

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### 3/4.8.1 A.C. SOURCES

##### OPERATING

##### LIMITING CONDITIONS FOR OPERATION

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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 each Class 1E 4 kV Bus, and
- b. Two separate and independent diesel generators, each with:
  1. A day fuel tank containing a minimum volume of 325 gallons of fuel, and
  2. A separate fuel storage system containing a minimum volume of 47,000 gallons of fuel, and
  3. A separate fuel transfer pump.

APPLICABILITY: MODES 1, 2, 3 and 4.

##### ACTION:

- a1. With an offsite circuit of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. offsite source by performing, for the affected 4 kV Bus, Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter; and Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours unless the diesel generator is already operating.\* Restore at least two offsite circuits and two diesel generators to OPERABLE status within 7 days\*\* or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- a2. With a diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining 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 for the affected 4 kV Bus,; and Surveillance Requirement

\* Note: A Diesel Generator is classified as "already operating" if the generator voltage and frequency are  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz.

\*\* The aggregate of the combined out of service times for the two diesel generators (exclusive of plant operation in Modes 5 and 6) during any calendar year shall not exceed 800 hours without notification to the NRC. A diesel generator shall be considered to be out of service (inoperable) from the time of the initial loss until it satisfies Surveillance Requirement 4.8.1.1.2.a.4.

## ELECTRICAL POWER SYSTEM

### ACTION (Continued)

4.8.1.1.2.a.4 within 24 hours for the remaining diesel generator unless the diesel generator is already operating.\* Restore at least two offsite circuits and two diesel generators to OPERABLE status within 7 days\*\* or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

- b. 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. offsite sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; and Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours unless the diesel generator is already operating.\* 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 7 days\*\* from the time of the initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- c. With one diesel generator inoperable, in addition to ACTION a or b 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 feed 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.

- d. With two of the above required offsite A.C. circuits inoperable, demonstrate the OPERABILITY of two diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4 within 8 hours unless the 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

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\* Note: A Diesel Generator is classified as "already operating" if the generator voltage and frequency are  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz.

\*\* The aggregate of the combined out of service times for the two diesel generators (exclusive of plant operation in Modes 5 and 6) during any calendar year shall not exceed 800 hours without notification to the NRC. A diesel generator shall be considered to be out of service (inoperable) from the time of the initial loss until it satisfies Surveillance Requirement 4.8.1.1.2.a.4.

## ELECTRICAL POWER SYSTEM

### ACTION (Continued)

offsite source restored, restore at least two offsite circuits to OPERABLE status within 7 days from the time of the initial loss or 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 diesel generators inoperable, demonstrate the OPERABILITY of two offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a 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 7 days\*\* from the time of the initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

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\* Note: A Diesel Generator is classified as "already operating" if the generator voltage and frequency are  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz.

\*\* The aggregate of the combined out of service times for the two diesel generators (exclusive of plant operation in Modes 5 and 6) during any calendar year shall not exceed 800 hours without notification to the NRC. A diesel generator shall be considered to be out of service (inoperable) from the time of the initial loss until it satisfies Surveillance Requirement 4.8.1.1.2.a.4.

## ELECTRICAL POWER SYSTEM

### ACTION (Continued)

#### SURVEILLANCE REQUIREMENTS

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4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and each Class 1E 4 kV Bus shall be:

- a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments and indicated power availability.

If tie breakers 3A0416 or 3A0603 are used to provide a source of power, the following buses are required.

for 3A0416  
3A04  
3B04  
3D1

for 3A0603  
3A06  
3B06  
3D2

- b. Demonstrated OPERABLE at least once per 18 months by transferring (manually and automatically) each Class 1E 4 kV Bus from its normal offsite power source to its alternate offsite power source.

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

- a. In accordance with the frequency specified in Table 4.8-1 on a STAGGERED TEST BASIS by:
  1. Verifying the fuel level in the day fuel tank,
  2. Verifying the fuel level in the fuel storage tank,
  3. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the day tank,
  4. Verifying the diesel generator starts from ambient conditions and accelerates to at least 900 rpm.\* The generator voltage and frequency shall be  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz after reaching 900 rpm. The diesel generator shall be started for this test by using one of the following signals:

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

## ELECTRICAL POWER SYSTEM

### SURVEILLANCE REQUIREMENTS (Continued)

- a) Manual
  - b) Simulated loss of offsite power by itself
  - c) Simulated loss of offsite power in conjunction with an ESF actuation test signal
5. Verifying the generator is synchronized, loaded to greater than or equal to 4700 kW in less than or equal to 77 seconds\*, and operates with a load greater than or equal to 4700 kW for at least an additional 60 minutes, and
6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.
- b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the day tank.
- c.1. At least once per 92 days and from new fuel prior to addition to the storage tanks by verifying that a sample obtained in accordance with ASTM-D4057-81 has a water and sediment content of less than or equal to .05 volume percent and a kinematic viscosity @ 40°C of greater than or equal to 1.9 but less than or equal to 4.1 when tested in accordance with ASTM-D975-81.
2. At least once every 92 days by obtaining a sample of fuel oil in accordance with ASTM-D4057-81 and verifying that particulate contamination is less than 10mg/liter when checked in accordance with ASTM D2276-83.
- d. At least once per 18 months by:
- 1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.
  - 2. Verifying the generator capability to reject a load of greater than or equal to 655.7 kW while maintaining voltage at  $4360 \pm 436$  volts and frequency at  $60 \pm 5.0$  Hz.
  - 3. Verifying the generator capability to reject a load of 4700 kW without tripping. The generator voltage shall not exceed 5450 volts during and following the load rejection.

\* All engine starts for the purpose of this surveillance testing may be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.

SURVEILLANCE REQUIREMENTS (Continued)

4. Simulating a loss of offsite power by itself, and
  - a) Verifying de-energization of the emergency busses and load shedding from the emergency busses.
  - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 10 seconds and operates for greater than or equal to 5 minutes while its generator is loaded with the permanently connected loads. After energization, the steady state voltage and frequency of the emergency busses shall be maintained at  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz during this test.
5. Verifying that on an ESF 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 steady-state generator voltage and frequency shall be  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz within 10 seconds after the auto-start signal; the generator voltage and frequency shall be maintained within these limits during this test.
6. Deleted
7. Simulating a loss of offsite power in conjunction with an ESF test signal, and
  - a) Verifying de-energization of the emergency busses and load shedding from the emergency busses.
  - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected emergency (accident) loads through the load sequence and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After loading the steady state voltage and frequency of the emergency busses shall be maintained at  $4360 \pm 436$  volts and  $60 +1.2/-0.3$  Hz during this test.
  - c) Verifying that all automatic diesel generator trips, except engine overspeed, generator differential, and low-low lube oil pressure, are automatically bypassed.

SURVEILLANCE REQUIREMENTS (Continued)

8. Verifying the diesel generator operates for at least 24 hours. During the first 2 hours of this test, the diesel generator shall be loaded to greater than or equal to 5170 kw and during the remaining 22 hours of this test, the diesel generator shall be loaded to greater than or equal to 4700 Kw. The generator voltage and frequency shall be  $4360 \pm 436$  Volts and  $60 \pm 1.2$  Hz after the start\* signal; the steady state generator voltage and frequency shall be maintained at  $4360 \pm 436$  Volts and  $60 \pm 1.2/-0.3$  Hz for the first 2 hours of this test and  $4360 \pm 436$  Volts and  $60 \pm 1.2$  Hz during the remaining 22 hours of this test. Within 5 minutes after completing this 24-hour test, perform Surveillance Requirement 4.8.1.1.2.d.4.b.
9. Verifying that the auto-connected loads to each diesel generator do not exceed 4700 kw.
10. Verifying the diesel generator's capability to:
  - a) Synchronize with the offsite power source while the generator is loaded with its emergency 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.
11. Verifying that with the diesel generator operating in a test mode, connected to its bus, a simulated safety injection signal overrides the test mode by (1) returning the diesel generator to standby operation and (2) automatically energizes the emergency loads with offsite power.
12. Verifying that each fuel transfer pump transfers fuel from each fuel storage tank to the day tank of each diesel via the installed cross connection lines.
13. Verifying that the automatic load sequence timer is OPERABLE with the interval between each load block within  $\pm 10\%$  of its design interval.
14. Verifying that lockout relay K23 prevents diesel generator starting when the diesel generator is actuated.

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\* The engine start for the purpose of this surveillance test may be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the engine is minimized.

SURVEILLANCE REQUIREMENTS (Continued)

- e. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting the diesel generators simultaneously, during shutdown, and verifying that the diesel generators accelerate to at least 900 rpm in less than or equal to 10 seconds.
- f. At least once per 10 years by:
  - 1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite solution or the equivalent, and
  - 2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND of the ASME Code at a test pressure equal to 110 percent of the system design pressure.

4.8.1.1.3 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.9.1. Reports of diesel generator failures shall include the information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977. If the number of failures in the last 100 valid tests (on a per nuclear unit basis) is greater than or equal to 7, the report shall be supplemented to include the additional information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977.

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ELECTRIC POWER SYSTEMS

Table 4.8.1

DIESEL GENERATOR TEST SCHEDULE

<u>Number of Failures in Last 20 Valid Tests*</u>	<u>Test Frequency</u>
$\leq 1$	At least once per 31 days
$\geq 2$	At least once per 7 days**

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\* 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, Revision 1, August 1977, where the number of tests and failures is determined on a per diesel generator basis.

\*\* This 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 or less.

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BASES3/4.8.1, 3/4.8.2, and 3/4.8.3 A.C. SOURCES, D.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

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

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set 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 and on Nuclear Regulatory Commission's generic letter 84-15. When one 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 diesel generator 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 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.

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 to verify OPERABILITY of the required independent circuits between the offsite transmission network and each Class 1E 4Kv bus. Two independent circuits are required in Modes 1 through 4. One source of power is supplied from Unit 2 itself and is normally provided through the Reserve Auxiliary Transformers (2XR1 and 2XR2). If the

BASESA.C. SOURCES, D.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS (Continued)

Unit 2 main generator 1so phase bus links are removed, then the Unit Auxiliary Transformer 2XU1 can be used in place of 2XR1 and/or 2XR2. The second source of power is provided through the Unit 3 Reserve Auxiliary Transformers (3XR1 and 3XR2) and/or, with the Unit 3 generator 1so phase bus links removed, the Unit 3 Unit Auxiliary Transformer (3XU1).

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," March 10, 1971, and 1.108 "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977, and 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, October 1979 and NRC generic letter 84-15. Reg. Guide 1.137 recommends testing of fuel oil samples in accordance with ASTM-D270-1975. However, ASTM-D270-1975 and ASTM D975-77 have been replaced by ASTM D4057-81 and ASTM D975-81, respectively, as the current versions of the standards in industry use. Also, the accelerated oxidation stability test (ASTM D2274-70) is replaced by a test for actual particulate contamination, ASTM D2276-83.

Additionally, Regulatory Guide 1.9 allows loading of the diesel generator to its 2000 hour rating in an accident situation. The full load, continuous operation rating for each diesel generator is 4700 kw, while the calculated accident loading in Modes 1 through 4 is 4000 kw. The largest anticipated load (including loads which are required to mitigate the consequences of a design basis accident or facilitate plant operation and maintenance) in Modes 5 and 6 is calculated to be less than 80% of the full rated capacity. No 2000 hour loading has been specified by the diesel generator manufacturer and, as a result the full loading rating of 4700 kw is conservatively established as the 2000 hour rating. Diesel frequency droop restrictions are established due to HPSI flow rate considerations.

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 onfloat 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.

ATTACHMENT D

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### 3/4.8.1 A.C. SOURCES

##### OPERATING

##### LIMITING CONDITIONS FOR OPERATION

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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 each Class 1E 4 kV Bus, and
- b. Two separate and independent diesel generators, each with:
  1. A day fuel tank containing a minimum volume of 325 gallons of fuel, and
  2. A separate fuel storage system containing a minimum volume of 47,000 gallons of fuel, and
  3. A separate fuel transfer pump.

APPLICABILITY: MODES 1, 2, 3 and 4.

##### ACTION:

- a1. With an offsite circuit of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. offsite source by performing, for the affected 4 kV Bus, Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter; and Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours unless the diesel generator is already operating.\* Restore at least two offsite circuits and two diesel generators to OPERABLE status within 7 days\*\* or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- a2. With a diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining 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 for the affected 4 kV Bus,; and Surveillance Requirement

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\* Note: A Diesel Generator is classified as "already operating" if the generator voltage and frequency are  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz.

\*\* The aggregate of the combined out of service times for the two diesel generators (exclusive of plant operation in Modes 5 and 6) during any calendar year shall not exceed 800 hours without notification to the NRC. A diesel generator shall be considered to be out of service (inoperable) from the time of the initial loss until it satisfies Surveillance Requirement 4.8.1.1.2.a.4.

## ELECTRICAL POWER SYSTEM

### ACTION (Continued)

4.8.1.1.2.a.4 within 24 hours for the remaining diesel generator unless the diesel generator is already operating.\* Restore at least two offsite circuits and two diesel generators to OPERABLE status within 7 days\*\* or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

- b. 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. offsite sources by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and once per 8 hours thereafter; and Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours unless the diesel generator is already operating.\* 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 7 days\*\* from the time of the initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- c. With one diesel generator inoperable, in addition to ACTION a or b 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 feed 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.

- d. With two of the above required offsite A.C. circuits inoperable, demonstrate the OPERABILITY of two diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4 within 8 hours unless the 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

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\* Note: A Diesel Generator is classified as "already operating" if the generator voltage and frequency are  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz.

\*\* The aggregate of the combined out of service times for the two diesel generators (exclusive of plant operation in Modes 5 and 6) during any calendar year shall not exceed 800 hours without notification to the NRC. A diesel generator shall be considered to be out of service (inoperable) from the time of the initial loss until it satisfies Surveillance Requirement 4.8.1.1.2.a.4.

## ELECTRICAL POWER SYSTEM

### ACTION (Continued)

offsite source restored; restore at least two offsite circuits to OPERABLE status within 7 days from the time of the initial loss or 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 diesel generators inoperable, demonstrate the OPERABILITY of two offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a 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 7 days\*\* from the time of the initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

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\* Note: A Diesel Generator is classified as "already operating" if the generator voltage and frequency are  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz.

\*\* The aggregate of the combined out of service times for the two diesel generators (exclusive of plant operation in Modes 5 and 6) during any calendar year shall not exceed 800 hours without notification to the NRC. A diesel generator shall be considered to be out of service (inoperable) from the time of the initial loss until it satisfies Surveillance Requirement 4.8.1.1.2.a.4.

## ELECTRICAL POWER SYSTEM

### ACTION (Continued)

#### SURVEILLANCE REQUIREMENTS

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4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and each Class 1E 4 kV Bus shall be:

- a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments and indicated power availability.

If tie breakers 2A0416 or 2A0603 are used to provide a source of power, the following buses are required.

for 2A0416  
2A04  
2B04  
2D1

for 2A0603  
2A06  
2B06  
2D2

- b. Demonstrated OPERABLE at least once per 18 months by transferring (manually and automatically) each Class 1E 4 kV Bus from its normal offsite power source to its alternate offsite power source.

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

- a. In accordance with the frequency specified in Table 4.8-1 on a STAGGERED TEST BASIS by:
  1. Verifying the fuel level in the day fuel tank,
  2. Verifying the fuel level in the fuel storage tank,
  3. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the day tank,
  4. Verifying the diesel generator starts from ambient conditions and accelerates to at least 900 rpm.\* The generator voltage and frequency shall be  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz after reaching 900 rpm. The diesel generator shall be started for this test by using one of the following signals:

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



## ELECTRICAL POWER SYSTEM

### SURVEILLANCE REQUIREMENTS (Continued)

- a) Manual
  - b) Simulated loss of offsite power by itself
  - c) Simulated loss of offsite power in conjunction with an ESF actuation test signal
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- 5. Verifying the generator is synchronized, loaded to greater than or equal to 4700 kW in less than or equal to 77 seconds\*, and operates with a load greater than or equal to 4700 kW for at least an additional 60 minutes, and
  - 6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.
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- b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the day tank.
  - c.1. At least once per 92 days and from new fuel prior to addition to the storage tanks by verifying that a sample obtained in accordance with ASTM-D4057-81 has a water and sediment content of less than or equal to .05 volume percent and a kinematic viscosity @ 40°C of greater than or equal to 1.9 but less than or equal to 4.1 when tested in accordance with ASTM-D975-81.
  - 2. At least once every 92 days by obtaining a sample of fuel oil in accordance with ASTM-D4057-81 and verifying that particulate contamination is less than 10mg/liter when checked in accordance with ASTM D2276-83.
  - d. At least once per 18 months by:
    - 1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.
    - 2. Verifying the generator capability to reject a load of greater than or equal to 655.7 kW while maintaining voltage at  $4360 \pm 436$  volts and frequency at  $60 \pm 5.0$  Hz.
    - 3. Verifying the generator capability to reject a load of 4700 kW without tripping. The generator voltage shall not exceed 5450 volts during and following the load rejection.

\* All engine starts for the purpose of this surveillance testing may be proceeded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the diesel engine is minimized.

## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

4. Simulating a loss of offsite power by itself, and
  - a) Verifying de-energization of the emergency busses and load shedding from the emergency busses.
  - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 10 seconds and operates for greater than or equal to 5 minutes while its generator is loaded with the permanently connected loads. After energization, the steady state voltage and frequency of the emergency busses shall be maintained at  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz during this test.
5. Verifying that on an ESF 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 steady-state generator voltage and frequency shall be  $4360 \pm 436$  volts and  $60 \pm 1.2$  Hz within 10 seconds after the auto-start signal; the generator voltage and frequency shall be maintained within these limits during this test.
6. Deleted
7. Simulating a loss of offsite power in conjunction with an ESF test signal, and
  - a) Verifying de-energization of the emergency busses and load shedding from the emergency busses.
  - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 10 seconds, energizes the auto-connected emergency (accident) loads through the load sequence and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After loading the steady state voltage and frequency of the emergency busses shall be maintained at  $4360 \pm 436$  volts and  $60 +1.2/-0.3$  Hz during this test.
  - c) Verifying that all automatic diesel generator trips, except engine overspeed, generator differential, and low-low lube oil pressure, are automatically bypassed.

## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

8. Verifying the diesel generator operates for at least 24 hours. During the first 2 hours of this test, the diesel generator shall be loaded to greater than or equal to 5170 kw and during the remaining 22 hours of this test, the diesel generator shall be loaded to greater than or equal to 4700 Kw. The generator voltage and frequency shall be  $4360 \pm 436$  Volts and  $60 \pm 1.2$  Hz after the start\* signal; the steady state generator voltage and frequency shall be maintained at  $4360 \pm 436$  Volts and  $60 \pm 1.2/-0.3$  Hz for the first 2 hours of this test and  $4360 \pm 436$  Volts and  $60 \pm 1.2$  Hz during the remaining 22 hours of this test. Within 5 minutes after completing this 24-hour test, perform Surveillance Requirement 4.8.1.1.2.d.4.b.
9. Verifying that the auto-connected loads to each diesel generator do not exceed 4700 kw.
10. Verifying the diesel generator's capability to:
  - a) Synchronize with the offsite power source while the generator is loaded with its emergency 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.
11. Verifying that with the diesel generator operating in a test mode, connected to its bus, a simulated safety injection signal overrides the test mode by (1) returning the diesel generator to standby operation and (2) automatically energizes the emergency loads with offsite power.
12. Verifying that each fuel transfer pump transfers fuel from each fuel storage tank to the day tank of each diesel via the installed cross connection lines.
13. Verifying that the automatic load sequence timer is OPERABLE with the interval between each load block within  $\pm 10\%$  of its design interval.
14. Verifying that lockout relay K23 prevents diesel generator starting when the diesel generator is actuated.

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\* The engine start for the purpose of this surveillance test may be preceded by an engine prelube period and/or other warmup procedures recommended by the manufacturer so that mechanical stress and wear on the engine is minimized.

SURVEILLANCE REQUIREMENTS (Continued)

- e. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting the diesel generators simultaneously, during shutdown, and verifying that the diesel generators accelerate to at least 900 rpm in less than or equal to 10 seconds.
- f. At least once per 10 years by:
  - 1. Draining each fuel oil storage tank, removing the accumulated sediment and cleaning the tank using a sodium hypochlorite solution or the equivalent, and
  - 2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND of the ASME Code at a test pressure equal to 110 percent of the system design pressure.

4.8.1.1.3 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission pursuant to Specification 6.9.1. Reports of diesel generator failures shall include the information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977. If the number of failures in the last 100 valid tests (on a per nuclear unit basis) is greater than or equal to 7, the report shall be supplemented to include the additional information recommended in Regulatory Position C.3.b of Regulatory Guide 1.108, Revision 1, August 1977.

CEW:5706F

ELECTRIC POWER SYSTEMS

Table 4.8.1

DIESEL GENERATOR TEST SCHEDULE

<u>Number of Failures in Last 20 Valid Tests*</u>	<u>Test Frequency</u>
$\leq 1$	At least once per 31 days
$\geq 2$	At least once per 7 days**

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\* 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, Revision 1, August 1977, where the number of tests and failures is determined on a per diesel generator basis.

\*\* This 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 or less.

CEW:7264F

BASES3/4.8.1, 3/4.8.2, and 3/4.8.3 A.C. SOURCES, D.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS

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

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one redundant set 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 and on Nuclear Regulatory Commission's generic letter 84-15. When one 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 diesel generator 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 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.

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 to verify OPERABILITY of the required independent circuits between the offsite transmission network and each Class 1E 4Kv bus. Two independent circuits are required in Modes 1 through 4. One source of power is supplied from Unit 3 itself and is normally provided through the Reserve Auxiliary Transformers (3XR1 and 3XR2). If the

BASESA.C. SOURCES, D.C. SOURCES AND ONSITE POWER DISTRIBUTION SYSTEMS (Continued)

Unit 3 main generator 1so phase bus links are removed, then the Unit Auxiliary Transformer 3XU1 can be used in place of 3XR1 and/or 3XR2. The second source of power is provided through the Unit 2 Reserve Auxiliary Transformers (2XR1 and 2XR2) and/or, with the Unit 2 generator 1so phase bus links removed, the Unit 2 Unit Auxiliary Transformer (2XU1).

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," March 10, 1971, and 1.108 "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977, and 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, October 1979 and NRC Generic Letter 84-15. Reg. Guide 1.137 recommends testing of fuel oil samples in accordance with ASTM-D270-1975. However, ASTM-D270-1975 and ASTM D975-77 have been replaced by ASTM 4057-81 and ASTM D975-81, respectively, as the current revision of the standards in industry use. Also, the accelerated oxidation stability test (ASTM D2274-70) is replaced by a test for actual particulate contamination, ASTM D2276-83.

Additionally, Regulatory Guide 1.9 allows loading of the diesel generator to its 2000 hour rating in an accident situation. The full load, continuous operation rating for each diesel generator is 4700 kw, while the calculated accident loading in Modes 1 through 4 is 4000 kw. The largest anticipated load (including loads which are required to mitigate the consequences of a design basis accident or facilitate plant operation and maintenance) in Modes 5 and 6 is calculated to be less than 80% of the full rated capacity. No 2000 hour loading has been specified by the diesel generator manufacturer and, as a result the full loading rating of 4700 kw is conservatively established as the 2000 hour rating. Diesel frequency droop restrictions are established due to HPSI flow rate considerations.

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 onfloat 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.

CEW:5966F

ENCLOSURE II



SAN ONOFRE COMPLETE DIESEL FUEL PROCUREMENT  
AND TESTING PROGRAM

Southern California Edison follows the program below for obtaining and ensuring that the diesel fuel oil delivered to San Onofre Units 2 and 3 will start and power the emergency diesel generators.

1. Diesel fuel oil is procured to meet Quality Class II specifications and all of the diesel fuel parameter limits provided in San Onofre Chemistry Procedure S0123-III-6.6 (attached). The limits provided in S0123-III-6.6 verify that the diesel fuel meets the requirements of the Technical Specifications, manufacturer's recommendations, Federal Specification VV-F-800C for diesel fuel oils, Reg. Guide 1.137, "Fuel Oil Systems for Standby Diesel Generators" and ASTM D975, "Standard Specification for Diesel Fuel Oils."
2. SCE procures diesel fuel oil from a manufacturer that has agreed to provide diesel fuel oil to meet SCE specifications.
3. The diesel fuel oil is tested by a third party (SCE contractor) prior to purchase, at the manufacturers' facility in order to verify diesel fuel oil quality prior to delivery.
4. The diesel fuel oil is then delivered to SCE's Vernon storage facility. Each tanker truck and each compartment of each tanker truck is sampled and the composite fuel sample tested and verified to meet all 15 parameter limits provided in S0123-III-6.6.
5. After delivery to the storage tanks at Vernon, a sample is drawn from the storage tank and verified to meet all 15 parameter limits provided in S0123-III-6.6.
6. The Vernon storage tanks are sampled and tested quarterly to verify that the diesel fuel oil continues to meet San Onofre Technical Specifications and the remainder of the parameters in S0123-III-6.6.
7. Prior to shipment of diesel fuel oil from the Vernon storage tanks to San Onofre, SCE personnel inspect the tanker truck to verify that it has been cleaned and dried. After the tanker truck is loaded, the individual compartments are sealed to prevent sabotage.
8. Upon arrival at San Onofre, SCE samples the bottom of every tanker compartment and checks for API gravity and visually inspects for water contamination prior to addition to the San Onofre diesel generator fuel storage tanks.
9. When the fuel is verified to be free of water and satisfies API gravity specifications, the diesel fuel oil is added to the storage tanks.
10. The diesel generator fuel storage tanks are then tested every 92 days to verify that the requirements of the Technical Specifications and S0123-III-6.6 are satisfied.