

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

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

- a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E Distribution System<sup>\*\*</sup> (1), and
- b. Three separate and independent standby diesel generators, each with a separate fuel tank containing a minimum volume of 60,500 gallons of fuel.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

- a. With one offsite circuit of the above-required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter. ~~Demonstrate the OPERABILITY of each standby diesel generator that has not been successfully tested within the past 24 hours by performing Surveillance Requirement 4.8.1.1.2.a.2) for each such standby diesel generator, separately, within 24 hours.~~ Restore the offsite circuit to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
- b. With a standby diesel generator inoperable, demonstrate the OPERABILITY of the above-required A.C. offsite sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter. If the standby diesel generator became inoperable due to any cause other than preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE standby diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.2) ~~and for each such standby diesel generator, separately, within 24 hours.~~ Restore the inoperable standby diesel generator to OPERABLE status within 72 hours or be in at least HOT SHUTDOWN within the next 12 hours and in COLD SHUTDOWN within the following 24 hours.
- c. With one offsite circuit <sup>of the above-required A.C. electrical power sources</sup> and one standby diesel generator ~~of the above-required A.C. electrical power sources~~ 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; and if the standby diesel generator became inoperable due to

INSERT ATTACHMENT A

8

INSERT ATTACHMENT B

~~\*This test is required to be completed regardless of when the inoperable standby diesel generator is restored to OPERABILITY.~~

~~\*\*Loss of one 13.8 kV Standby bus to 4.16 kV ESF bus line constitutes loss of one offsite source. Loss of two 13.8 kV Standby busses to 4.16 kV ESF bus lines constitutes loss of two offsite sources.~~

ATTACHMENT A.

... an inoperable support system, an independently testable component, or ...

ATTACHMENT B.

... , unless it can be demonstrated there is no common mode failure for the remaining diesel generator(s). ...

## ELECTRICAL POWER SYSTEMS

### LIMITING CONDITION FOR OPERATION

#### ACTION (Continued)

any cause other than preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE standby diesel generators by performing Surveillance Requirement 4.8.1.1.2a.2) within 8 hours<sup>\*</sup>; 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 three standby 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.

- d. With one standby 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 auxiliary 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, ~~demonstrate the OPERABILITY of three standby diesel generators by performing the requirements of Specification 4.8.1.1.2a.2) within 8 hours unless the standby diesel generators are already operating;~~ 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 or three of the above required standby 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 two standby 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 three standby diesel generators 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.

<sup>\*</sup>This test is required to be completed regardless of when the inoperable standby diesel generator is restored to OPERABILITY.

ATTACHMENT C

- c. Maintain properties of new and stored fuel oil in accordance with the Fuel Oil Monitoring Program.
- d. Deleted

## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the Onsite Class 1E Distribution System shall be:

- a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments, indicated power availability, and
- b. Demonstrated OPERABLE at least once per 18 months during shutdown by transferring the unit power supply from the normal circuit to each of the alternate circuits.

4.8.1.1.2 Each standby diesel generator shall be demonstrated OPERABLE: (2)

- a. In accordance with the frequency specified in Table 4.8-1 on a STAGGERED TEST BASIS by:

- 1) Verifying the fuel level in its associated fuel tank,
- 2) Verifying the diesel starts from ambient condition and accelerates to 600 rpm (nominal) in less than or equal to 10 seconds.\* (3)  
The generator voltage and frequency shall be 4160 + 416 volts and 60 + 1.2 Hz within 10 seconds<sup>(3)</sup> after the start signal.  
The diesel generator shall be started for this test by using one of the following signals:
  - a) Manual, or
  - b) Simulated loss-of-offsite power by itself, or
  - c) Simulated loss-of-offsite power in conjunction with a Safety Injection test signal, or
  - d) A Safety Injection test signal by itself.

- 3) Verifying the generator is synchronized, loaded to greater than ~~5000~~ <sup>(4)(6)</sup> or equal to 5500 kW in less than or equal to 10 minutes\*, and operates with a load greater than or equal to 5500 kW for at least 60 minutes, and ~~of~~ <sup>5000</sup>

- 4) Verifying the standby diesel generator is aligned to provide standby power to the associated emergency busses.

~~\*These diesel generator starts from ambient conditions shall be performed only once per 184 days in these surveillance tests and all other engine starts for the purpose of this surveillance testing shall be preceded by an engine prelube period and/or other warmup procedures such as gradual loading (>150 sec) recommended by the manufacturer so that the mechanical stress and wear on the diesel engine is minimized.~~

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

- b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from its associated fuel tank;
- INSERT ATTACHMENT C*
- ~~c. By sampling new fuel oil in accordance with ASTM-D4057 prior to addition to storage tanks and:~~
- ~~1) By verifying in accordance with the tests specified in ASTM-D975-81 prior to addition to the storage tanks that the sample has:~~
    - ~~a) An API Gravity of within 0.3 degrees at 60°F, or a specific gravity of within 0.0016 at 60/60°F, when compared to the supplier's certificate, or an absolute specific gravity at 60/60°F of greater than or equal to 0.83 but less than or equal to 0.89, or an API gravity of greater than or equal to 27 degrees but less than or equal to 39 degrees;~~
    - ~~b) A kinematic viscosity at 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes if gravity was not determined by comparison with the supplier's certification;~~
    - ~~c) A flash point equal to or greater than 125°F; and~~
    - ~~d) A clear and bright appearance with proper color when tested in accordance with ASTM-D4176-82.~~
  - ~~2) By verifying within 30 days of obtaining the sample that the other properties specified in Table 1 of ASTM-D975-81 are met when tested in accordance with ASTM-D975-81 except that the analysis for sulfur may be performed in accordance with ASTM-D1552-79, ASTM-D2622-82, or ASTM-D4294-83.~~
- ~~d. At least once every 31 days by obtaining a sample of fuel oil in accordance with ASTM-D2276-78, and verifying that total particulate contamination is less than 10 mg/liter when checked in accordance with ASTM-D2276-78, Method A;~~
- e. At least once per 18 months, during shutdown, by:
- 1) Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service;
  - 2) Verifying the generator capability to reject a load of greater (4)(5) than or equal to 785.3 kW while maintaining voltage at  $4160 \pm 416$  volts and frequency at  $60 \pm 4.5$  Hz;

## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

- 3) Verifying the generator capability to reject a load of 5500 kW without tripping. The generator voltage shall not exceed 5262 volts during and following the load rejection; (4)(5)
- 4) Simulating a loss-of-offsite power by itself, and:
  - a) Verifying deenergization of the ESF busses and load shedding from the ESF busses, and
  - b) Verifying the diesel starts on the auto-start signal within 10 seconds, energizes the auto-connected shutdown loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization, the steady-state voltage and frequency of the ESF busses shall be maintained at  $4160 \pm 416$  volts and  $60 \pm 1.2$  Hz during this test.
- 5) Verifying that on a Safety Injection test signal, without loss-of-offsite power, the diesel generator starts on the auto-start signal and operates on standby for greater than or equal to 5 minutes. The generator voltage and frequency shall be  $4160 \pm 416$  volts and  $60 \pm 1.2$  Hz within 10 seconds after the auto-start signal; the steady-state generator voltage and frequency shall be maintained within these limits during this test;
- 6) Simulating a loss-of-offsite power in conjunction with a Safety Injection test signal, and:
  - a) Verifying deenergization of the ESF busses and load shedding from the ESF busses;
  - b) Verifying the diesel starts on the auto-start signal within 10 seconds, energizes the auto-connected ESF (accident) loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the ESF loads. After energization, the steady-state voltage and frequency of the ESF busses shall be maintained at  $4160 \pm 416$  volts and  $60 \pm 1.2$  Hz during this test; and
  - c) Verifying that all automatic diesel generator trips, except engine overspeed, generator differential, and low lube oil pressure are automatically bypassed upon loss of voltage on the ESF bus concurrent with a Safety Injection Actuation signal.
- 7) Verifying the standby diesel generator operates for at least 24 hours. During the first 2 hours of this test, the diesel (4)(5)

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

generator shall be loaded to ~~greater than or equal to 5935 kW~~ <sup>5700 to 6050 kW (6)</sup> and during the remaining 22 hours of this test, the diesel generator shall be loaded to ~~greater than or equal to 5500 kW. (6)~~ <sup>5900</sup>  
~~The generator voltage and frequency shall be 4160 ± 416 volts and 60 ± 1.2 Hz within 10 seconds after the start signal; the steady-state generator voltage and frequency shall be maintained within these limits during this test. Within 5 minutes after completing this 24-hour test, perform~~ <sup>a fast start per</sup> Specification 4.8.1.1.2e.6)b); <sup>4.8.1.1.2a.2 (7)</sup>

4160 ± 416  
Volts and  
60 ± 1.2 Hz

- 8) Verifying that the auto-connected loads to each standby diesel generator do not exceed the 2000-hour rating of 5935 kW;
- 9) Verifying the standby diesel generator's capability to:
  - a) Synchronize with the offsite power source while the generator is loaded with its ESF loads upon a simulated restoration of offsite power,
  - b) Transfer its loads to the offsite power source, and
  - c) Be restored to its standby status.
- 10) Verifying that with the standby diesel generator operating in a test mode, connected to its bus, a simulated Safety Injection signal overrides the test mode by: (1) returning the diesel generator to standby operation, and (2) automatically energizing the ESF loads with offsite power; (5)
- 11) Verifying that the automatic load sequence timer is OPERABLE with the first sequenced load verified to be loaded between 1.0 second and 1.6 seconds, and all other load blocks within ± 10% of its design interval;
- 12) Verifying that the standby diesel generator emergency stop lock-out feature prevents diesel generator starting; and

~~\*If future load conditions exceed the 2000-hour rating (5935 kW) of the diesel generator, the diesel generator will be tested at the 2-hour rating (6050 kW) thereafter.~~

~~\*\*If Specification 4.8.1.1.2e.6)b) is not satisfactorily completed, it is not necessary to repeat the preceding 24-hour test. Instead, the standby diesel generator may be operated at 5500 kW for 1 hour or until operating temperature has stabilized.~~



ATTACHMENT D

SPECIFICATION NOTATIONS

- (1) Loss of one 13.8 kV Standby Bus to 4.16 kV ESF bus line constitutes loss of one offsite source. Loss of two 13.8 kV Standby busses to 4.16 kV ESF bus lines constitutes loss of two offsite sources.
- (2) All diesel generator starts for the purpose of these surveillances may be preceded by a prelube period.
- (3) A diesel generator start in less than or equal to 10 seconds (fast start) shall be performed every 184 days. All other diesel generator starts for the purpose of this surveillance may be modified starts involving reduced fuel (load limit) and/or idling and gradual acceleration to synchronous speed.
- (4) Generator loading may be accomplished in accordance with vendor recommendations, including a warmup period prior to loading.
- (5) The diesel generator start for this surveillance may be a modified start (see SR 4.8.1.1.2a.2)
- (6) Momentary transients outside this load range due to changing conditions on the grid shall not invalidate the test.
- (7) If Specification 4.8.1.1.2a.2) is not satisfactorily completed, it is not necessary to repeat the preceding 24-hour test. Instead, the standby diesel generator may be operated at 5000-5500 kW for a minimum of 2 hours or until operating temperature has stabilized.
- (8) Criteria for determining number of failures and number of valid tests shall be in accordance with Regulatory Position C.2.e of Regulatory Guide 1.108, but determined on a per diesel generator basis.

For the purpose of determining the required test frequency, the previous test failure count may be reduced to zero if a complete diesel overhaul to like-new condition is completed, provided that the overhaul, including appropriate post-maintenance operation and testing, is specifically approved by the manufacturer and if acceptable reliability has been demonstrated. The reliability criterion shall be the successful completion of 14 consecutive tests in a single series. Ten of these tests shall be in accordance with the routine Surveillance Requirements 4.8.1.1.2a.2 and 4.8.1.1.2a.3 and four tests in accordance with the 184-day testing requirement of Surveillance Requirements 4.8.1.1.2a.2 and 4.8.1.1.2a.3. If this criterion is not satisfied during the first series of tests, any alternate criterion to be used to transvalue the failure count to zero requires NRC approval.

- (9) The associated test frequency shall be maintained until seven consecutive failure free demands have been performed and the number of failures in the last 20 valid demands has been reduced to one.

Table 4.8-1

DIESEL GENERATOR TEST SCHEDULE

| <u>NUMBER OF FAILURES IN<br/>LAST 20 VALID TESTS*(8)</u> | <u>NUMBER OF FAILURES IN<br/>LAST 100 VALID TESTS*(8)</u> | <u>TEST FREQUENCY</u> |
|--|---|-----------------------|
| $\leq 1$   | $\leq 4$  | Once per 31 days      |
| $\geq 2^{**}(9)$   | $\geq 5$  | Once per 7 days       |

INSERT ATTACHMENT D

~~\* Criteria for determining number of failures and number of valid tests shall be in accordance with Regulatory Position C.2.e of Regulatory Guide 1.108, but determined on a per diesel generator basis.~~

~~For the purpose of determining the required test frequency, the previous test failure count may be reduced to zero if a complete diesel overhaul to like-new condition is completed, provided that the overhaul, including appropriate post-maintenance operation and testing, is specifically approved by the manufacturer and if acceptable reliability has been demonstrated. The reliability criterion shall be the successful completion of 14 consecutive tests in a single series. Ten of these tests shall be in accordance with the routine Surveillance Requirements 4.8.1.1.2.a.2 and 4.8.1.1.2.a.3 and four tests in accordance with the 184-day testing requirement of Surveillance Requirements 4.8.1.1.2.a.2 and 4.8.1.1.2.a.3. If this criterion is not satisfied during the first series of tests, any alternate criterion to be used to transvalue the failure count to zero requires NRC approval.~~

~~\*\*The associated test frequency shall be maintained until seven consecutive failure free demands have been performed and the number of failures in the last 20 valid demands has been reduced to one.~~

ATTACHMENT E

i) Diesel Fuel Oil Testing Program

A diesel fuel oil testing program to implement required testing of both new fuel oil and stored fuel oil shall be established. The program shall include sampling and testing requirements, and acceptance criteria, all based on applicable ASTM Standards. The purpose of the program is to establish the following:

- a. Acceptability of new fuel oil for use prior to addition to storage tanks by determining that the fuel oil has:
  1. an API gravity or absolute specific gravity within limits,
  2. a flash point and kinematic viscosity within limits for ASTM 2D fuel oil, and
  3. a clear and bright appearance with proper color;
- b. Other properties for ASTM 2D fuel oil are within limits within 30 days following sampling and addition to storage tanks; and
- c. Total particulate concentration of fuel oil is  $\leq 10$  mg/l when tested every 31 days using a test method based on ASTM D-2276.

## ADMINISTRATIVE CONTROLS

### PROCEDURES AND PROGRAMS (Continued)

- 10) Limitations on the annual dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources conforming to 40 CFR Part 190.
- h) Radiological Environmental Monitoring Program

A program shall be provided to monitor the radiation and radionuclides in the environs of the plant. The program shall provide (1) representative measurements of radioactivity in the highest potential exposure pathways, and (2) verification of the accuracy of the effluent monitoring program and modeling of environmental exposure pathways. The program shall (1) be contained in the ODCM, (2) conform to the guidance of Appendix I to 10 CFR Part 50, and (3) include the following:

  - 1) Monitoring, sampling, analysis, and reporting of radiation and radionuclides in the environment in accordance with the methodology and parameters in the ODCM,
  - 2) A Land Use Census to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the monitoring program are made if required by the results of this census, and
  - 3) Participation in a Interlaboratory Comparison Program to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring.

### INSERT ATTACHMENT E

#### 6.9 REPORTING REQUIREMENTS

##### ROUTINE REPORTS

6.9.1 In addition to the applicable reporting requirements of Title 10, Code of Federal Regulations, the following reports shall be submitted to the Regional Administrator of the Regional Office of the NRC unless otherwise noted.

##### STARTUP REPORT

6.9.1.1 A summary report of plant startup and power escalation testing shall be submitted following: (1) receipt of an Operating License, (2) amendment to the license involving a planned increase in power level, (3) installation of fuel that has a different design or has been manufactured by a different fuel supplier, and (4) modifications that may have significantly altered the nuclear, thermal, or hydraulic performance of the unit.

The Startup Report shall address each of the tests identified in the Final Safety Analysis Report and shall include a description of the measured values of the operating conditions or characteristics obtained during the test

ATTACHMENT 4

PROPOSED TECHNICAL SPECIFICATION BASES CHANGES

## ATTACHMENT F

### BACKGROUND

The unit 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, Train B and Train C diesel generators (DGs)). As required by 10 CFR 50, Appendix A, GDC 17, 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 DG.

Offsite power is transmitted to the plant switchyard at 345 kV by multiple circuits on four separate rights-of-way. The two unit standby transformers are energized from separate buses in the switchyard via independent feeders. Each standby transformer has the capacity to supply the Class 1E loads of both units. In normal operation, the Class 1E loads of each unit can be supplied by the standby transformers and/or its auxiliary unit transformer. In the event of a loss of power from its normal source that unit's Class 1E loads are manually transferred to the unit's auxiliary transformer or to the standby transformers.

In the event of a loss of preferred power, the ESF electrical loads are automatically connected to the DGs 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).

Ratings for Train A, Train B and Train C DGs satisfy the requirements of Regulatory Guide 1.108. The continuous service rating of each DG is 5500 kW with 10% overload permissible for up to 2 hours in any 24 hour period.

Refer to UFSAR Chapter 8 for a more complete description.

### APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the FSAR, Chapter 6 and Chapter 15, 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.

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 NRC Policy Statement.

#### LCO

Two qualified circuits between the offsite transmission network and the onsite Class 1E Electrical Power System and separate and independent DGs for each train ensure availability of the required power to shut down the reactor and maintain 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 FSAR 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.

Each DG 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] seconds. Each DG 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 DG in standby with the engine hot, DG in standby with the engine at ambient conditions, and DG operating in parallel test mode.

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

### 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 3.8.2, "AC Sources-Shutdown."

#### 3.8.1.1 Action a.

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. However, if a second required circuit fails 4.8.1.1.1.a, the second offsite circuit is inoperable, and Action e, for two offsite circuits inoperable, is entered.

#### TS 3.8.1.1 Action b.

To ensure a highly reliable power source remains with one diesel generator inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. However, if a second required circuit fails 4.8.1.1.1.a, the second offsite circuit is inoperable, and Action c, for one offsite circuit and one diesel generator inoperable, is entered. Action b provides an allowance to avoid unnecessary testing of OPERABLE diesel generators. If it can be determined that the cause of the inoperable diesel generator does not exist on the OPERABLE diesel generators, is an independently testable component or an inoperable support system, surveillance requirement 4.8.1.1.2.a.2 does not have to be performed.

#### TS 3.8.1.1 Action c.

To ensure a highly reliable power source remains with one offsite circuit and one diesel generator inoperable, it is necessary to verify the OPERABILITY of the remaining required offsite circuit on a more frequent basis. However, if a second required circuit fails 4.8.1.1.1.a, the second offsite circuit is inoperable. Action c provides an allowance to avoid unnecessary testing of OPERABLE diesel generators. If it can be determined that the cause of the inoperable diesel generator does not exist on the OPERABLE diesel generators, is an independently testable component or an inoperable support system, surveillance requirement 4.8.1.1.2.a.2 does not have to be performed.



TS 3.8.1.1 Action d.

Provides assurance that a loss of offsite power, during the period that a diesel generator is inoperable, does not result in a complete loss of safety function of critical systems. In this condition the remaining OPERABLE diesel generators and offsite circuits are adequate to supply electrical power to the onsite Class 1E Distribution System. Thus, on a component basis, single failure protection for the required feature's function may be lost; however, function has not been lost. Additionally, the completion time takes into account the capacity and capability of the remaining AC sources, and the low probability of a DBA occurring during the period.

TS 3.8.1.1 Action e.

Operation may continue 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. 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.

TS 3.8.1.1 Action f.

With two or three of the standby diesel generators inoperable, there is insufficient or 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. Since the offsite electrical power system is the only source of AC power for this level of degradation, 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, which could result in a total loss of AC power). Since any inadvertent generator trip could also result in a total loss of offsite 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.

Surveillance Requirements

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 4. Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident

conditions). The Technical Specification Surveillance Requirements (SRs) for demonstrating the OPERABILITY of the standby diesel generators are in accordance with the recommendations of Regulatory Guide 1.108, Regulatory Guide 1.137, as addressed in the FSAR and NUREG 1431.

Where the SRs discussed herein specify voltage and frequency tolerances, the following is applicable. The minimum steady state output voltage of 3744 is 90% of the nominal 4160 V output voltage. This value, which is specified in ANSI C84.1, allows for voltage drop to the terminals of 4000 V motors whose minimum operating voltage is specified as 90% or 3600 V. It also allows for voltage drops to motors and other equipment down through the 120 V level where minimum operating voltage is also usually specified as 90% of name plate rating. The specified maximum steady state output voltage of 4576 V is less than the maximum operating voltage of 4756 specified for 4000 V motors. It ensures that for a lightly loaded distribution system, the voltage at the terminals of 4000 V motors is less than the maximum rated operating voltages. The specified minimum and maximum frequencies of the standby diesel generators are 58.8 Hz and 61.2 Hz, respectively. These values are equal to plus or minus 2% of the 60 Hz nominal frequency and are derived from the recommendations given in Regulatory Guide 1.108 and NUREG 1431.

SR 4.8.1.1.1.a

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.

SR 4.8.1.1.1.b

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 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 the 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 4.8.1.1.2.a.1

This SR provides verification that the level of fuel oil in the fuel tank is at or above the required level.

SR 4.8.1.1.2.a.2

This SR helps 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.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs are modified by a Note (Note 2) to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period and followed by a warmup period prior to loading.

For purposes of this testing, the DGs are started from standby conditions. Standby condition for a DG mean that the diesel engine coolant and oil are being continuously circulated and temperature is being maintained consistent with manufacturer recommendations.

In order to reduce stress and wear on diesel engines, some manufactures recommend a modified start in which the starting speed of DGs is limited, warmup is limited to this lower speed, and the DGs are gradually accelerated to synchronous speed prior to loading. These start procedures are the intent of Note 3, which is only applicable when such modified start procedures are recommended by the manufacturer.

Once per 184 days the DG starts from standby conditions and achieves required voltage and frequency within 10 seconds. The 10 second start requirement supports the assumptions of the design basis LOCA analysis in the FSAR.

The 10 second start requirement is not applicable (see Note 3) when a modified start procedure as described above is used.

The normal 31 day Frequency for SR 3.8.1.2 (see Table 4.8-1, "Diesel Generator Test Schedule, " in the accompanying LCO) is consistent with Regulatory Guide 1.108. The 184 day Frequency in Note 3 is a reduction in cold testing consistent with Generic Letter 84-15. These Frequencies provide adequate assurance of DG OPERABILITY, while minimizing degradation resulting from testing.

SR 4.8.1.1.2.a.3

This Surveillance verifies that the DGs are 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 temperature, while minimizing the time that the DG is connected to the offsite source.

The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

This SR is modified by two Notes. Note 4 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 6 states that momentary transients, because of changing bus loads, do not invalidate this test.

A successful DG start must precede this test to credit satisfactory performance.

SR 4.8.1.1.2.b

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 from the fuel oil tanks once every 31 days eliminates the necessary environment for bacterial survival. This is the most effective means of controlling microbiological fouling. In addition, it eliminates the potential for water entrainment in the fuel oil during DG 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. This SR is for preventative maintenance. The presence of water does not necessarily represent failure of the SR, provided the accumulated water is removed during the performance of this Surveillance.

SR 4.8.1.1.2.c

The requirements will be controlled and administered by the Diesel Fuel Oil Testing Program located in section 6.8.3 of Administrative Controls.

SR 4.8.1.1.2.e.1

This inspection is conducted each refueling to ensure unexpected degradation is discovered.

SR 4.8.1.1.2.e.2

Each DG is provided with an engine overspeed trip to prevent damage to the engine. Recovery from the transient caused by the loss of a large load could cause diesel engine overspeed, which, if excessive, might result in a trip of the engine. This Surveillance demonstrates the DG load response characteristics and capability to reject the largest single load (785.3 kW) without exceeding predetermined voltage and frequency. The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.108.

This SR is modified by two Notes. Note 4 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 5 allows the diesel start for this surveillance to be a modified start as stated in SR 4.8.1.1.2.a.2.

SR 4.8.1.1.2.e.3

This Surveillance demonstrates the DG 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.

The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.108 and is intended to be consistent with expected fuel cycle lengths.

This SR is modified by two Notes. Note 4 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 5 allows the diesel start for this surveillance to be a modified start as stated in SR 4.8.1.1.2.a.2.

SR 4.8.1.1.2.e.4

As required by Regulatory Guide 1.108 (Ref.9), paragraph 2.a.(1), this Surveillance demonstrates the as designed operation of the standby power sources during loss of the offsite source. 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 DG. It further demonstrates the capability of the DG to automatically achieve the required voltage and frequency within the specified time.

The DG autostart time of 10 seconds is derived from requirements of the accident analysis to respond to a design basis large break LOCA. The frequency should be restored to within 2% of nominal following a load sequence step. The Surveillance should 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 autoconnected loads is intended to satisfactorily show the relationship of these loads to the DG loading logic. In certain circumstances, many of these loads cannot actually be connected or loaded without undue hardship or potential for undesired operation. For instance, Emergency Core Cooling Systems (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 residual heat removal (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 DG systems 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 Frequency of 18 months is consistent with the recommendations of Regulatory Guide 1.108, paragraph 2.a.(1), takes into consideration unit conditions require to perform the Surveillance, and is intended to be consistent with expected fuel cycle lengths.

SR 4.8.1.1.2.e.5

This Surveillance demonstrates that the DG automatically starts and achieves the required voltage and frequency within the specified time (10 seconds) from the design basis actuation signal (LOCA signal) and operates  $\geq$  5 minutes. The 5 minute period provides sufficient time to demonstrate stability.

The Frequency of 18 months takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with the expected fuel cycle lengths.

SR 4.8.1.1.2.e.6

In the event of a DBA coincident with a loss of offsite power, the DGs are required to supply the necessary power to ESF systems so that the fuel, RCS, and containment design limits are not exceeded.

This Surveillance demonstrates the DG operation, during a loss of offsite power actuation test signal in conjunction with an ESF actuation signal. In lieu of actual demonstration of connection and loading of loads, testing that adequately shows capability of the DG system 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.

This surveillance also demonstrates that DG noncritical protective function (e.g., high jacket water temperature) are bypassed on a loss of voltage signal concurrent with an ESF actuation test signal, and critical protective functions (engine overspeed, generator differential current, and low lube oil pressure) are operable. 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 DG availability to mitigate the DBA is more critical than protection the engine against minor problems that are not immediately detrimental to emergency operation of the DG.

The Frequency of 18 months takes into consideration unit conditions required to perform the Surveillance and is intended to be consistent with an expected fuel cycle length of 18 months. 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 4.8.1.1.2.e.7

Regulatory Guide 1.108, paragraph 2.a.(3), requires demonstration once per 18 months that the DGs can start and run continuously at full load capability for an interval of not less than 24 hours,  $\geq$  2 hours of which is at a load equivalent to 110% of the continuous duty rating and the remainder of the time at a load equivalent to the continuous duty rating of the DG. The DG starts for this Surveillance can be performed either from standby or hot conditions.

This Surveillance also demonstrates that the diesel engine can restart from a hot condition, such as subsequent to shutdown from normal Surveillances, and achieve the required voltage and frequency within 10 seconds. The 10 second time is derived from the requirements of the accident analysis to respond to a design basis large break LOCA. The 18 month Frequency is consistent with the recommendation of Regulatory Guide 1.108, paragraph 2.a.(5).

recommendation of Regulatory Guide 1.108, paragraph 2.a.(5).

The load band is provided to avoid routine overloading of the DG. Routine overloading may result in more frequent teardown inspections in accordance with vendor recommendations in order to maintain DG OPERABILITY.

The 18 month Frequency is consistent with the recommendations of Regulatory Guide 1.108, 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.

This SR is modified by three Notes. Note 4 indicates that diesel engine runs for this Surveillance may include gradual loading, as recommended by the manufacturer, so that mechanical stress and wear on the diesel engine are minimized. Note 5 allows the diesel start for this surveillance to be a modified start as stated in SR 4.8.1.1.2.a.2. Note 6 states that momentary transients, because of changing bus loads, do not invalidate this test.

SR 4.8.1.1.2.e.8

This SR is used to verify that the loads for the diesel do not exceed the 2000 hour rating approved by Cooper.

SR 4.8.1.1.2.e.9

As required by Regulatory Guide 1.108, paragraph 2.a.(6), this Surveillance ensures that the manual synchronization and automatic load transfer from the DG to the offsite source can be made and the DG can be returned to ready to load status when offsite power is restored. It also ensures that the autostart logic is reset to allow the DG to reload if a subsequent loss of offsite power occurs. The DG is considered to be in ready to load status when the DG is at rated speed and voltage, the output breaker is open and can receive and autoclose signal on bus undervoltage, and the load sequence times are reset.

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

SR 4.8.1.1.2.e.10

Demonstration of the test mode override ensures that the DG availability under accident conditions will not be compromised as a result of testing and the DG will automatically reset to ready to load operation if a LOCA actuation signal is received during operation in the test mode. Ready to load operation is defined as the DG running at rated speed and voltage with the DG output breaker open. These provisions for automatic switchover are required by IEEE-308, paragraph 6.2.6(2).



The intent in the requirement is to show that the emergency loading was not affected by the DG operation in test mode. 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 recommendation of Regulatory Guide 1.108, 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 4.8.1.1.2.e.11

As required by Regulatory Guide 1.108, paragraph 2.a.(2), each DG is required to demonstrate proper operation for the DBA loading sequence to ensure that voltage and frequency are maintained within the required limits. Under accident conditions, prior to connecting the DGs to their respective buses, all loads are shed except load center feeders and those motor control centers that power Class 1E loads (referred to as "permanently connected" loads). Upon reaching 90% of rated voltage and frequency, the DGs are then connected to their respective buses.

Loads are then sequentially connected to the bus by the automatic load sequencer. This sequencing logic controls the permissive and starting signals to motor breakers to prevent overloading of the DGs due to high motor starting currents. The 10% load sequence time interval tolerance ensures that sufficient time exists for the DG to restore frequency and voltage prior to applying the next load and that safety analysis assumptions regarding ESF equipment time delays are not violated.

The Frequency of 18 months is consistent with the recommendation of Regulatory Guide 1.108, 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 4.8.1.1.2.e.12

This SR verifies that the diesel will not start when the emergency stop lockout feature is tripped. This prevents any further damage to the diesel engine or generator.

SR 4.8.1.1.2.e.13

This SR verifies the requirements of Branch Technical Position PSB-1 that the load shedding scheme automatically prevents load shedding during the sequencing of the emergency loads to the bus. It also verifies the reinstatement of the load shedding feature upon completion of the load sequencing action.

SR 4.8.1.1.2.f

This Surveillance demonstrates that the DG starting independence has not been compromised. Also, this Surveillance demonstrates that each engine can achieve proper speed within the specified time when the DGs are started simultaneously.

The 10 year Frequency is consistent with the recommendations of Regulatory Guide 1.108, paragraph 2.b, and Regulatory Guide 1.137, paragraph C.2.f.

SR 4.8.1.1.2.g

This SR provided assurance that any accumulation of sediment over time or the normal wear on the system has not degraded the diesels.

## 3/4.8 ELECTRICAL POWER SYSTEMS

### BASES

#### 3/4.8.1, 3/4.8.2, and 3/4.8.3 A.C. SOURCES, D.C. SOURCES, and ONSITE POWER DISTRIBUTION

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

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least two redundant sets of onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss-of-offsite power and single failure of the other onsite A.C. source. The A.C. and D.C. source allowable out-of-service times are based on Regulatory Guide 1.93, "Availability of Electrical Power Sources," December 1974. ~~When one standby diesel generator is inoperable, there is an additional ACTION requirement to verify that all required systems, subsystems, trains, components and devices, that depend on the remaining OPERABLE standby diesel generators as a source of emergency power, are also OPERABLE, and that the steam-driven auxiliary feedwater pump is OPERABLE. This requirement is intended to provide assurance that a loss-of-offsite power event will not result in a complete loss of safety function of critical systems during the period one of the standby diesel generators is inoperable. 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.~~

#### *INSERT ATTACHMENT F*

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

The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are 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; and ASTM D975-81, ASTM D1552-79, ASTM D2622-82, ASTM D4294-83, and ASTM D2276-78. The standby diesel generators auxiliary systems are designed to circulate warm oil and water through the diesel while the diesel is not running, to preclude cold ambient starts. For the purposes of surveillance testing, ambient conditions are considered to be the hot pre-lube condition.