

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. Diesel oil feed tanks containing a minimum volume of 339 gallons of fuel, and
  2. A separate diesel generator fuel oil storage tank containing:
    - a. A minimum volume of 38,760 gallons of fuel, or
    - b. A fuel oil volume less than 38,760 gallons and greater than 38,000 gallons of fuel for a period not to exceed 5 days (provided replacement fuel oil is onsite within the first 48 hours), and
  3. A separate fuel transfer pump.

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

ACTION:

- a. With one offsite circuit of 3.8.1.1a inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. circuit by performing Surveillance Requirement 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter. If either diesel generator has not been successfully tested within the past 24 hours, demonstrate its OPERABILITY by performing Surveillance Requirement 4.8.1.1.2a.4 separately for each diesel generator (unless it is already operating) within 24 hours. Restore the offsite 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 3.8.1.1b inoperable, demonstrate the OPERABILITY of the offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1a (separately for each offsite A.C. circuit) within 1 hour and at least once per 8 hours thereafter. 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 (unless it has been successfully tested in the last 24 hours) by performing Surveillance Requirement 4.8.1.1.2a.4 within 24 hours. Restore the diesel generator 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.
- c. With one offsite A.C. circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. circuit by performing Surveillance Requirement 4.8.1.1.1a 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 4.8.1.1.2a.4 within 8 hours (unless it is already operating). Restore at least one of the inoperable sources to OPERABLE status within 12 hours or be in

ACTION (Continued)

at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore the other A.C. power source (offsite A.C. circuit or diesel generator) to OPERABLE status in accordance with the provisions of ACTION statement a or b, as appropriate, with the time requirement of that ACTION statement based on the time of initial loss of the remaining inoperable A.C. power source. A successful test of diesel generator OPERABILITY per Surveillance Requirement 4.8.1.1.2a.4 performed under this ACTION statement satisfies the diesel generator test requirement of ACTION statement a or b.

- d. With one diesel generator inoperable, in addition to ACTION b. or c. above, verify that:
- (1) All required systems, subsystems, trains, components, and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE, and
  - (2) When in MODE 1, 2, or 3, the steam-driven emergency feed pump is OPERABLE.

If these conditions are not satisfied within 2 hours be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

- e. With two of the above required offsite A.C. circuits inoperable, demonstrate the OPERABILITY of two diesel generators by performing Surveillance Requirement 4.8.1.1.2a.4 separately for each diesel generator within 8 hours unless the diesel generators are already operating; restore one of the inoperable offsite A.C. circuits to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours. Following restoration of one offsite A.C. circuit, follow ACTION statement a with the time requirement of that ACTION statement based on the time of initial loss of the remaining inoperable offsite A.C. circuit. A successful test of diesel generator OPERABILITY per Surveillance Requirement 4.8.1.1.2a.4 performed under this ACTION statement satisfies the diesel generator test requirement of ACTION statement a.
- f. With two of the above required diesel generators inoperable, demonstrate the OPERABILITY of two offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter; restore 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. Following restoration of one diesel generator, follow ACTION statement b with the time requirement of that ACTION statement based on the time of initial loss of the remaining inoperable diesel generator.

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

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE\*:

- a. In accordance with the frequency specified in Table 4.8-1 on a STAGGERED TEST BASIS by:
  1. Verifying the fuel level in the diesel oil feed tank,
  2. Verifying the fuel level in the diesel generator fuel oil storage tank,
  3. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the diesel oil feed tank,
  4. Verifying the diesel starts and accelerates to at least 600 rpm ( $60 \pm 1.2$  Hz) in less than or equal to 10 seconds. The generator voltage and frequency shall be  $4160 \pm 420$ , -240 volts and  $60 \pm 1.2$  Hz within 10 seconds after the start signal. The diesel generator shall be started for this test by using one of the following signals:
    - a) Manual.
    - b) Simulated loss-of-offsite power by itself.
    - c) Simulated loss-of-offsite power in conjunction with an ESF actuation test signal.
    - d) An ESF actuation test signal by itself.

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\*All planned starts for the purpose of surveillance in this section may be preceded by a prelube period as recommended by the manufacturer.

SURVEILLANCE REQUIREMENTS (Continued)

5. Verifying the generator is synchronized (10 seconds), subsequently loaded to an indicated 4200-4400 Kw\* in less than or equal to 176 seconds,\*\* and operates for at least an additional 60 minutes, and
  6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.
- b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the diesel oil feed tanks.
  - c. At least once per 92 days and from new fuel oil prior to addition to the storage tanks, by obtaining a sample of fuel oil in accordance with ASTM-D270-1975, and by verifying that the sample meets the following minimum requirements and is tested within the specified time limits:
    1. As soon as sample is taken (or prior to adding new fuel to the storage tank) verify in accordance with the test specified in ASTM-D975-77 that the sample has:
      - a) A water and sediment content of less or equal to 0.05 volume percent.
      - b) A kinematic viscosity @ 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes.
      - c) A specific gravity as specified by the manufacturer @ 60/60°F of greater than or equal to 0.85 but less than or equal to 0.99 or an API gravity @ 60°F of greater than or equal to 11 degrees but less than or equal to 35 degrees.
    2. Verify an impurity level of less than 2 mg of insolubles per 100 ml when tested in accordance with ASTM-D2274-70; analysis shall be completed within 7 days after obtaining the sample but may be performed after the addition of new fuel oil; and

\*This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing under direct monitoring of the manufacturer or momentary variation due to changing bus loads shall not invalidate the test.

\*\*The diesel generator fast loading requirement (176 sec) shall be performed at least once per 184 days in these surveillance tests. For all other surveillance tests, load the diesel generator at a rate consistent with the manufacturer's recommendations.



SURVEILLANCE REQUIREMENTS (Continued)

3. Verify the other properties specified in Table 1 of ASTM-D975-1977 and Regulatory Guide 1.137, Revision 1, October 1979, Position 2.a., when tested in accordance with ASTM-D975-1977; analysis shall be completed within 14 days after obtaining the sample but may be performed after the addition of new fuel oil. Failure to meet this requirement shall not affect diesel generator OPERABILITY; however, corrective action shall be initiated within 72 hours to return the fuel oil supply to within acceptable limits.
- d. At least once per 18 months during shutdown by:
  1. Verifying the generator capability to reject a load of greater than or equal to 498 kW (HPSI pump) while maintaining voltage at  $4160 \pm 420$ , -240 volts and frequency at  $60 \pm 4.5$ , -1.2 Hz.
  2. Verifying the generator capability to reject a load of 4400 kW without tripping. The generator voltage shall not exceed 5023 volts during and following the load rejection.
  3. Simulating a loss-of-offsite power by itself, and:
    - a) Verifying deenergization of the emergency busses and load shedding from the emergency busses. # SEE NOTE
    - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 10 seconds after the auto-start signal, energizes the auto-connected shutdown loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization, the steady-state voltage and frequency of the emergency busses shall be maintained at  $4160 \pm 420$ , -240 volts and  $60 \pm 1.2$ , -0.3 Hz during this test. # SEE NOTE
  4. Verifying that on an SIAS 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 steady-state generator voltage and frequency shall be  $4160 \pm 420$ , -240 volts and  $60 \pm 1.2$  Hz within 10 seconds after the auto-start signal; the generator voltage and frequency shall be maintained within these limits during this test.

5. Simulating a loss-of-offsite power in conjunction with an SIAS actuation test signal, and
  - a) Verifying deenergization of the emergency busses and load shedding from the emergency busses.# SEE NOTE
  - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses with permanently connected loads within 10 seconds after the auto-start signal, energizes the auto-connected emergency loads through the load sequencer and operates for greater than or equal to 5 minutes. After energization, the steady-state voltage and frequency of the emergency busses shall be maintained at  $4160 \pm 420$ , -240 volts and  $60 \pm 1.2$ , -0.3 Hz during this test.# SEE NOTE
  - 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 concurrent with a safety injection actuation signal.
6. 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 an indicated 4700 to 4900 Kw\* and during the remaining 22 hours of this test, the diesel generator shall be loaded to an indicated 4200 to 4400 Kw.\* The generator voltage and frequency shall be  $4160 \pm 420$ , -240 volts and  $60 \pm 1.2$  Hz within 10 seconds after the start signal; the steady-state generator voltage and frequency shall be  $4160 \pm 420$  volts and  $60 \pm 1.2$ , -0.3 Hz during this test. Within 5 minutes after completing this 24-hour test, perform Surveillance Requirement 4.8.1.1.2.d.3b.\*\*
7. Verifying that the auto-connected loads to each diesel generator do not exceed the 2000-hour rating of 4400 kW.

## # NOTE:

UNTIL STARTUP FOLLOWING REFUEL 7 In lieu of the prescribed integrated tests (i.e., actual demonstration of shedding, connection, and loading of loads) testing and analysis that shows the capability of the diesel generator to perform these functions will be considered acceptable for train AB A.C. ESF busses. This provision will apply to the associated train AB ESF loads with the exception of Motor Control Center 3AB311-S that has been verified acceptable via analysis.

\*This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing under direct monitoring of the manufacturer or momentary variation due to changing bus loads shall not invalidate the test.

\*\*If Surveillance Requirement 4.8.1.1.2d.3b is not satisfactorily completed, it is not necessary to repeat the preceding 24-hour test. Instead, the diesel generator may be operated at an indicated 4200-4400 kw\* for 1 hour or until internal operating temperatures have stabilized.

SURVEILLANCE REQUIREMENTS (Continued)

8. 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.
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 energizes the emergency loads with offsite power.
10. Verifying that each fuel transfer pump transfers fuel to its associated diesel oil feed tank by taking suction from the opposite train fuel oil storage tank via the installed cross connect.
11. Verifying that the automatic load sequence timer is OPERABLE with the time of each load block within  $\pm 10\%$  of the sequenced load block time.
12. Verifying that the following diesel generator lockout features prevent diesel generator starting only when required:
  - a) turning gear engaged
  - b) emergency stop
  - c) loss of D.C. control power
  - d) governor fuel oil linkage tripped
- e. At the first refueling outage, and thereafter, at intervals not to exceed 24 months, subject the diesels to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.
- f. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting the diesel generators simultaneously, during shutdown, and verifying that the diesel generators accelerate to at least 600 rpm ( $60 * 1.2$  Hz) in less than or equal to 10 seconds.
- g. At least once per 10 years by:
  1. Draining each diesel generator fuel oil storage tank, removing the accumulated sediment, and cleaning the tank using a sodium hypochlorite solution or equivalent, and

EXISTING

SURVEILLANCE REQUIREMENTS (Continued)

2. Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND of the ASME Code at a test pressure equal to 110% of the system design pressure.
  - h. By performing a visual inspection of the interior of the diesel generator fuel oil storage tanks each time the tank is drained and, if necessary, clean the tank with a sodium hypochlorite solution, or equivalent.
- 4.8.1.1.3 Reports - All diesel generator failures, valid or nonvalid, shall be reported in a Special Report to the Commission 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 20 or 100 starts (on a per diesel generator basis) exceeds the criteria in Table 4.8-1, take the appropriate action specified in Table 4.8-1a and attachments thereto.



TABLE 4.8-1  
DIESEL GENERATOR TEST SCHEDULE

EXISTING

<u>NUMBER OF FAILURES IN LAST 20 VALID TESTS.*,#</u>	<u>NUMBER OF FAILURES IN LAST 100 VALID TESTS*</u>	<u>TEST FREQUENCY***</u>
$\leq 1$	$\leq 4$	At least once per 31 days
$\geq 2$	$\geq 5$	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 last 20 and 100 tests are determined on a per diesel generator basis. For the purposes of this test schedule, only valid tests conducted after the Operating License issuance date shall be included in the computation of the "last 100 valid tests". Entry into this test schedule shall be made at the 31 day test frequency. Increased test frequency for one diesel generator shall not affect the test frequency for the remaining diesel generator, even under the STAGGERED TEST BASIS criteria.

\*\*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.

\*\*\*For purposes of determining the required test frequency, the previous test failure count may be reduced to zero if a complete diesel overhaul to like-new conditions is completed, provided that the overhaul, including appropriate post-maintenance operation and testing, is specifically approved by the manufacturer and if acceptable reliability has been demonstrated. The reliability criterion shall be successful completion of 14 consecutive tests in a single series; 10 of these tests shall be in accordance with Surveillance Requirement 4.8.1.1.2a.4,5 and 4 of these tests shall include the fast loading requirement described in the double-asterisked (\*\*) note to surveillance requirement 4.8.1.1.2a.5. If this criterion is not satisfied during the first series of tests, any alternate criterion used to trans-value the failure count to zero may only be implemented with prior approval by the NRC.

#The valid failure to start the "A" Train Diesel Generator on 08/20/91 due to the loss of the power dropping resistor in the governor circuitry is not to be counted toward the adjustment of test frequency for the "A" Train EDG. If the first 14 valid tests on the "A" Train EDG following the 08/20/91 failure do not result in a failure caused by the new power dropping resistor, the valid 08/20/91 failure is trans-valued to zero and this provision no longer applies.

TABLE 4.8-1a

ADDITIONAL RELIABILITY ACTIONS

EXISTING

<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 (see Note 1).
5	11	Declare the diesel generator inoperable. Perform a requalification test program for the affected diesel generator (see Note 2).

TABLE NOTATIONS

- (1) As a minimum the Reliability Improvement Program report for NRC audit shall include:
- 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
  - f) an assessment of the existing reliability of electric power to engineered safety feature equipment

Once the initial report has been prepared detailing the diesel generator reliability improvement program, as defined above, only a supplemental report is required 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, submit a yearly data report on the diesel generator reliability.

- (2) The diesel generator requalification program shall consist of the following:
- (a) Perform seven consecutive successful demands without a failure within 30 days of the diesel generator being restored to operable status and fourteen consecutive successful demands without a failure within 75 days of the diesel generator of being restored to operable status.
  - (b) If a failure occurs during the first seven tests in the requalification test program, perform seven consecutive successful demands without an additional failure within 30 days of the diesel generator being restored to operable status and fourteen consecutive successful demands without a failure within 75 days of the diesel generator (see 2a) being restored to operable status.

EXISTING

TABLE NOTATIONS

- (c) If a failure occurs during the second seven tests (tests 8 through 14) of (a) above, perform fourteen consecutive successful demands without an additional failure within 75 days of the failure which occurred during the requalification testing.
- (d) Following the second failure during the requalification test program, be in as least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.
- (e) 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:

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



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

The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are in accordance with the recommendations of Regulatory Guides 1.9 "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, and 1.108 "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977, and 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, October 1979. The provision allowing diesel generator starts utilizing manufacturers' recommended prelube and/or warmup procedures, including longer starting and loading periods, is to minimize stress and wear on the diesel engine and is in accordance with Generic Letter 84-15 concerning Diesel Generator Reliability and Station Blackout. Fast starts from ambient conditions (includes lubricating and warmup systems operating while in standby lineup) at least once every 184 days is in accordance with RRAB PRA analysis of this surveillance.

The diesel generator Surveillance testing performed once per 18 months during shutdown is in accordance with Regulatory Guide 1.108, Regulatory Position C.2. The maximum voltage limit in Surveillance test 4.8.1.1.2.d.2 was increased to 5023 volts in response to NRC Information Notice 91-13; Inadequate Testing of Emergency Diesel Generators. A maximum voltage limit is provided to ensure that components electrically connected to the diesel generator are not damaged as a result of the momentary voltage excursion experienced during this test.

The Surveillance Requirement for demonstrating the OPERABILITY of the station batteries are based on the recommendations of Regulatory Guide 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage on float charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

Table 4.8-2 specifies the normal limits for each designated pilot cell and each connected cell for electrolyte level, float voltage, and specific gravity. The limits for the designated pilot cells float voltage and specific gravity, greater than 2.13 volts and 0.015 below the manufacturer's full charge specific gravity or a battery charger current that had stabilized at a low value, is characteristic of a charged cell with adequate capacity. The normal limits for each connected cell for float voltage and specific gravity, greater than 2.13 volts and not more than 0.020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than 0.010 below the manufacturer's full charge specific gravity, ensures the OPERABILITY and capability of the battery.

NPF-38-172

ATTACHMENT B

### 3/4.8 ELECTRICAL POWER SYSTEMS

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

##### OPERATING

## PROPOSED

##### LIMITING CONDITION FOR OPERATION

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

- a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and
- b. Two separate and independent diesel generators, each with:
  1. Diesel oil feed tanks containing a minimum volume of 339 gallons of fuel, and
  2. A separate diesel generator fuel oil storage tank containing:
    - a. A minimum volume of 38,760 gallons of fuel, or
    - b. A fuel oil volume less than 38,760 gallons and greater than 38,000 gallons of fuel for a period not to exceed 5 days (provided replacement fuel oil is onsite within the first 48 hours), and
  3. A separate fuel transfer pump.

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

##### ACTION:

- a. With one offsite circuit of 3.8.1.1a inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. circuit by performing Surveillance Requirement 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter. ~~If either diesel generator has not been successfully tested within the past 24 hours, demonstrate its OPERABILITY by performing Surveillance Requirement 4.8.1.1.2a.4 separately for each diesel generator (unless it is already operating) within 24 hours.~~ Restore the offsite 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 3.8.1.1b inoperable, demonstrate the OPERABILITY of the offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1a (separately for each offsite A.C. circuit) within 1 hour and at least once per 8 hours thereafter. If the diesel generator became inoperable due to any cause other than an inoperable support system, an independently testable component, or preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE diesel generator (unless it has been successfully tested in the last 24 hours) by performing Surveillance Requirement 4.8.1.1.2a.4 within 24.8 hours unless the absence of any potential common mode failure for the remaining diesel generator is demonstrated. Restore the diesel generator 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.
- c. With one offsite A.C. circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining offsite A.C. circuit by performing Surveillance Requirement 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter; and, if the diesel generator became inoperable due to any cause other than an inoperable support system, an independently testable component, or preplanned preventive maintenance or testing, demonstrate the OPERABILITY of the remaining OPERABLE diesel generator by performing Surveillance Requirement 4.8.1.1.2a.4 within 8

## PROPOSED

## ACTION (Continued)

hours (unless it is already operating) unless the absence of any potential common mode failure for the remaining diesel generator is demonstrated. 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 the other A.C. power source (offsite A.C. circuit or diesel generator) to OPERABLE status in accordance with the provisions of ACTION statement a or b, as appropriate, with the time requirement of that ACTION statement based on the time of initial loss of the remaining inoperable A.C. power source. A successful test of diesel generator OPERABILITY per Surveillance Requirement 4.8.1.1.2a.4 performed under this ACTION statement satisfies the diesel generator test requirement of ACTION statement a or b.

- d. With one diesel generator inoperable, in addition to ACTION b. or c. above, verify that:
- (1) All required systems, subsystems, trains, components, and devices that depend on the remaining OPERABLE diesel generator as a source of emergency power are also OPERABLE, and
  - (2) When in MODE 1, 2, or 3, the steam-driven emergency feed pump is OPERABLE.

If these conditions are not satisfied within 2 hours be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

- e. With two of the above required offsite A.C. circuits inoperable, ~~demonstrate the OPERABILITY of two diesel generators by performing Surveillance Requirement 4.8.1.1.2a.4 separately for each diesel generator within 8 hours unless the diesel generators are already operating;~~ restore one of the inoperable offsite A.C. circuits to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours. Following restoration of one offsite A.C. circuit, follow ACTION statement a with the time requirement of that ACTION statement based on the time of initial loss of the remaining inoperable offsite A.C. circuit. A successful test of diesel generator OPERABILITY per Surveillance Requirement 4.8.1.1.2a.4 performed under this ACTION statement satisfies the diesel generator test requirement of ACTION statement a.
- f. With two of the above required diesel generators inoperable, demonstrate the OPERABILITY of two offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1a within 1 hour and at least once per 8 hours thereafter; restore 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. Following restoration of one diesel generator, follow ACTION statement b with the time requirement of that ACTION statement based on the time of initial loss of the remaining inoperable diesel generator.



## SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

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

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE\*:

- a. At least once per 31 days in accordance with the frequency specified in Table 4-8-1 on a STAGGERED TEST BASIS by:
  1. Verifying the fuel level in the diesel oil feed tank,
  2. Verifying the fuel level in the diesel generator fuel oil storage tank,
  3. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the diesel oil feed tank,
  4. Verifying the diesel starts and accelerates to at least 600 rpm ( $60 \pm 1.2$  Hz) in less than or equal to 10 seconds\*\*. The generator voltage and frequency shall be at least 3920/4160 + 420, -240 volts and 58.8/60  $\pm 1.2$  Hz within 10 seconds after the start signal\*\*. The steady state voltage and frequency shall be maintained at 4160 + 420, -240 volts and  $60 \pm 1.2$  Hz. The diesel generator shall be started for this test by using one of the following signals:
    - a) Manual.
    - b) Simulated loss-of-offsite power by itself.
    - c) Simulated loss-of-offsite power in conjunction with an ESF actuation test signal.
    - d) An ESF actuation test signal by itself.

\*All planned starts for the purpose of surveillance in this section may be preceded by a prelube period as recommended by the manufacturer.

\*\*A modified diesel generator start involving idling and gradual acceleration to synchronous speed may be used for this surveillance requirement as recommended by the manufacturer. When modified start procedures are not used, the time, speed, voltage, and frequency tolerances of this surveillance requirement must be met.

5. Verifying the generator is synchronized, ~~(10 seconds), subsequently loaded to an indicated 4000-4200-4400 Kw\* in accordance with the manufacturer's recommendation less than or equal to 176 seconds,\*\* and operates for at least an additional 60 minutes, and~~
6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.
- b. At least once per 31 days and after each operation of the diesel where the period of operation was greater than or equal to 1 hour by checking for and removing accumulated water from the diesel oil feed tanks.
- c. Maintain properties of new and stored fuel oil in accordance with the Fuel Oil Testing Program. ~~At least once per 92 days and from new fuel oil prior to addition to the storage tanks, by obtaining a sample of fuel oil in accordance with ASTM D270-1975, and by verifying that the sample meets the following minimum requirements and is tested within the specified time limits:~~
  1. ~~As soon as sample is taken (or prior to adding new fuel to the storage tank) verify in accordance with the test specified in ASTM D975-77 that the sample has:~~
    - a) ~~A water and sediment content of less or equal to 0.05 volume percent.~~
    - b) ~~A kinematic viscosity @ 40°C of greater than or equal to 1.9 centistokes, but less than or equal to 4.1 centistokes.~~
    - c) ~~A specific gravity as specified by the manufacturer @ 60/60°F of greater than or equal to 0.85 but less than or equal to 0.99 or an API gravity @ 60°F of greater than or equal to 11 degrees but less than or equal to 35 degrees.~~
  2. ~~Verify an impurity level of less than 2 mg of insolubles per 100 ml when tested in accordance with ASTM D2274-70; analysis shall be completed within 7 days after obtaining the sample but may be performed after the addition of new fuel oil; and~~

\*This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing under direct monitoring of the manufacturer or momentary variation due to changing bus loads shall not invalidate the test.

\*\*The diesel generator fast loading requirement (176 sec) shall be performed at least once per 184 days in these surveillance tests. For all other surveillance tests, load the diesel generator at a rate consistent with the manufacturer's recommendations.

3. ~~Verify the other properties specified in Table 1 of ASTM D975-1977 and Regulatory Guide 1.137, Revision 1, October 1979, Position 2.a., when tested in accordance with ASTM D975-1977; analysis shall be completed within 14 days after obtaining the sample but may be performed after the addition of new fuel oil. Failure to meet ~~this~~these requirements shall not necessarily affect diesel generator OPERABILITY; however, corrective action shall be initiated within 72 hours to return the fuel oil supply to within acceptable limits.~~
- d. At least once per 18 months during shutdown by:
1. Verifying the generator capability to reject a load of greater than or equal to 498 kW (~~HPSI pump~~) while maintaining voltage at  $4160 + 420, -240$  volts and frequency at  $60 + 4.5, -1.2$  Hz.
  2. Verifying the generator capability to reject a load of an indicated 4000-4400 kw without tripping. The generator voltage shall not exceed 5023 volts during and following the load rejection.
  3. Simulating a loss-of-offsite power by itself, and:
    - a) Verifying deenergization of the emergency busses and load shedding from the emergency busses. ~~# SEE NOTE~~
    - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses with and the permanently connected loads within 10 seconds after the auto-start signal, energizes the auto-connected shutdown loads through the load sequencer and operates for greater than or equal to 5 minutes while its generator is loaded with the shutdown loads. After energization, the steady-state voltage and frequency of the emergency busses shall be maintained at  $4160 + 420, -240$  volts and  $60 + 1.2, -0.3$  Hz during this test.  
~~# SEE NOTE~~
  4. Verifying that on an SIAS 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 steady-state generator voltage and frequency shall be  $4160 + 420, -240$  volts and  $60 \pm 1.2$  Hz within 10 seconds after the auto-start signal; the generator voltage and frequency shall be maintained within these limits during this test.

5. Simulating a loss-of-offsite power in conjunction with an SIAS actuation test signal, and
  - a) Verifying deenergization of the emergency busses and load shedding from the emergency busses. ~~# SEE NOTE~~
  - b) Verifying the diesel starts on the auto-start signal, energizes the emergency busses ~~with and the~~ permanently connected loads within 10 seconds after the auto-start signal, energizes the auto-connected emergency loads through the load sequencer and operates for greater than or equal to 5 minutes. After energization, the steady-state voltage and frequency of the emergency busses shall be maintained at  $4160 + 420, -240$  volts and  $60 + 1.2, -0.3$  Hz during this test. ~~# SEE NOTE~~
  - 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 concurrent with a safety injection actuation signal.
6. Verifying the diesel generator operates for ~~at least~~ an interval of not less than 24 hours. During ~~the first~~ 2 hours of this test, the diesel generator shall be loaded to an indicated 4700 to 4900 Kw\* and during ~~the remaining~~ 22 hours of this test, the diesel generator shall be loaded to an indicated ~~4000~~ 4200 to 4400 Kw.\* The generator voltage and frequency shall be  $4160 + 420, -240$  volts and  $60 \pm 1.2$  Hz within 10 seconds after the start signal; the steady-state generator voltage and frequency shall be  $4160 \pm 420$  volts and  $60 + 1.2, -0.3$  Hz during this test. Within 5 minutes after completing this 24-hour test, perform Surveillance Requirement 4.8.1.1.2.a.4 ~~4.8.1.1.2.d.3b~~.\*\*
7. Verifying that the auto-connected loads and permanently connected loads to each diesel generator do not exceed the 2000-hour rating of 4400 kW.

# NOTE:

UNTIL STARTUP FOLLOWING REFUEL 7 In lieu of the prescribed integrated tests (i.e., actual demonstration of shedding, connection, and loading of loads) testing and analysis that shows the capability of the diesel generator to perform these functions will be considered acceptable for train AB A.C. ESF busses. This provision will apply to the associated train AB ESF loads with the exception of Motor Control Center 3AB311-S that has been verified acceptable via analysis

\*This band is meant as guidance to avoid routine overloading of the engine. Loads in excess of this band for special testing under direct monitoring of the manufacturer or momentary variation due to changing bus loads shall not invalidate the test.

\*\*If Surveillance Requirement 4.8.1.1.2.a.4 ~~4.8.1.1.2.d.3b~~ is not satisfactorily completed, it is not necessary to repeat the preceding 24-hour test. Instead, the diesel generator may be operated at an indicated 4000 ~~4200~~ 4400 kw\* for 2-4 hours or until internal operating temperatures have stabilized.



8. 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.
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 energizes the emergency loads with offsite power.
10. Verifying that each fuel transfer pump transfers fuel to its associated diesel oil feed tank by taking suction from the opposite train fuel oil storage tank via the installed cross connect.
11. Verifying that the automatic load sequence timer is OPERABLE with the time of each load block within  $\pm 10\%$  of the sequenced load block time.
12. Verifying that the following diesel generator lockout features prevent diesel generator starting only when required:
  - a) turning gear engaged
  - b) emergency stop
  - c) loss of D.C. control power
  - d) governor fuel oil linkage tripped
- e. At the first refueling outage, and thereafter, at intervals not to exceed 24 months, subject the diesels to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service.
- f. At least once per 10 years or after any modifications which could affect diesel generator interdependence by starting the diesel generators simultaneously, during shutdown, and verifying that the diesel generators accelerate to at least 600 rpm ( $60 \pm 1.2$  Hz) in less than or equal to 10 seconds.
- g. At least once per 10 years by:
  1. Draining each diesel generator fuel oil storage tank, removing the accumulated sediment, and cleaning the tank using a sodium hypochlorite solution or equivalent, ~~and~~ or an appropriate mechanical method (such as pressure washing or manual wiping).

2. ~~Performing a pressure test of those portions of the diesel fuel oil system designed to Section III, subsection ND of the ASME Code at a test pressure equal to 110% of the system design pressure.~~

h. By performing a visual inspection of the interior of the diesel generator fuel oil storage tanks each time the tank is drained and, if necessary, clean the tank with a sodium hypochlorite solution, or equivalent, or with an appropriate mechanical method (such as pressure washing or manual wiping).

4.8.1.1.3 Reports - (Not Used) ~~All diesel generator failures, valid or nonvalid, shall be reported in a Special Report to the Commission 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 20 or 100 starts (on a per diesel generator basis) exceeds the criteria in Table 4.8-1, take the appropriate action specified in Table 4.8-1a and attachments thereto.~~

PROPOSED

DIESEL GENERATOR TEST SCHEDULENot Used**PROPOSED**

<u>NUMBER OF FAILURES IN</u> <u>LAST 20 VALID TESTS, * #</u>	<u>NUMBER OF FAILURES IN</u> <u>LAST 100 VALID TESTS *</u>	<u>TEST FREQUENCY ***</u>
$\leq 1$	$\leq 4$	At least once per 31 days
$\geq 2$	$\geq 5$	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 last 20 and 100 tests are determined on a per diesel generator basis. For the purposes of this test schedule, only valid tests conducted after the Operating License issuance date shall be included in the computation of the "last 100 valid tests". Entry into this test schedule shall be made at the 31 day test frequency. Increased test frequency for one diesel generator shall not affect the test frequency for the remaining diesel generator, even under the STAGGERED TEST BASES criteria.~~

~~\*\*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.~~

~~\*\*\*For purposes of determining the required test frequency, the previous test failure count may be reduced to zero if a complete diesel overhaul to like new conditions is completed, provided that the overhaul, including appropriate post maintenance operation and testing, is specifically approved by the manufacturer and if acceptable reliability has been demonstrated. The reliability criterion shall be successful completion of 14 consecutive tests in a single series; 10 of these tests shall be in accordance with Surveillance Requirement 4.8.1.1.2a.4,5 and 4 of these tests shall include the fast loading requirement described in the double asterisked(\*\*) note to surveillance requirement 4.8.1.1.2a.5. If this criterion is not satisfied during the first series of tests, any alternate criterion used to trans value the failure count to zero may only be implemented with prior approval by the NRC.~~

~~#The valid failure to start the "A" Train Diesel Generator on 08/20/91 due to the loss of the power dropping resistor in the governor circuitry is not to be counted toward the adjustment of test frequency for the "A" Train EDG. If the first 14 valid tests on the "A" Train EDG following the 08/20/91 failure do not result in a failure caused by the new power dropping resistor, the valid 08/20/91 failure is trans valued to zero and this provision no longer applies.~~

TABLE 4.8-1a

## ADDITIONAL RELIABILITY ACTIONS

PROPOSED

No. of failures in last 20 valid tests	No. of failures in last 100 valid tests	Action
3	6	Within 14 days prepare and maintain a report for NRC audit describing the diesel generator reliability improvement program implemented at the site (see Note 1).
5	11	Declare the diesel generator inoperable. Perform a requalification test program for the affected diesel generator (see Note 2).



PROPOSED

## TABLE NOTATIONS

- ~~(1) As a minimum the Reliability Improvement Program report for NRC audit shall include:~~
- ~~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~~
  - ~~f) an assessment of the existing reliability of electric power to engineered safety feature equipment~~

~~Once the initial report has been prepared detailing the diesel generator reliability improvement program, as defined above, only a supplemental report is required 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, submit a yearly data report on the diesel generator reliability.~~

- ~~(2) The diesel generator requalification program shall consist of the following:~~
- ~~(a) Perform seven consecutive successful demands without a failure within 30 days of the diesel generator being restored to operable status and fourteen consecutive successful demands without a failure within 75 days of the diesel generator of being restored to operable status.~~
  - ~~(b) If a failure occurs during the first seven tests in the requalification test program, perform seven consecutive successful demands without an additional failure within 30 days of the diesel generator being restored to operable status and fourteen consecutive successful demands without a failure within 75 days of the diesel generator (see 2a) being restored to operable status.~~

PROPOSED

## TABLE NOTATIONS

- ~~———— (c) ——— If a failure occurs during the second seven tests (tests 8 through 14) of (a) above, perform fourteen consecutive successful demands without an additional failure within 75 days of the failure which occurred during the requalification testing.~~
- ~~———— (d) ——— Following the second failure during the requalification test program, be in as least HOT STANDBY within the next 6 hours and COLD SHUTDOWN within the following 30 hours.~~
- ~~———— (e) ——— 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:~~

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

ADMINISTRATIVE CONTROLS

PROCEDURES AND PROGRAMS (Continued)

6.8.4 h. Diesel Fuel Oil Testing Program

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

1. Acceptability of new fuel oil for use prior to addition to the storage tanks by determining that the fuel oil has:
  - a. An API gravity or an absolute specific gravity within limits,
  - b. A flash point and kinematic viscosity within limits for ASTM 2D fuel oil, and
  - c. Either a clear and bright appearance with proper color or a water and sediment content of less than or equal to 0.05 volume percent.
2. Other properties for ASTM 2D fuel oil are within limits within 30 days following sampling and addition to the storage tanks; and
3. Total particulate concentration of the fuel is less than or equal to 10 mg/l when tested every 31 days in accordance with ASTM D-2276, Method A-2 or A-3.

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

The Surveillance Requirements for demonstrating the OPERABILITY of the diesel generators are ~~consistent in accordance~~ with the recommendations of Regulatory Guides 1.9 "Selection of Diesel Generator Set Capacity for Standby Power Supplies," March 10, 1971, and 1.108 "Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants," Revision 1, August 1977, and 1.137, "Fuel Oil Systems for Standby Diesel Generators," Revision 1, October 1979. ~~Other~~ The provisions are derived from Generic Letter 93-05 "Line-Item Technical Specifications Improvements to Reduce Surveillance Requirements for Testing During Power Operation" 94-01 "Removal of Accelerated Testing and Special Reporting Requirements for Emergency Diesel Generators," and NUREG 1432 Standard Technical Specifications Combustion Engineering Plants allowing diesel generator starts utilizing manufacturers' recommended prelube and/or warmup procedure, including longer starting and loading periods, is to minimize stress and wear on the diesel engine and is in accordance with Generic Letter 94-15 concerning Diesel Generator Reliability and Station Blackout. Fast starts from ambient conditions (includes lubricating and warmup systems operating while in standby lineup) at least once every 184 days is in accordance with RRAB PA analysis of this surveillance.

The diesel generator Surveillance testing performed once per 18 months during shutdown is in accordance with Regulatory Guide 1.108, Regulatory Position C.2.

INSERT A

The maximum voltage limit in surveillance test 4.8.1.1.2.d.2 was increased to 5023 volts in response to NRC Information Notice 91-13; Inadequate Testing of Emergency Diesel Generators. A maximum voltage limit is provided to ensure that components electrically connected to the diesel generator are not damaged as a result of the momentary voltage excursion experienced during this test.

The Surveillance Requirement for demonstrating the OPERABILITY of the station batteries are based on the recommendations of Regulatory Guide 1.129, "Maintenance Testing and Replacement of Large Lead Storage Batteries for Nuclear Power Plants," February 1978, and IEEE Std 450-1980, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations."

Verifying average electrolyte temperature above the minimum for which the battery was sized, total battery terminal voltage on float charge, connection resistance values and the performance of battery service and discharge tests ensures the effectiveness of the charging system, the ability to handle high discharge rates and compares the battery capacity at that time with the rated capacity.

Table 4.8-2 specifies the normal limits for each designated pilot cell and each connected cell for electrolyte level, float voltage, and specific gravity. The limits for the designated pilot cells float voltage and specific gravity, greater than 2.13 volts and 0.015 below the manufacturer's full charge specific gravity or a battery charger current that had stabilized at a low value, is characteristic of a charged cell with adequate capacity. The normal limits for each connected cell for float voltage and specific gravity, greater than 2.13 volts and not more than 0.020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than 0.010 below the manufacturer's full charge specific gravity, ensures the OPERABILITY and capability of the battery.

# PROPOSED

REVIEWERS NOTE: The underlined text is new. The italicized text was proposed in a previous change submitted by letter dated July 7, 1995.

The Onsite Power System includes three 4.16 kV ESF buses (3A3-S, 3B3-S, and 3AB3-S). Power for safety related loads is normally supplied by the non-safety related 4.16 kV buses (3A2 and 3B2) of the Offsite Power System. Should offsite power from either of these buses be lost, the Onsite Power System will receive power automatically from the appropriate diesel generator. Non-safety related loads will be automatically disconnected from the safety Onsite Power System. Each ESF bus (3A3-S or 3B3-S) is redundant to the other; each can supply sufficient power to its safety related loads to enable safe shutdown, or to mitigate the consequences of a design basis accident. The third bus, 3AB3-S, may be connected to either 3A3-S or 3B3-S, but never to both. Therefore 3AB3-S is not considered as a third, separate source of ESF power. The three ESF buses and their loads are tested as described below.

*Surveillance requirements 4.8.1.1.2.d.3 and 4.8.1.1.2.d.5 are the integrated testing requirements that demonstrate the as designed operation of the standby A.C. power sources during loss of the offsite power source and during a loss of offsite power in conjunction with a Safety Injection Actuation Signal (SIAS).*

*The testing verifies all actions encountered from the loss-of-offsite power (LOOP), including shedding of the nonessential loads and the energizing of the emergency busses and respective loads from the diesel generator. It further demonstrates the capability of the diesel generators to automatically achieve the required voltage and frequency within the specified time.*

*The requirement to verify the connection and energization of permanently connected loads and auto-connected loads is intended to satisfactorily show the relationship of these loads to the diesel generators loading logic. Permanently connected loads are those loads that remain connected to the bus upon the bus deenergizing and are subsequently energized by the diesel generators. Auto connected loads are those loads that are disconnected from the bus upon the bus deenergizing and are auto-connected through the automatic load sequencer. Surveillance 4.8.1.1.2.d.3b verifies the diesel generators capability to energize the shutdown loads and surveillance 4.8.1.1.2.d.5b verifies the diesel generators capability to energize the emergency loads. Shutdown loads are those loads required upon a LOOP (Re: FSAR Table 8.3.1). Emergency loads are those loads required upon a LOOP in conjunction with an SIAS. This testing verifies that in the event of a Design Bases Accident (DBA) coincident with a loss of offsite power, the diesel generators are capable of supplying the necessary power to Engineered Safety Features (ESF) systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded.*

Surveillance requirement 4.8.1.1.2d.1 requires the verification at least once per 18 months of the diesel generators' ability to reject a load of greater than or equal to 498 Kw while specific voltage and frequency constraints are maintained. The intent of this Surveillance requirement is to require the diesel generator to reject the largest single load. The largest single load on the diesel generator is the Essential Chiller which requires 430 Kw under tornado/missile conditions. The difference between the specified 498 Kw load in the Surveillance requirement and the 430 Kw required by the actual largest single load is a margin of conservatism. A method of rejecting a load greater than or equal to 498 Kw utilizing the wet and dry cooling tower fans has been developed and will satisfy the Surveillance requirement.

The loading range for the diesel generators (4000-4400 Kw) as specified in surveillance requirements is equal to approximately 90 to 100 percent of its continuous rating. This provides for a range to conduct testing without inadvertently overloading of the diesel generators. Inadvertent overloading creates unnecessary wear and mechanical stress that may adversely affect the reliability and longevity of the diesel generators.