

ELECTRICAL POWER SYSTEMS**FOR INFORMATION ONLY**D.C. DISTRIBUTION - OPERATINGLIMITING CONDITION FOR OPERATION

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

TRAIN "A" consisting of 250/125-volt D.C. MCC 1, 125-volt D.C. station batteries 1P and 1N and 2 full capacity chargers.

TRAIN "B" consisting of 250/125-volt D.C. MCC 2, 125-volt D.C. station batteries 2P and 2N and 2 full capacity chargers.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

- a. With only one 125-volt D.C. bus of a 250/125 volt D.C. MCC OPERABLE, 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 only one 125-volt D.C. battery or only one charger of one MCC OPERABLE, restore the inoperable battery 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

4.8.2.3.1 Each D.C. bus train shall be determined OPERABLE and energized with disconnect switches open between redundant busses at least once per 7 days by verifying correct disconnect switch/breaker alignment, indicated power availability from the charger and battery, and voltage on the bus of greater than or equal to 125 volts D.C.

4.8.2.3.2 Each 125-volt battery and charger shall be demonstrated OPERABLE:

- a. At least once per 7 days by:
 1. Verifying that the parameters in Table 4.8-1 meet the Category A limits, and

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2. Verifying total battery terminal voltage is greater than or equal to 129 volts on float charge.
- b. At least once per 92 days and within 7 days after a battery discharge (battery terminal voltage below 110 volts), or battery overcharge (battery terminal voltage above 150 volts), by:
 1. Verifying that the parameters in Table 4.8-1 meet the Category B limits,
 2. Verifying that there is no visible corrosion at either terminals or connectors, or the connection resistance of these items is less than 150×10^{-6} ohms, and
 3. Verifying that the average electrolyte temperature of every sixth connected cell is above 60°F.
 - c. At least once per 18 months by verifying that the battery charger will supply at least 475 amperes at a minimum of 130 volts for at least 8 hours; and at least once each REFUELING INTERVAL 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 and coated with anti-corrosion material, and
 3. The resistance of each cell-to-cell and terminal connection is less than or equal to 150×10^{-6} Ohms.
 - d. At least once each REFUELING INTERVAL, during shutdown, by verifying that the battery capacity is adequate to supply and maintain in OPERABLE status all of the actual or simulated emergency loads for the design duty cycle when the battery is subjected to a battery service test. Once per 60 months, a modified performance discharge test may be performed in lieu of the battery service test.
 - e. Verify battery capacity is $\geq 80\%$ of the manufacturer's rating when subjected to a performance discharge test or modified performance discharge test:
 1. At least once per 60 months, during shutdown, when the battery shows no signs of degradation, and has not reached 85% of service life,

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2. At least once per 12 months, during shutdown, when the battery shows signs of degradation, or has reached 85% of service life with < 100% of the manufacturer's rated capacity.

3. At least once per 24 months, during shutdown, when the battery has reached 85% of service life with \geq 100% of the manufacturer's rated capacity.

~~At least once per 60 months, during shutdown, by verifying that the battery capacity is at least 80% of the manufacturer's rating when subjected to a performance discharge test. Once per 60 month interval this performance discharge test may be performed in lieu of the battery service test.~~

~~f. Every REFUELING INTERVAL, during shutdown, performance discharge tests of battery capacity shall be given to any battery that shows signs of degradation or has reached 85% of the service life expected for the application. Degradation is indicated when the battery capacity drops more than 10% of rated capacity from its average on previous performance tests, or is below 90% of the manufacturer's rating.~~

TABLE 4.8-1

BATTERY SURVEILLANCE REQUIREMENTS

Parameter	CATEGORY A ⁽¹⁾	CATEGORY B ⁽²⁾	
	Limits for each designated pilot cell	Limits for each connected cell	Allowable ⁽³⁾ value for each connected cell
Electrolyte Level	>Minimum level indication mark, and $\leq \frac{1}{4}$ " above maximum level indication mark ^(d)	>Minimum level indication mark, and $\leq \frac{1}{4}$ " above maximum level indication mark ^(d)	Above top of plates, and not overflowing
Float Voltage	≥ 2.13 volts	≥ 2.13 volts ^(b)	> 2.07 volts
Specific Gravity ^(a)	≥ 1.200 ^(c)	≥ 1.195	Not more than .020 below the average of all connected cells
		Average of all connected cells > 1.205	Average of all connected cells ≥ 1.195 ^(c)

(a) Corrected for electrolyte temperature and level. If the level is between the high and low marks and the temperature corrected specific gravity is within the manufacturer's nominal specific gravity range, it is not necessary to correct for level.

(b) Corrected for average electrolyte temperature.

(c) Or battery charging current, following a service, ~~or~~ performance discharge, or modified performance discharge test, is less than two amps, when on a float charge.

(d) It is acceptable for the electrolyte level to temporarily increase above the specified maximum during equalizing charges provided it is not overflowing.

(1) For any Category A parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that within 24 hours all the Category B measurements are taken and found to be within their allowable values, and provided all parameter(s) are restored to within limits within the next 6 days.

(2) For any Category B parameter(s) outside the limit(s) shown, the battery may be considered OPERABLE provided that they are within their allowable values and provided the parameter(s) are restored to within limits within 7 days.

(3) Any Category B parameter not within its allowable value indicates an inoperable battery.

3/4.8 ELECTRICAL POWER SYSTEMS**FOR INFORMATION ONLY**BASES

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

Qualified offsite to onsite circuits are those that are described in the USAR and are part of the licensing basis for the plant.

An OPERABLE qualified offsite to onsite circuit consists of all breakers, transformers, switches, interrupting devices, cabling, and controls required to transmit power from the offsite transmission network to the onsite Class 1E essential buses.

An OPERABLE qualified offsite to onsite circuit consists of:

1. One OPERABLE 345 kV transmission line
2. One OPERABLE 345 - 13.8 kV startup transformer
3. One OPERABLE 13.8 kV bus, and
4. One OPERABLE 13.8 - 4.16 kV bus tie transformer.

Typically, the electrical power reserve source selector switches are selected to the two different startup transformers. However, under certain conditions it is appropriate to select both switches to the same startup transformer. The circuit in which the startup transformer does not have a reserve source selector switch pre-selected to it must still meet the requirements of having its 345 kV transmission line, startup transformer, 13.8 kV bus and bus tie transformer OPERABLE.

In the case where a 13.8 kV bus is powered from a startup transformer, the reserve source selector switch should be selected to the opposite startup transformer.

In MODES 1-4, if one of the required 13.8 kV - 4.16 kV bus tie transformers is inoperable, then one qualified offsite to onsite circuit is inoperable and the requirement of LCO 3.8.1.1.a is not met. The appropriate corresponding ACTION statement must be entered. The essential 4.16 kV buses remain OPERABLE while energized with one 13.8 kV - 4.16 kV bus tie transformer inoperable.

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the safety analyses and are based upon maintaining at least one 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.

3/4.8 ELECTRICAL POWER SYSTEMSBASES

Surveillance Requirements 4.8.1.1.2.a.4 and 4.8.1.1.2.c.4 verify proper starting of the Emergency Diesel Generators from standby conditions. Verification that an Emergency Diesel Generator has achieved a frequency of 60 Hz within the required time constraints meets the requirement for verifying the Emergency Diesel Generator has accelerated to 900 RPM.

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.

The Surveillance Requirements 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. 450-1995~~1980~~, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead - Acid Batteries for Stationary Applications." "~~IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Lead Storage Batteries for Generating Stations and Substations.~~" except that certain tests will be performed at least once each REFUELING INTERVAL.

Battery degradation is indicated when the battery capacity drops more than 10% from its capacity on the previous performance discharge or modified performance discharge test, or is below 90% of the manufacturer's rated capacity.

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 4.8-1 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 cell's float voltage and specific gravity, greater than 2.13 volts and .015 below the manufacturer's full charge specific gravity or a battery charger current of less than two amps 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 .020 below the manufacturer's full charge specific gravity with an average specific gravity of all the connected cells not more than .010 below the manufacturer's full charge specific gravity, ensures the OPERABILITY and capability of the battery. Exceptions to the specific gravity requirements are taken to allow for the normal deviations experienced after a battery discharge and subsequent recharge associated with a service, ~~or~~ performance discharge, or modified performance discharge test. The specific gravity deviations are recognized and discussed in IEEE Std. 450-1995~~1980~~.

FOR INFORMATION ONLY3/4.8 ELECTRICAL POWER SYSTEMSBASES

Operation with a battery cell's parameter outside the normal limit but within the allowable value specified in Table 4.8-1 is permitted for up to seven days. During this seven-day period: (1) the allowable value for electrolyte level ensures no physical damage to the plates with an adequate electron transfer capability; (2) the allowable value for the average specific gravity of all the cells, not more than .020 below the manufacturer's recommended full charge specific gravity, ensures that the decrease in rating will be less than the safety margin provided in sizing; (3) the allowable value for an individual cell's specific gravity, ensures that an individual cell's specific gravity will not be more than .040 below the manufacturer's full charge specific gravity and that the overall capability of the battery will be maintained within an acceptable limit; and (4) the allowable value for an individual cell's float voltage, greater than 2.07 volts, ensures the battery's capability to perform its design function.