

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:

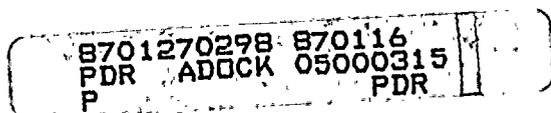
- a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and
- b. Two separate and independent diesel generators, each with:
  1. A separate day fuel tank containing a minimum volume of 70 gallons of fuel,
  2. A separate fuel storage system\* containing a minimum volume of 42,000 gallons of fuel, and
  3. A separate fuel transfer pump.

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

ACTION:

- a. 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 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; restore at least two offsite circuits and two diesel generators to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With a diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the 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; and if the diesel generator became inoperable due to any cause other than preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE diesel generator by performing Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours; restore diesel generators to OPERABLE status within 168 hours and an accumulated annual outage time of 576 hours exclusive of MODES 5 and 6 or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. At the number of failures for the inoperable diesel indicated in Table 4.8-1 perform the Additional Reliability Actions prescribed in Table 4.8-1 and its attachments.

\*Tanks are separate between diesels but shared between Units 1 and 2.





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## ELECTRICAL POWER SYSTEMS

### ACTION (Continued)

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- c. With one offsite circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. offsite source by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter and if the diesel generator became inoperable due to any cause other than preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE diesel generator by performing Surveillance Requirement 4.8.1.1.2.a.4 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. With the diesel generator restored to OPERABLE status, follow ACTION Statement a.\* With the offsite circuit restored to OPERABLE status, follow ACTION Statement b.\*
- 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 offsite source restored, follow ACTION Statement a.\*
- 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. With one diesel generator unit restored, follow ACTION Statement b\* or c.\*

\* The ACTION statement time shall be based upon the time associated with the component inoperability, and is not reset when exiting this ACTION statement.

### SURVEILLANCE REQUIREMENTS

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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 and indicated power availability, and
- b. Demonstrated OPERABLE at least once per 18 months by transferring the unit power source automatically from the normal auxiliary source to the preferred reserve source and by transferring manually to the alternate reserve source.



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## ELECTRICAL POWER SYSTEMS

### SURVEILLANCE REQUIREMENTS (Continued)

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4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

- a. In accordance with the frequency specified in Table 4.8-2 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 that the fuel transfer pump can be started and that it transfers fuel from the storage system to the day fuel tank,
  4. Verifying that the diesel starts from ambient condition and that it accelerates to at least 514 rpm in less than or equal to 10 seconds,\*
  5. Verifying that the generator is loaded to greater than or equal to 1700 kw and that it operates for greater than or equal to 60 minutes and verifying that the generator output breaker to the emergency bus is OPERABLE, and
  6. Verifying that the diesel generator is aligned to provide standby power to the associated emergency busses.
- b. At least once per 31 days by checking for and removing accumulated water from the day fuel tanks to below the fuel tank suction level.
- c. At least once per 92 days and from new fuel oil prior to addition to the storage tanks, by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to .05 volume percent and a kinematic viscosity at 40°C of greater than or equal to 1.9 but less than or equal to 4.1 when tested in accordance with ASTM-D975-77.
- d. At least once per 18 months, during shutdown, by:
  1. Subjecting the diesel engine 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 greater than or equal to 600 kw while maintaining voltage at 4160 ± 420 volts and frequency at 60 ± 1.2 Hz,
  3. Verifying the generator capability to reject a load of 3500 kw without exceeding 75% of the difference between nominal speed and the overspeed trip setpoint,

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\*The diesel generator start (10 seconds) from ambient conditions shall be performed at least once per 184 days in these surveillance tests. All other engine starts for the purpose of this surveillance testing and compensatory action may be at reduced acceleration rates as recommended by the manufacturer so that mechanical stress and wear on the diesel engine are minimized.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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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 that the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads 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 load sequencing is completed, the steady state voltage and frequency of the emergency busses shall be maintained at  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz during the test.
5. Verifying that, on a Safety Injection 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,
6. Simulating a loss of offsite power in conjunction with a Safety Injection actuation test signal, and by:
  - 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 sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After load sequencing is completed, the steady state voltage and frequency of the emergency busses shall be  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz. The voltage and frequency shall be maintained within these limits for the remainder of this test, and
  - c) Verifying that all automatic diesel generator trips, except engine overspeed and generator differential, are automatically bypassed upon loss of voltage on the emergency bus and/or Safety Injection actuation signal.
7. Verifying that the diesel generator operates for at least 24 hours. During this test the diesel generator shall be loaded to 3500 kw. Within 5 minutes after completing this 24-hour test, perform Surveillance Requirement 4.8.1.1.2.d.4.
8. Verifying that the auto-connected loads to each diesel generator do not exceed 3500 kw.



ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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9. 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.
  
10. Verifying that with the diesel generator operating in a test mode while connected to its test load, a simulated Safety Injection signal overrides the test mode by:
  - (a) Returning the diesel generator to standby operation, and
  - (b) Verifying the emergency loads are serviced by offsite power.



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TABLE 4.8-1

ADDITIONAL RELIABILITY ACTIONS

<u>No. of failures in last 20 valid tests</u>	<u>No. of failures in last 100 valid tests</u>	<u>Action</u>
3	6	Within 14 days prepare and maintain a report for NRC audit describing the Diesel Generator Reliability Improvement Program implemented at the site. Minimum requirements for the report are indicated in Attachment 1 to this table.
5	11	Declare the diesel generator inoperable. Perform a requalification test program for the affected diesel generator. Requalification test program requirements are indicated in Attachment 2 to this table.

ATTACHMENT 1 TO TABLE 4.8-1

REPORTING REQUIREMENT

As a minimum the Reliability Improvement Program report for NRC audit shall include the following:

- a) A summary of all tests (valid and invalid) that occurred within the time period over which the last 20/100 valid tests were performed,
- b) Analysis of failures and determination of root causes of failures,
- c) Evaluation of each of the recommendations of NUREG/CR-0660, "Enhancement of Onsite Emergency Diesel Generator Reliability in Operating Reactors," with respect to their application to the Plant,
- d) Identification of all actions taken or to be taken to 1) correct the root causes of failures defined in b) above and 2) achieve a general improvement of diesel generator reliability,
- e) The schedule for implementation of each action from d) above, and
- f) An assessment of the existing reliability of electric power to engineered-safety-feature equipment.

Once a licensee has prepared and maintained an initial report detailing the diesel generator reliability improvement program at his site, as defined above, the licensee need prepare only a supplemental report within 14 days after each failure during a valid demand for so long as the affected diesel generator unit continues to violate the criteria (3/20 or 6/100) for the reliability improvement program remedial action. The supplemental report need only update the failure/demand history for the affected diesel generator unit since the last report for that diesel generator. The supplemental report shall also present an analysis of the failure(s) with a root cause determination, if possible, and shall delineate any further procedural, hardware or operational changes to be incorporated into the site diesel generator improvement program and the schedule for implementation of those changes.

In addition to the above, the licensee shall submit a yearly data report on the Diesel Generator Reliability Improvement Program in the Annual Operating Report.

ATTACHMENT 2 TO TABLE 4.8-1  
DIESEL GENERATOR REQUALIFICATION PROGRAM

- (1) Perform seven consecutive successful demands without a failure within 30 days of diesel generator being restored to OPERABLE status and fourteen consecutive successful demands without a failure within 75 days of diesel generator being restored to OPERABLE status.
- (2) If a failure occurs during the first seven tests in the requalification test program, perform seven successful demands without an additional failure within 30 days of diesel generator being restored to OPERABLE status and fourteen consecutive successful demands without a failure within 75 days of being restored to OPERABLE status.
- (3) If a failure occurs during the second seven tests (tests 8 through 14) of (1) above, perform fourteen consecutive successful demands without an additional failure within 75 days of the failure which occurred during the requalification testing.
- (4) Following the second failure during the requalification test program, be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.
- (5) During requalification testing the diesel generator should not be tested more frequently than at 24-hour intervals.

After a diesel generator has been successfully requalified, subsequent repeated requalification tests will not be required for that diesel generator under the following conditions:

- (a) The number of failures in the last 20 valid demands is less than 5,
- (b) The number of failures in the last 100 valid demands is less than 11, and
- (c) In the event that following successful requalification of a diesel generator, the number of failures is still in excess of the remedial action criteria (a and/or b above) the following exception will be allowed until the diesel generator is no longer in violation of the remedial action criteria (a and/or b above).

Requalification testing will not be required provided that after each valid demand the number of failures in the last 20 and/or 100 valid demands has not increased. Once the diesel generator is no longer in violation of the remedial action criteria above the provisions of those criteria alone will prevail.

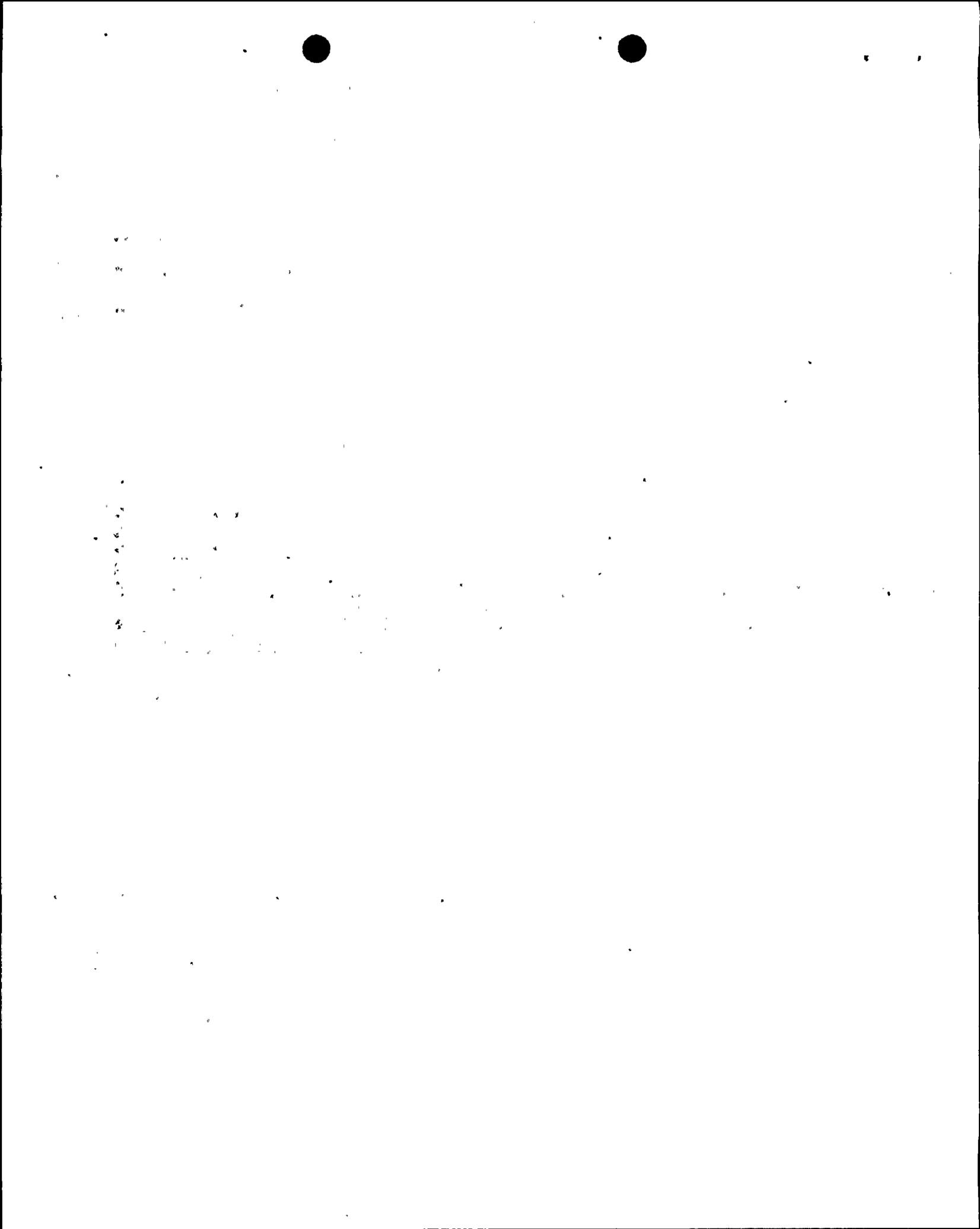


Table 4.8-2

DIESEL GENERATOR TEST SCHEDULE

<u>Number of Failures in Last 20 Valid Tests*</u>	<u>Test Frequency</u>
Less than or equal to 1	At least once per 31 days
Greater than or equal to 2	At least once per 7 days**

\*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. For the purposes of this test schedule, only valid tests conducted after the OL issuance date shall be included in the computation of the "last 20 valid tests."

\*\*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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## 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, and
- b. One diesel generator with:
  1. A day fuel tank containing a minimum of 70 gallons of fuel,
  2. A fuel storage system containing a minimum of 42,000 gallons of fuel, and
  3. A fuel transfer pump.

APPLICABILITY: MODES 5 and 6.

#### ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until the minimum required A.C. electrical power sources are restored to OPERABLE status.

#### SURVEILLANCE REQUIREMENTS

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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 and 4.8.1.1.2 except for requirement 4.8.1.1.2.a.5.



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ELECTRICAL POWER SYSTEMS

3/4.8.2 ONSITE POWER DISTRIBUTION SYSTEMS

A.C. DISTRIBUTION - OPERATING

LIMITING CONDITION FOR OPERATION

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3.8.2.1 The following A.C. electrical busses shall be OPERABLE and energized with tie breakers open between redundant busses:

4160-volt Emergency Bus # T 11A & T 11B

4160-volt Emergency Bus # T 11C & T 11D

600-volt Emergency Bus # 11A & 11B

600-volt Emergency Bus # 11C & 11D

\*120-volt A.C. Vital Bus # Channel I

\*120-volt A.C. Vital Bus # Channel II

\*120-volt A.C. Vital Bus # Channel III

\*120-volt A.C. Vital Bus # Channel IV

\*Energized from its associated inverter connected to a DC bus.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With less than the above complement of A.C. busses OPERABLE, restore the inoperable bus to OPERABLE status within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

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4.8.2.1 The specified A.C. busses shall be determined OPERABLE and energized from A.C. sources with tie breakers open between redundant busses at least once per 7 days by verifying correct breaker alignment and indicated power availability.



ELECTRICAL POWER SYSTEMS

A.C. DISTRIBUTION - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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3.8.2.2 As a minimum, the following A.C. electrical busses shall be OPERABLE and energized:

- 1 - 4160-volt Emergency Bus,
- 1 - 600-volt Emergency Bus, and
- 2 - \*120-volt A.C. Vital Busses.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above complement of A.C. busses OPERABLE and energized, establish CONTAINMENT INTEGRITY within 8 hours.

\* Energized from its associated inverter connected to a D.C. bus.

SURVEILLANCE REQUIREMENTS

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4.8.2.2 The specified A.C. busses shall be determined OPERABLE and energized at least once per 7 days by verifying correct breaker alignment and indicated power availability.



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ELECTRICAL POWER SYSTEMS

D.C. DISTRIBUTION - OPERATING

LIMITING CONDITION FOR OPERATION

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3.8.2.3 The following D.C. bus trains shall be energized and OPERABLE with tie breakers between bus trains open:

TRAIN AB consisting of 250-volt D.C. bus AB, 250-volt D.C. battery bank No. 1 AB, and a full capacity charger, and

TRAIN CD consisting of 250-volt D.C. bus CD, 250-volt D.C. battery bank No. 1 CD, and a full capacity charger.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

- a. With one 250-volt D.C. bus inoperable, restore the inoperable bus 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.
- b. With one 250-volt D.C. battery and/or its charger inoperable, restore the inoperable battery and/or charger 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.

SURVEILLANCE REQUIREMENTS

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4.8.2.3.1 Each D.C. bus train shall be determined OPERABLE and energized with tie breakers open at least once per 7 days by verifying correct breaker alignment and indicated power availability.

4.8.2.3.2 Each 250-volt battery bank and charger shall be demonstrated OPERABLE:

- a. At least once per 7 days by verifying that:
  1. The electrolyte level of each pilot cell is between the minimum and maximum level indication marks,



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ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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2. The pilot cell specific gravity, corrected to 77°F, and full electrolyte level (fluid at the bottom of the maximum level indication mark), is greater than or equal to 1.200,
  3. The pilot cell voltage is greater than or equal to 2.10 volts, and
  4. The overall battery voltage is greater than or equal to 250 volts.
- b. At least once per 92 days by verifying that:
1. The voltage of each connected cell is greater than or equal to 2.10 volts under float charge and has not decreased more than 0.05 volts from the value observed during the original acceptance test, and
  2. The specific gravity, corrected to 77°F, and full electrolyte level (fluid at the bottom of the maximum level indication mark), of each connected cell is greater than or equal to 1.200 and has not decreased more than 0.03 from the value observed during the previous test, and
  3. The electrolyte level of each connected cell is between the top of the minimum level indication mark and the bottom of the maximum level indication mark.
- c. At least once per 18 months by verifying that:
1. The cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration,
  2. The cell-to-cell and terminal connections are clean, tight, free of corrosion and coated with anti-corrosion material,
  3. The battery charger will supply at least 140 amperes at greater than or equal to 250 volts for at least 4 hours.
- d. At least once per 18 months, perform a battery service test during shutdown (MODES 5 or 6), by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status the emergency loads for the times specified in Table 4.8-3 with the battery charger disconnected. The battery terminal voltage shall be maintained greater than or equal to 210 volts throughout this test.
- e. At least once per 60 months, perform a battery discharge test during shutdown (MODES 5 or 6), by verifying that the battery capacity is at least 80% of the manufacturer's rating. This performance discharge test shall be performed in place of the battery service test.

TABLE 4.8-3

BATTERY EMERGENCY LOADS

<u>AB Battery Loads</u>	<u>Minimum Time</u>
1. Channel III static inverter**	3 hrs
2. Channel IV static inverter**	3 hrs
3. Computer static inverter* **	3 hrs
4. Feed pump turbine 1E oil pump**	1 hr
5. Control room emergency lighting**	8 hrs
6. Main turbine backup oil pump**	3 hrs
7. Isolation valve control**	8 hrs
8. All control circuits**	8 hrs
<u>CD Battery Loads</u>	
1. Channel I static inverter**	3 hrs
2. Channel II static inverter**	3 hrs
3. BOP static inverter* **	3 hrs
4. Feed pump turbine 1W oil pump**	1 hr
5. Generator seal oil pump**	8 hrs
6. Turbine emergency oil pump**	3 hrs
7. Isolation valves**	8 hrs
8. Annunciators**	8 hrs
9. All control circuits**	8 hrs

\*AC power sources to the inverters shall be turned off at the start of the test and may be turned on at the end of the specified time interval. Inverters may be left in this operating mode for the duration of the discharge test.

\*\*With actual or simulated connected loads added to the battery.

ELECTRICAL POWER SYSTEMS

D.C. DISTRIBUTION - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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3.8.2.4 As a minimum, the following D.C. electrical equipment and bus shall be energized and OPERABLE:

1 - 250-volt D.C. bus, and

1 - 250-volt battery bank and charger associated with the above D.C. bus.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above complement of D.C. equipment and bus OPERABLE, establish CONTAINMENT INTEGRITY within 8 hours.

SURVEILLANCE REQUIREMENTS

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4.8.2.4.1 The above required 250-volt D.C. bus shall be determined OPERABLE and energized at least once per 7 days by verifying correct breaker alignment and indicated power availability.

4.8.2.4.2 The above required 250-volt battery bank and charger shall be demonstrated OPERABLE per Surveillance Requirement 4.8.2.3.2.



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ELECTRICAL POWER SYSTEMS

D.C. DISTRIBUTION - OPERATING - TRAIN N BATTERY SYSTEM

LIMITING CONDITION FOR OPERATION

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3.8.2.5 The following D.C. bus train shall be energized and OPERABLE:

TRAIN N consisting of 250-volt D.C. bus N, 250-volt D.C. battery bank N and a full capacity charger.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

With the Train N battery system inoperable, declare the turbine driven Auxiliary Feedwater Pump inoperable and follow the ACTION statement of Specification 3.7.1.2.

SURVEILLANCE REQUIREMENTS

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4.8.2.5.1 The D.C. bus train N shall be determined OPERABLE and energized at least once per 7 days by verifying correct breaker alignment and indicated power availability.

4.8.2.5.2 The 250-volt battery bank and charger shall be demonstrated OPERABLE:

- a. At least once per 7 days by verifying that:
  1. The electrolyte level of each pilot cell is between the minimum and maximum level indication marks,



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ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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2. The pilot cell specific gravity, corrected to 77°F, and full electrolyte level (fluid at the bottom of the maximum level indication mark), is greater than or equal to 1.200.
  3. The pilot cell voltage is greater than or equal to 2.10 volts, and
  4. The overall battery voltage is greater than or equal to 250 volts.
- b. At least once per 92 days by verifying that:
1. The voltage of each connected cell is greater than or equal to 2.10 volts under float charge and has not decreased more than 0.05 volts from the value observed during the original acceptance test, and
  2. The specific gravity, corrected to 77°F, and full electrolyte level (fluid at the bottom of the maximum level indication mark), of each connected cell is greater than or equal to 1.200 and has not decreased more than 0.03 from the value observed during the previous test, and
  3. The electrolyte level of each connected cell is between the top of the minimum level indication mark and the bottom of the maximum level indication mark.
- c. At least once per 18 months by verifying that:
1. The cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration,
  2. The cell-to-cell and terminal connections are clean, tight, free of corrosion and coated with anti-corrosion material,
  3. The battery charger will supply at least 10 amperes at greater than or equal to 250 volts for at least 4 hours.
- d. At least once per 18 months, perform a battery service test during shutdown (MODES 5 or 6), by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status the emergency loads for the times specified in Table 4.8-4 with the battery charger disconnected. The battery terminal voltage shall be maintained greater than or equal to 210 volts throughout this test.
- e. At least once per 60 months, perform a battery discharge test during shutdown (MODES 5 or 6), by verifying that the battery capacity is at least 80% of the manufacturer's rating. This performance discharge test shall be performed in place of the battery service test.

TABLE 4.8-4

BATTERY EMERGENCY LOADS

<u>"N" Battery Loads</u>	<u>Minimum Time</u>
Auxiliary feedwater turbine control bus	4 hours
FMO-211 valve	*
FMO-221 valve	*
FMO-231 valve	*
FMO-241 valve	*
TDTV valve	*

\*Valves will be operated through the following sequence:

1. Beginning of test: open valves.
  2. Five minutes after the beginning of the test: close the valves.
  3. Ten minutes after the beginning of the test: reopen the valves.
  4. Four hours after the beginning of the test: close the valves.
- End of the test.



ELECTRICAL POWER SYSTEMS

3/4.8.3 Alternative A.C. Power Sources

LIMITING CONDITION FOR OPERATION

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3.8.3.1 The steady state bus voltage for the manual alternate reserve source\* shall be greater than or equal to 90% of the nominal bus voltage.

APPLICABILITY: Whenever the manual alternate reserve source (69 kv) is connected to more than two busses.

ACTION: With bus voltage less than 90% nominal, adjust load on the remaining busses to maintain steady state bus voltage greater than or equal to 90% limit.

SURVEILLANCE REQUIREMENTS

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4.8.3.1 No additional surveillance requirements other than those required by Specifications 4.8.1.1.1 and 4.8.1.2.

\*Shared with D. C. Cook Unit 2.



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### 3/4.8 ELECTRICAL POWER SYSTEMS

#### BASES

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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 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 accident analyses and are based upon maintaining at least one of each of the 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 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 facility status.

In reference to Specification 3.8.1.1 Action b, the phrase "and an accumulated annual outage time of 576 hours exclusive of MODES 5 and 6" shall be interpreted as follows. This phrase refers to the amount of time the diesel generator has been inoperable in the past 365 days while in MODES 1, 2, 3, and 4. This time includes the amount of time spent in ACTION statements except for that time utilized for regularly scheduled surveillances. The accumulated annual outage time is reset to zero upon successful completion of the diesel generator requalification program (Attachment 2 to Table 4.8-1).

The train N station battery system provides an independent 250 volt DC power supply for power and control of the turbine driven auxiliary feedwater pump train. The limiting conditions of operation for the train N battery are consistent with the requirements of the auxiliary feedwater system. The surveillance requirements for the train N battery system are consistent with the requirements of the AB and CD station batteries. The train N battery loads are derived from equipment in the turbine driven auxiliary feedwater pump train and battery sizing is consistent with the functional requirements of these components. Simulated loads for battery tests are loads equivalent to measured actual loads.



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 circuits between the offsite transmission network and the onsite Class 1E distribution system, and
- b. Two separate and independent diesel generators, each with:
  1. A separate day fuel tank containing a minimum volume of 70 gallons of fuel,
  2. A separate fuel storage system\* containing a minimum volume of 42,000 gallons of fuel, and
  3. A separate fuel transfer pump.

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

ACTION:

- a. 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 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; restore at least two offsite circuits and two diesel generators to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With a diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the 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; and if the diesel generator became inoperable due to any cause other than preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE diesel generator by performing Surveillance Requirement 4.8.1.1.2.a.4 within 24 hours; restore diesel generators to OPERABLE status within 168 hours and an accumulated annual outage time of 576 hours exclusive of MODES 5 and 6 or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. At the number of failures for the inoperable diesel indicated in Table 4.8-1 perform the Additional Reliability Actions prescribed in Table 4.8-1 and its attachments.

\*Tanks are separate between diesels but shared between Units 1 and 2.



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## ELECTRICAL POWER SYSTEMS

### ACTION (Continued)

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- c. With one offsite circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. offsite source by performing Surveillance Requirement 4.8.1.1.1.a within 1 hour and at least once per 8 hours thereafter and if the diesel generator became inoperable due to any cause other than preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE diesel generator by performing Surveillance Requirement 4.8.1.1.2.a.4 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. With the diesel generator restored to OPERABLE status, follow ACTION Statement a.\* With the offsite circuit restored to OPERABLE status, follow ACTION Statement b.\*
- 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 offsite source restored, follow ACTION Statement a.\*
- 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. With one diesel generator unit restored, follow ACTION Statement b\* or c.\*

\* The ACTION statement time shall be based upon the time associated with the component inoperability, and is not reset when exiting this ACTION statement.

### SURVEILLANCE REQUIREMENTS

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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 and indicated power availability, and
- b. Demonstrated OPERABLE at least once per 18 months by transferring the unit power source automatically from the normal auxiliary source to the preferred reserve source and by transferring manually to the alternate reserve source.



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ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

- a. In accordance with the frequency specified in Table 4.8-2 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 that the fuel transfer pump can be started and that it transfers fuel from the storage system to the day fuel tank,
  4. Verifying that the diesel starts from ambient condition and that it accelerates to at least 514 rpm in less than or equal to 10 seconds,\*
  5. Verifying that the generator is loaded to greater than or equal to 1700 kw and that it operates for greater than or equal to 60 minutes and verifying that the generator output breaker to the emergency bus is OPERABLE, and
  6. Verifying that the diesel generator is aligned to provide standby power to the associated emergency busses.
- b. At least once per 31 days by checking for and removing accumulated water from the day fuel tanks to below the fuel tank suction level.
- c. At least once per 92 days and from new fuel oil prior to addition to the storage tanks, by verifying that a sample obtained in accordance with ASTM-D270-1975 has a water and sediment content of less than or equal to .05 volume percent and a kinematic viscosity at 40°C of greater than or equal to 1.9 but less than or equal to 4.1 when tested in accordance with ASTM-D975-77.
- d. At least once per 18 months, during shutdown, by:
  1. Subjecting the diesel engine 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 greater than or equal to 600 kw while maintaining voltage at 4160 ± 420 volts and frequency at 60 ± 1.2 Hz,
  3. Verifying the generator capability to reject a load of 3500 kw without exceeding 75% of the difference between nominal speed and the overspeed trip setpoint,

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\*The diesel generator start (10 seconds) from ambient conditions shall be performed at least once per 184 days in these surveillance tests. All other engine starts for the purpose of this surveillance testing may be at reduced acceleration rates as recommended by the manufacturer so that mechanical stress and wear on the diesel engine are minimized.



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ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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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 that the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads 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 load sequencing is completed, the steady state voltage and frequency of the emergency busses shall be maintained at  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz during the test.
5. Verifying that, on a Safety Injection 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,
6. Simulating a loss of offsite power in conjunction with a Safety Injection actuation test signal, and by:
  - 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 sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the emergency loads. After load sequencing is completed, the steady state voltage and frequency of the emergency busses shall be  $4160 \pm 420$  volts and  $60 \pm 1.2$  Hz. The voltage and frequency shall be maintained within these limits for the remainder of this test, and
  - c) Verifying that all automatic diesel generator trips, except engine overspeed and generator differential, are automatically bypassed upon loss of voltage on the emergency bus and/or Safety Injection actuation signal.
7. Verifying that the diesel generator operates for at least 24 hours. During this test the diesel generator shall be loaded to 3500 kw. Within 5 minutes after completing this 24-hour test, perform Surveillance Requirement 4.8.1.1.2.d.4.
8. Verifying that the auto-connected loads to each diesel generator do not exceed 3500 kw.

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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9. 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.
  
10. Verifying that with the diesel generator operating in a test mode while connected to its test load, a simulated Safety Injection signal overrides the test mode by:
  - (a) Returning the diesel generator to standby operation, and
  - (b) Verifying the emergency loads are serviced by offsite power.

TABLE 4.8-1

ADDITIONAL RELIABILITY ACTIONS

<u>No. of failures in last 20 valid tests</u>	<u>No. of failures in last 100 valid tests</u>	<u>Action</u>
3	6	Within 14 days prepare and maintain a report for NRC audit describing the diesel generator reliability improvement program implemented at the site. Minimum requirements for the report are indicated in Attachment 1 to this table.
5	11	Declare the diesel generator inoperable. Perform a requalification test program for the affected diesel generator. Requalification test program requirements are indicated in Attachment 2 to this table.



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ATTACHMENT 1 TO TABLE 4.8-1

REPORTING REQUIREMENT

As a minimum the Reliability Improvement Program report for NRC audit shall include the following:

- a) A summary of all tests (valid and invalid) that occurred within the time period over which the last 20/100 valid tests were performed,
- b) Analysis of failures and determination of root causes of failures,
- c) Evaluation of each of the recommendations of NUREG/CR-0660, "Enhancement of Onsite Emergency Diesel Generator Reliability in Operating Reactors," with respect to their application to the Plant,
- d) Identification of all actions taken or to be taken to 1) correct the root causes of failures defined in b) above and 2) achieve a general improvement of diesel generator reliability,
- e) The schedule for implementation of each action from d) above, and
- f) An assessment of the existing reliability of electric power to engineered-safety-feature equipment.

Once a licensee has prepared and maintained an initial report detailing the diesel generator reliability improvement program at his site, as defined above, the licensee need prepare only a supplemental report within 14 days after each failure during a valid demand for so long as the affected diesel generator unit continues to violate the criteria (3/20 or 6/100) for the reliability improvement program remedial action. The supplemental report need only update the failure/demand history for the affected diesel generator unit since the last report for that diesel generator. The supplemental report shall also present an analysis of the failure(s) with a root cause determination, if possible, and shall delineate any further procedural, hardware or operational changes to be incorporated into the site diesel generator improvement program and the schedule for implementation of those changes.

In addition to the above, the licensee shall submit a yearly data report on the diesel generator reliability improvement program in the Annual Operating Report.



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ATTACHMENT 2 TO TABLE 4.8-1  
DIESEL GENERATOR REQUALIFICATION PROGRAM

- (1) Perform seven consecutive successful demands without a failure within 30 days of diesel generator being restored to OPERABLE status and fourteen consecutive successful demands without a failure within 75 days of diesel generator being restored to OPERABLE status.
- (2) If a failure occurs during the first seven tests in the requalification test program, perform seven successful demands without an additional failure within 30 days of diesel generator being restored to OPERABLE status and fourteen consecutive successful demands without a failure within 75 days of being restored to OPERABLE status.
- (3) If a failure occurs during the second seven tests (tests 8 through 14) of (1) above, perform fourteen consecutive successful demands without an additional failure within 75 days of the failure which occurred during the requalification testing.
- (4) Following the second failure during the requalification test program, be in at least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.
- (5) During requalification testing the diesel generator should not be tested more frequently than at 24-hour intervals.

After a diesel generator has been successfully requalified, subsequent repeated requalification tests will not be required for that diesel generator under the following conditions:

- (a) The number of failures in the last 20 valid demands is less than 5,
- (b) The number of failures in the last 100 valid demands is less than 11, and
- (c) In the event that following successful requalification of a diesel generator, the number of failures is still in excess of the remedial action criteria (a and/or b above) the following exception will be allowed until the diesel generator is no longer in violation of the remedial action criteria (a and/or b above).

Requalification testing will not be required provided that after each valid demand the number of failures in the last 20 and/or 100 valid demands has not increased. Once the diesel generator is no longer in violation of the remedial action criteria above the provisions of those criteria alone will prevail.



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Table 4.8-2

DIESEL GENERATOR TEST SCHEDULE

<u>Number of Failures in Last 20 Valid Tests*</u>	<u>Test Frequency</u>
Less than or equal to 1	At least once per 31 days
Greater than or equal to 2	At least once per 7 days**

\*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. For the purposes of this test schedule, only valid tests conducted after the OL issuance date shall be included in the computation of the "last 20 valid tests."

\*\*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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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, and
- b. One diesel generator with:
  1. A day fuel tank containing a minimum of 70 gallons of fuel,
  2. A fuel storage system containing a minimum of 42,000 gallons of fuel, and
  3. A fuel transfer pump.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above minimum required A.C. electrical power sources OPERABLE, suspend all operations involving CORE ALTERATIONS or positive reactivity changes until the minimum required A.C. electrical power sources are restored to OPERABLE status.

SURVEILLANCE REQUIREMENTS

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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 and 4.8.1.1.2 except for requirement 4.8.1.1.2.a.5.



ELECTRICAL POWER SYSTEMS

3/4.8.2 ONSITE POWER DISTRIBUTION SYSTEMS

A.C. DISTRIBUTION - OPERATING

LIMITING CONDITION FOR OPERATION

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3.8.2.1 The following A.C. electrical busses shall be OPERABLE and energized with tie breakers open between redundant busses:

4160-volt Emergency Bus # T 11A & T 11B

4160-volt Emergency Bus # T 11C & T 11D

600-volt Emergency Bus # 11A & 11B

600-volt Emergency Bus # 11C & 11D

\*120-volt A.C. Vital Bus # Channel I

\*120-volt A.C. Vital Bus # Channel II

\*120-volt A.C. Vital Bus # Channel III

\*120-volt A.C. Vital Bus # Channel IV

\*Energized from its associated inverter connected to a DC bus.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With less than the above complement of A.C. busses OPERABLE, restore the inoperable bus to OPERABLE status within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

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4.8.2.1 The specified A.C. busses shall be determined OPERABLE and energized from A.C. sources with tie breakers open between redundant busses at least once per 7 days by verifying correct breaker alignment and indicated power availability.



ELECTRICAL POWER SYSTEMS

A.C. DISTRIBUTION - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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3.8.2.2 As a minimum, the following A.C. electrical busses shall be OPERABLE and energized:

- 1 - 4160-volt Emergency Bus,
- 1 - 600-volt Emergency Bus, and
- 2 - \*120-volt A.C. Vital Busses.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above complement of A.C. busses OPERABLE and energized, establish CONTAINMENT INTEGRITY within 8 hours.

SURVEILLANCE REQUIREMENTS

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4.8.2.2 The specified A.C. busses shall be determined OPERABLE and energized at least once per 7 days by verifying correct breaker alignment and indicated power availability.

\* Energized from its associated inverter connected to a DC bus.

ELECTRICAL POWER SYSTEMS

D.C. DISTRIBUTION - OPERATING

LIMITING CONDITION FOR OPERATION

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3.8.2.3 The following D.C. bus trains shall be energized and OPERABLE with tie breakers between bus trains open:

TRAIN AB consisting of 250-volt D.C. bus AB, 250-volt D.C. battery bank No. 1 AB, and a full capacity charger, and

TRAIN CD consisting of 250-volt D.C. bus CD, 250-volt D.C. battery bank No. 1 CD, and a full capacity charger.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

- a. With one 250-volt D.C. bus inoperable, restore the inoperable bus 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.
- b. With one 250-volt D.C. battery and/or its charger inoperable, restore the inoperable battery and/or charger 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.

SURVEILLANCE REQUIREMENTS

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4.8.2.3.1 Each D.C. bus train shall be determined OPERABLE and energized with tie breakers open at least once per 7 days by verifying correct breaker alignment and indicated power availability.

4.8.2.3.2 Each 250-volt battery bank and charger shall be demonstrated OPERABLE:

- a. At least once per 7 days by verifying that:
  1. The electrolyte level of each pilot cell is between the minimum and maximum level indication marks,

ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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2. The pilot cell specific gravity, corrected to 77°F, and full electrolyte level (fluid at the bottom of the maximum level indication mark), is greater than or equal to 1.200.
  3. The pilot cell voltage is greater than or equal to 2.10 volts, and
  4. The overall battery voltage is greater than or equal to 250 volts.
- b. At least once per 92 days by verifying that:
1. The voltage of each connected cell is greater than or equal to 2.10 volts under float charge and has not decreased more than 0.05 volts from the value observed during the original acceptance test, and
  2. The specific gravity, corrected to 77°F, and full electrolyte level (fluid at the bottom of the maximum level indication mark), of each connected cell is greater than or equal to 1.200 and has not decreased more than 0.03 from the value observed during the previous test, and
  3. The electrolyte level of each connected cell is between the top of the minimum level indication mark and the bottom of the maximum level indication mark.
- c. At least once per 18 months by verifying that:
1. The cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration,
  2. The cell-to-cell and terminal connections are clean, tight, free of corrosion and coated with anti-corrosion material,
  3. The battery charger will supply at least 140 amperes at greater than or equal to 250 volts for at least 4 hours.
- d. At least once per 18 months, perform a battery service test during shutdown, (MODES 5 or 6), by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status the emergency loads for the times specified in Table 4.8-3 with the battery charger disconnected. The battery terminal voltage shall be maintained greater than or equal to 210 volts throughout this test.
- e. At least once per 60 months, perform a battery discharge test during shutdown (MODES 5 or 6), by verifying that the battery capacity is at least 80% of the manufacturer's rating. This performance discharge test shall be performed in place of the battery service test.

TABLE 4.8-3

BATTERY EMERGENCY LOADS

<u>AB Battery Loads</u>	<u>Minimum Time</u>
1. Channel III static inverter**	3 hrs
2. Channel IV static inverter**	3 hrs
3. Computer static inverter* **	3 hrs
4. Feed pump turbine 1E oil pump**	1 hr
5. Control room emergency lighting**	8 hrs
6. Main turbine backup oil pump**	3 hrs
7. Isolation valve control**	8 hrs
8. All control circuits**	8 hrs

<u>CD Battery Loads</u>	
1. Channel I static inverter**	3 hrs
2. Channel II static inverter**	3 hrs
3. BOP static inverter* **	3 hrs
4. Feed pump turbine 1W oil pump**	1 hr
5. Generator seal oil pump**	8 hrs
6. Turbine emergency oil pump**	3 hrs
7. Isolation valves**	8 hrs
8. Annunciators**	8 hrs
9. All control circuits**	8 hrs

\*AC power sources to the inverters shall be turned off at the start of the test and may be turned on at the end of the specified time interval. Inverters may be left in this operating mode for the duration of the discharge test.

\*\*With actual or simulated connected loads added to the battery.

ELECTRICAL POWER SYSTEMS

D.C. DISTRIBUTION - SHUTDOWN

LIMITING CONDITION FOR OPERATION

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3.8.2.4 As a minimum, the following D.C. electrical equipment and bus shall be energized and OPERABLE:

- 1 - 250-volt D.C. bus, and
- 1 - 250-volt battery bank and charger associated with the above D.C. bus.

APPLICABILITY: MODES 5 and 6.

ACTION:

With less than the above complement of D.C. equipment and bus OPERABLE, establish CONTAINMENT INTEGRITY within 8 hours.

SURVEILLANCE REQUIREMENTS

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4.8.2.4.1 The above required 250-volt D.C. bus shall be determined OPERABLE and energized at least once per 7 days by verifying correct breaker alignment and indicated power availability.

4.8.2.4.2 The above required 250-volt battery bank and charger shall be demonstrated OPERABLE per Surveillance Requirement 4.8.2.3.2.



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ELECTRICAL POWER SYSTEMS

D.C. DISTRIBUTION - OPERATING - TRAIN N BATTERY SYSTEM

LIMITING CONDITION FOR OPERATION

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3.8.2.5 The following D.C. bus train shall be energized and OPERABLE:

TRAIN N consisting of 250-volt D.C. bus N, 250-volt D.C. battery bank N and a full capacity charger.

APPLICABILITY: MODES 1, 2 and 3.

ACTION:

With the Train N battery system inoperable, declare the turbine driven Auxiliary Feedwater Pump inoperable and follow the ACTION statement of Specification 3.7:1.2.

SURVEILLANCE REQUIREMENTS

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4.8.2.5.1 The D.C. bus train N shall be determined OPERABLE and energized at least once per 7 days by verifying correct breaker alignment and indicated power availability.

4.8.2.5.2 The 250-volt battery bank and charger shall be demonstrated OPERABLE:

- a. At least once per 7 days by verifying that:
  1. The electrolyte level of each pilot cell is between the minimum and maximum level indication marks,

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ELECTRICAL POWER SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

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2. The pilot cell specific gravity, corrected to 77°F, and full electrolyte level (fluid at the bottom of the maximum level indication mark), is greater than or equal to 1.200.
  3. The pilot cell voltage is greater than or equal to 2.10 volts, and
  4. The overall battery voltage is greater than or equal to 250 volts.
- b. At least once per 92 days by verifying that:
1. The voltage of each connected cell is greater than or equal to 2.10 volts under float charge and has not decreased more than 0.05 volts from the value observed during the original acceptance test, and
  2. The specific gravity, corrected to 77°F, and full electrolyte level (fluid at the bottom of the maximum level indication mark), of each connected cell is greater than or equal to 1.200 and has not decreased more than 0.03 from the value observed during the previous test, and
  3. The electrolyte level of each connected cell is between the top of the minimum level indication mark and the bottom of the maximum level indication mark.
- c. At least once per 18 months by verifying that:
1. The cells, cell plates and battery racks show no visual indication of physical damage or abnormal deterioration,
  2. The cell-to-cell and terminal connections are clean, tight, free of corrosion and coated with anti-corrosion material,
  3. The battery charger will supply at least 10 amperes at greater than or equal to 250 volts for at least 4 hours.
- d. At least once per 18 months, perform a battery service test during shutdown (MODES 5 or 6), by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status the emergency loads for the times specified in Table 4.8-4 with the battery charger disconnected. The battery terminal voltage shall be maintained greater than or equal to 210 volts throughout this test.
- e. At least once per 60 months, perform a battery discharge test during shutdown (MODES 5 or 6), by verifying that the battery capacity is at least 80% of the manufacturer's rating. This performance discharge test shall be performed in place of the battery service test.

TABLE 4.8-4

BATTERY EMERGENCY LOADS

<u>"N" Battery Loads</u>	<u>Minimum Time</u>
Auxiliary feedwater turbine control bus	4 hours
FMO-211 valve	*
FMO-221 valve	*
FMO-231 valve	*
FMO-241 valve	*
TDTV valve	*

\*Valves will be operated through the following sequence:

1. Beginning of test: open valves.
  2. Five minutes after the beginning of the test: close the valves.
  3. Ten minutes after the beginning of the test: reopen the valves.
  4. Four hours after the beginning of the test: close the valves.
- End of the test.

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ELECTRICAL POWER SYSTEMS

3/4.8.3 Alternative A.C. Power Sources

LIMITING CONDITION FOR OPERATION

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3.8.3.1 The steady state bus voltage for the manual alternate reserve source\* shall be greater than or equal to 90% of the nominal bus voltage.

APPLICABILITY: Whenever the manual alternate reserve source (69 kv) is connected to more than two busses.

ACTION: With bus voltage less than 90% nominal, adjust load on the remaining busses to maintain steady state bus voltage greater than or equal to 90% limit.

SURVEILLANCE REQUIREMENTS

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4.8.3.1 No additional surveillance requirements other than those required by Specifications 4.8.1.1.1 and 4.8.1.2.

\*Shared with D. C. Cook Unit 1.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that every entry should be supported by a valid receipt or invoice. This ensures transparency and allows for easy verification of the data.

In the second section, the author outlines the various methods used to collect and analyze the data. This includes both manual and automated techniques. The goal is to ensure that the information gathered is both reliable and comprehensive.

The third part of the report details the results of the analysis. It shows a clear upward trend in the data over the period studied. This suggests that the current strategies being implemented are effective and should be continued.

Finally, the document concludes with a series of recommendations for future actions. These include further refining the data collection process and exploring new opportunities for growth. The author believes that with continued effort, the organization can achieve its long-term goals.

BASES

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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 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 accident analyses and are based upon maintaining at least one of each of the 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 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 facility status.

In reference to Specification 3.8.1.1 Action b, the phrase "and an accumulated annual outage time of 576 hours exclusive of MODES 5 and 6" shall be interpreted as follows. This phrase refers to the amount of time the diesel generator has been inoperable in the past 365 days while in MODES 1, 2, 3, and 4. This time includes the amount of time spent in ACTION statements except for that time utilized for regularly scheduled surveillances. The accumulated annual outage time is reset to zero upon successful completion of the diesel generator requalification program (Attachment 2 to Table 4.8-1).

The train N station battery system provides an independent 250 volt DC power supply for power and control of the turbine driven auxiliary feedwater pump train. The limiting conditions of operation for the train N battery are consistent with the requirements of the auxiliary feedwater system. The surveillance requirements for the train N battery system are consistent with the requirements of the AB and CD station batteries. The train N battery loads are derived from equipment in the turbine driven auxiliary feedwater pump train and battery sizing is consistent with the functional requirements of these components. Simulated loads for battery tests are loads equivalent to measured actual loads.