

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS

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4.8.1.1.1 Two physically independent A.C. circuits between the offsite transmission network and the onsite Class 1E distribution system (vital bus system) shall be:

- a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignments, power availability, and
- b. Demonstrated OPERABLE at least once per 18 months during shutdown by transferring (manually and automatically) vital bus supply from one 13/4 kv transformer to the other 13/4 kv transformer.

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 its day tank.
- 2. Verifying the diesel starts and accelerates to 900 rpm in less than or equal to 10 seconds\*. The generator voltage and frequency shall be  $\geq 3950$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz within 13 seconds after the start signal.

REPLACE WITH  
INSERT "A" 2 →

Subsequently, verifying the generator is synchronized, gradually loaded to 2500-2600 kw\*\*, and operates at a load of 2500-2600 kw for greater than or equal to 60 minutes.

- 3. Verifying the diesel generator is aligned to provide standby power to the associated vital bus.
- 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 one hour by checking for and removing accumulated water from the day tanks.

c. At least once per 6 months, the diesel generator shall be started from ambient conditions and accelerated to at least 900 rpm in less than or equal to 10 seconds\*. The generator voltage and frequency shall be  $\geq 3950$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz within 13 seconds after the start signal.

REPLACE WITH  
INSERT "A" 2 →

The generator shall be synchronized to its emergency bus, loaded to 2500-2600\*\* kw in less than or equal to 60 seconds, and operate at a load of 2500-2600 kw for at least 60 minutes.

This test, if it is performed so it coincides with the testing required by Surveillance Requirement 4.8.1.1.2.a.2, may also serve to concurrently meet those requirements.

with voltage maintained  $\geq 3910$  and  $\leq 4580$  volts

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SURVEILLANCE REQUIREMENTS (Continued)

- d. At least once per 18 months during shutdown by:
1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service,
  2. Verifying that, on rejection of a load greater than or equal to 820 kw, the voltage and frequency are restored to  $\geq 3950$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz within 4 seconds. ~~3950~~ 3910 ~~4580~~ 4400  
 $\geq 58.8$  and  $\leq 60.5$
  3. Simulating a loss of offsite power by itself, and:
    - a) Verifying de-energization of the vital bus and load shedding from the vital bus.
    - b) Verifying the diesel starts on the auto-start signal\*, energizes the vital bus with permanently connected loads within 13 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 of these loads,* the steady state voltage and frequency of the vital bus shall be maintained at  $\geq 3950$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz during this test. ~~3950~~ 3910 ~~4580~~ 4400  $\geq 58.8$  and  $\leq 60.5$
  4. Verifying that on an ESF actuation 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\*. *REPLACE WITH INSERT "B"* The generator voltage and frequency shall be  $\geq 3950$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz within 13 seconds after the auto-start signal and shall be maintained within these limits during this test.
  5. Not Used.
  6. Simulating a loss of offsite power in conjunction with an ESF actuation test signal, and:
    - a) Verifying de-energization of the vital bus and load shedding from the vital bus.
    - b) Verifying the diesel starts on the auto-start signal\*, energizes the vital bus with permanently connected loads within 13 seconds, energizes the auto-connected emergency (accident) loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. *After energization of these loads,* the steady state voltage and frequency of the vital bus shall be maintained at  $\geq 3950$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz during this test. ~~3950~~ 3910 ~~4580~~ 4400  
 $\geq 58.8$  and  $\leq 60.5$

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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- c) Verifying that all nonessential automatic diesel generator trips (i.e., other than engine overspeed, lube oil pressure low, 4 KV bus differential and generator differential), are automatically bypassed upon loss of voltage on the vital bus concurrent with a safety injection actuation signal.
  - 7. 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 2760-2860 kw.\*\* During the remaining 22 hours of this test, the diesel generator shall be loaded to 2500-2600 kw\*\*. The steady state voltage and frequency shall be maintained at  $\geq 3950$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz during this test. 3910
  - 8. Verifying that the auto-connected loads to each diesel generator do not exceed the two hour rating of 2860 kw.
  - 9. 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 energizing the emergency loads with offsite power.
  - e. At least once per ten years or after any modifications which could affect diesel generator interdependence by starting all diesel generators simultaneously\*, during shutdown, and verifying that all diesel generators accelerate to at least ~~900 rpm~~ in less than or equal to ~~10~~ seconds. 58.8 Hz  
13
  - f. At least once per 18 months, the following test shall be performed within 5 minutes of diesel shutdown after the diesel has operated for at least two hours at 2500-2600 kw\*\*:

REPLACE WITH INSERT "A" 2

Verifying the diesel starts and accelerates to 900 rpm in less than or equal to 10 seconds\*. The generator voltage and frequency shall be  $\geq 3950$  volts and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz within 13 seconds after the start signal.

4.8.1.1.3 The diesel fuel oil storage and transfer system shall be demonstrated OPERABLE:

- a. At least once per 31 days by:
  - 1. Verifying the level in each of the above required fuel storage tanks.
  - 2. Verifying that both fuel transfer pumps can be started and transfer fuel from the fuel storage tanks to the day tanks.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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- b. At least once per 92 days by verifying that a sample of diesel fuel from each of the above required fuel storage tanks is within the acceptable limits specified in Table 1 of ASTM D975-77 when checked for viscosity, water and sediment.

4.8.1.1.4 Reports - All diesel generator failures, valid or non-valid, shall be reported to the Commission in a Special Report pursuant to Specification 6.9.2 within 30 days. 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.

\_\_\_\_\_ <sup>may</sup>  
\* Surveillance testing ~~shall~~ be conducted in accordance with the manufacturer's recommendations regarding engine prelube, warm-up and loading (unless loading times are specified in the individual Surveillance Requirements).

\*\* This band is meant as guidance to preclude routine exceedances of the diesel generator manufacturer's design ratings. Loads in excess of this band for special testing or momentary variations due to changing bus loads shall not invalidate the test.

### 3/4.8 ELECTRICAL POWER SYSTEMS

#### BASES

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#### 3/4.8.1 and 3/4.8.2 A.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 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 accident analyses and are based upon maintaining at least two independent 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 one onsite A.C. source.

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

The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are based upon the recommendations of Regulatory Guide 1.9, "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, and Regulatory Guide 1.108, "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977.

INSERT C 2 →

DELETE 2 →

For the purposes of establishing initial conditions for surveillance testing, "ambient conditions" mean that the diesel lube oil temperature is  $120 \pm 20$  degrees F. The minimum lube oil temperature for an OPERABLE diesel is 100 degrees F. Lube oil heaters are designed to maintain the oil temperature at approximately 120 degrees F.

#### 3/4.8.3 ELECTRICAL EQUIPMENT PROTECTIVE DEVICES

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

The surveillance frequency applicable to molded case circuit breakers and lower voltage circuit breakers provides assurance of breaker reliability by testing at least one representative sample of each manufacturer's brand of molded case and lower voltage circuit breakers. Each manufacturer's molded

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SURVEILLANCE REQUIREMENTS

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- b. Demonstrated OPERABLE at least once per 18 months during shutdown by transferring (manually and automatically) vital bus supply from one 13/4 kv transformer to the other 13/4 kv transformer.

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Subsequently, verifying the generator is synchronized, gradually loaded to 2500-2600 kw\*\*, and operates at a load of 2500-2600 kw for greater than or equal to 60 minutes.

3. Verifying the diesel generator is aligned to provide standby power to the associated vital bus.

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 tanks.

c. At least once per 6 months, the diesel generator shall be started from ambient conditions and accelerated to at least 900 rpm in less than or equal to 10 seconds\*. The generator voltage and frequency shall be  $\geq 3950$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz within 13 seconds after the start signal.

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with voltage maintained  $\geq 3910$  and  $\leq 4580$  volts

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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d. At least once per 18 months during shutdown by:

1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service,
2. Verifying that, on rejection of a load of greater than or equal to 820 kw, the voltage and frequency are restored to  $\geq 3950$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz within 4 seconds. 3910      4400  
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3. Simulating a loss of offsite power by itself, and:

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After energization of these loads,

4. Verifying that on an ESF actuation 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  $\geq 3950$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz within 13 seconds after the auto-start signal and shall be maintained within these limits during this test.

REPLACE WITH INSERT "B" →

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6. Simulating a loss of offsite power in conjunction with an ESF actuation test signal, and

- a) Verifying de-energization of the vital bus and load shedding from the vital bus.
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ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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SURVEILLANCE REQUIREMENTS (Continued)

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INSERT "C" 2

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