

3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION 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 A.C. circuits between the offsite transmission network and the onsite Class 1E distribution system (vital bus system), and
- b. Three separate and independent diesel generators with:
  1. Separate day tanks containing a minimum volume of 130 gallons of fuel, and
  2. A common fuel storage system consisting of two storage tanks, each containing a minimum volume of 23,000 gallons of fuel, and two fuel transfer pumps.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

- a. With an independent A.C. circuit of the above required A.C. electrical power sources inoperable:
  1. Demonstrate the OPERABILITY of the remaining independent A.C. circuit by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter; and
  2. Within 24 hours, declare required systems or components with no offsite power available inoperable when a redundant required system or component is inoperable, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and
  3. Restore the inoperable independent A.C. circuit to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With one diesel generator of the above required A.C. electrical power sources inoperable:
  1. Demonstrate the OPERABILITY of the independent A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter; and
  2. Within 4 hours, declare required systems or components supported by the inoperable diesel generator inoperable when a required redundant system or component is inoperable, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and

## ELECTRICAL POWER SYSTEMS

### ACTION (Continued)

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3. Determine the two remaining OPERABLE diesel generators are not inoperable due to common cause failure or perform Surveillance Requirement 4.8.1.1.2.a.2 within 24 hours. If the diesel generator is inoperable for preventive maintenance, the two remaining OPERABLE diesel generators need not be tested nor the OPERABILITY evaluated; and
4. In any case:
  - a) Restore the inoperable diesel generator to OPERABLE status:
    1. Within 72 hours, or
    2. Within 14 days if the Supplemental Power Source (SPS) is available within 72 hours and verified once per 12 hours thereafter. If at any time the availability of the SPS cannot be met, either:
      - a. Restore the SPS to available status or restore the diesel generator to OPERABLE status within 72 hours from entry into 3.8.1.1 Action b, or
      - b. If 3.8.1.1 Action b has been entered for  $\geq 48$  hours, restore the SPS to available status or restore the diesel generator to OPERABLE status within 24 hours,
  - Otherwise,
    3. Be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the next 30 hours.
- c. With one independent A.C. circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining independent A.C. circuit by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter; demonstrate the OPERABILITY of the remaining OPERABLE diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.2 within 8 hours; restore at least one of the inoperable sources to OPERABLE status within 12 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore at least two independent A.C. circuits and three 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.

## ELECTRICAL POWER SYSTEMS

### ACTION (Continued)

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- d. With two of the above required independent A.C. circuits inoperable:
  - 1. Demonstrate the OPERABILITY of three diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.2 within 8 hours, unless the diesel generators are already operating; and
  - 2. Within 12 hours, declare required systems or components supported by the inoperable offsite circuits inoperable when a required redundant system or component is inoperable, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; and
  - 3. Restore at least one of the inoperable independent A.C. circuits to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours; and
  - 4. With only one of the independent A.C. circuits OPERABLE, restore the other independent A.C. circuit 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.
- e. With two or more of the above required diesel generators inoperable, demonstrate the OPERABILITY of two independent A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter; restore at least two 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 three 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.
- f. With one of the above required fuel transfer pumps inoperable, either restore it to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- g. With one of the above required fuel storage tanks inoperable, either restore it to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- h. LCO 3.0.4.b is not applicable to DGs.

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SALEM - UNIT 2

3/4 8-2b

Amendment No. 234  
OCT 11 2002

## 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 in accordance with the Surveillance Frequency Control Program by verifying correct breaker alignments, power availability, and
- b. Demonstrated OPERABLE in accordance with the Surveillance Frequency Control Program 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 Surveillance Frequency Control Program by:
  1. Verifying the fuel level in its day tank.
  2. Verifying the diesel generator starts from standby conditions\* and achieves  $\geq 3910$  volts and  $\geq 58.8$  Hz in  $\leq 13$  seconds, and subsequently achieves steady state voltage of  $\geq 3910$  and  $\leq 4400$  volts and frequency of  $60 \pm 1.2$  Hz.  
  
Subsequently, verifying the generator is synchronized with voltage maintained  $\geq 3910$  and  $\leq 4580$  volts, gradually loaded to 2340-2600 kw\*\*, and operates at a load of 2340-2600 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. In accordance with the Surveillance Frequency Control Program 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. In accordance with the Surveillance Frequency Control Program by verifying the diesel generator starts from standby conditions\* and achieves  $\geq 3910$  volts and  $\geq 58.8$  Hz in  $\leq 13$  seconds, and subsequently achieves steady state voltage of  $\geq 3910$  and  $\leq 4400$  volts and frequency of  $60 \pm 1.2$  Hz.

The generator shall be synchronized to its emergency bus with voltage maintained  $\geq 3910$  and  $\leq 4580$  volts, loaded to 2340-2600\*\* kw in less than or equal to 60 seconds, and operate at a load of 2340-2600 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.

## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

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- d. In accordance with the Surveillance Frequency Control Program during shutdown by:
1. DELETED
  2. Verifying that, on rejection of a load greater than or equal to 820 kw, the voltage and frequency are restored to  $\geq 3910$  and  $\leq 4400$  volts and  $60 \pm 1.2$  Hz within 4 seconds, and subsequently achieves a steady state frequency of  $\geq 58.8$  and  $\leq 60.5$  Hz.
  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  $\geq 3910$  and  $\leq 4400$  volts and  $\geq 58.8$  and  $\leq 60.5$  Hz during this test.
  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 diesel generator shall achieve  $\geq 3910$  volts and  $\geq 58.8$  Hz in  $\leq 13$  seconds, and subsequently achieves steady state voltage of  $\geq 3910$  and  $\leq 4400$  volts and frequency of  $\geq 58.8$  and  $\leq 60.5$  Hz.
  5. Deleted
  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  $\geq 3910$  and  $\leq 4400$  volts and  $\geq 58.8$  and  $\leq 60.5$  Hz during this test.

## 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. Deleted
  
- 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. In accordance with the Surveillance Frequency Control Program 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 58.8 Hz in less than or equal to 13 seconds.
  
- f. In accordance with the Surveillance Frequency Control Program, the following test shall be performed within 5 minutes of diesel shutdown after the diesel has operated for at least two hours at 2340-2600 kw\*\*:  
  
Verifying the diesel generator starts and achieves  $\geq 3910$  volts and  $\geq 58.8$  Hz in  $\leq 13$  seconds, and subsequently achieves steady state voltage of  $\geq 3910$  and  $\leq 4400$  volts and frequency of  $60 \pm 1.2$  Hz.
  
- g. In accordance with the Surveillance Frequency Control Program verifying the diesel generator operates for at least 24 hours\*. During the first 2 hours of this test, the diesel generators 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  $\geq 3910$  and  $\leq 4580$  volts and  $60 \pm 1.2$  Hz during this test.

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

- a. In accordance with the Surveillance Frequency Control Program 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. In accordance with the Surveillance Frequency Control Program 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 - NOT USED

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\* Surveillance testing may be conducted in accordance with the manufacturer's recommendations regarding engine prelude, 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.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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TABLE 4.8-1  
DIESEL GENERATOR TEST SCHEDULE

NOT USED

ELECTRICAL POWER SYSTEMS

SHUTDOWN

LIMITING CONDITION FOR OPERATION

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

- a. One circuit between the offsite transmission network and the onsite Class 1E distribution system (vital bus system), and
- b. Two separate and independent diesel generators with:
  - 1. Separate day tanks containing a minimum volume of 130 gallons of fuel, and
  - 2. A common fuel storage system containing a minimum volume of 23,000 gallons of fuel, and
  - 3. A fuel transfer pump.

APPLICABILITY: MODES 5 and 6.  
During movement of irradiated fuel assemblies.

ACTION:

- a. With one of the above minimum required A.C. electrical power sources not OPERABLE, immediately declare the affected required features inoperable, or suspend all operations involving CORE ALTERATIONS, movement of irradiated fuel, and positive reactivity changes until the minimum required A.C. electrical power sources are restored to OPERABLE status.
- b. With two of the required diesel generators not OPERABLE, suspend all operations involving CORE ALTERATIONS, movement of irradiated fuel, and all operations involving positive reactivity additions, and immediately initiate action to restore one required DG to OPERABLE status.

SURVEILLANCE REQUIREMENTS

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-----NOTE-----  
The following surveillances are not required to be performed to maintain operability during Modes 5 and 6. These surveillances are: 4.8.1.1.1.b, 4.8.1.1.2.d.2, 4.8.1.1.2.d.3, 4.8.1.1.2.d.4, 4.8.1.1.2.d.6, 4.8.1.1.2.d.9, 4.8.1.1.2.e, 4.8.1.1.2.f, and 4.8.1.1.2.g.  
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4.8.1.2 The above required A.C. electrical power sources shall be demonstrated OPERABLE by the performance of each of the Surveillance Requirements of 4.8.1.1.1, 4.8.1.1.2, 4.8.1.1.3 (except for requirement 4.8.1.1.3.a.2) and 4.8.1.1.4.