Auto Trip,100%	Lost Busses 14 & 21
2	3/30/91 11:48	HSD2	Manual Trip100%	Unit Sub 52 transformer Failure
3	6/2/91 06:47	HSD3	Auto Trip,100%	Overspeed Test
4	6/27/91 13:34	HSD4	Auto Trip,100%	Breakers 11 & 163
5	7/4/91 08:25	HSD5	Auto Trip,100%	"C" Reactor Coolant Pump
6	7/25/91 15:34	RF01	Shutdown	Planned Refueling Outage (early due to Cryofit Leak)
7	9/7/92 00:01	RF02	Auto Trip,12%	Low SG Level loss of FW - Planned Refueling Outage
8	11/14/92 09:43	HSD6	Power Reduction TG Offline	Planned T/G Overspeed test
9	11/27/92 15:19	HSD6	Auto Trip,100%	Over-Power Delta T Trip - SSPS Ch #1in test + Ch #4 noise
10	12/13/92 06:46	HSD8	Manual Trip,100%	Lost "C&B" CW pumps due to seaweed
11	1/3/93 03:50	HSD9	Manual Trip,100%	Inadvertent isolation of 21/22 FW heaters – loss of both Main FW pumps
12	1/14/93 20:19	HSD10	Auto Trip,100%	Main generator breaker trip – Iso-Phase bus duct damper blade
13	5/20/93 04:37	HSD11	Manual Trip,100%	"D" MSIV continued to close
14	7/27/93 08:14	HSD12	Auto Trip,100%	SSPS electrical fault
15	9/22/93 05:21	CSD1	Auto Trip,100%	ALTEREX brush failure
16	1/25/94 09:34	CSD2	Auto Trip,100%	MSIV continued to close
17	4/9/94 00:01	RF03	Shutdown	Planned Refueling Outage
18	6/18/95 18:26	HSD13	Manual Trip,100%	Lost busses 21&14 – transformer failure
19	11/3/95 23:59	RF04	Shutdown	Planned Refueling Outage
20	1/27/96 09:45	HSD14	Auto Trip,100%	Failed EHC circuit board
21	5/10/97 00:01	RF05	Auto Trip,8%	IR NI Hi Flux Trip - Planned Refueling Outage
22	12/5/97 16:55	CSD3	Shutdown	Leak in 3" line below RC-V-89 & CBA design change
23	6/11/98 05:18	CSD4	Shutdown	Failure of both CBA compressors
24	11/12/98 05:45	CSD5	Shutdown	Generator Step-Up Xfmr 25KV links to Iso-Phase Bus
25	12/22/98 08:27	HSD15	Auto Trip,100%	Breaker 163 pole disagreement – transfer trip
26	3/27/99 00:24	RF06	Shutdown	Planned Refueling Outage
27	5/19/99 18:23	HSD16	Power Reduction TG Offline	High Exciter vibration
28	1/8/00 05:30	HSD17	Shutdown	Replace Turbine Electrical Trip Solenoid
29	6/26/00 18:53	HSD18	Manual Trip,100%	Manual reactor trip due to SSPS Failure "A" Main FW Pump Trip
30	10/21/00 00:01	RF07	Shutdown	Planned Refueling Outage
31	3/5/01 23:24	CSD6	Auto Trip, 100%	Loss of transmission due to snow
32	3/20/01 16:23	HSD19	Shutdown	Failed Turbine speed sensor – input for EHC control circuit
33	10/15/01 13:07	HSD20	Auto Trip, 100%	Control rod drop (N-11) – Auto reactor trip on negative rate
34	5/4/02 00:01	RF08	Shutdown	Planned Refueling Outage

TABLE 2

DATA FOR OUTAGE TYPES BASED ON SEABROOK STATION DATA CYCLE 1 THROUGH CYCLE 8

Plant STATUS	# of Outages	Total Duration (days)	AVG Duration (Days)	Fraction of Year
PWR	N/A	3574.3	N/A	0.830
RF	8	529.1	66.1	0.123
HSD	20	67.9	3.4	0.016
CSD	6	132.7	22.1	0.031
Total	34	4304.0	N/A	1.000

PWR – At Power Operation

RF – Refueling Outage

HSD – Unplanned Outage, Hot Standby / Hot Shutdown

CSD – Unplanned Outage, Cold Shutdown