

3.7 AUXILIARY ELECTRICAL POWER

Applicability: Applies to the OPERATING status of the auxiliary electrical power supply.

Objective: To assure the OPERABILITY of the auxiliary electrical power supply.

Specification:

NOTE: LCO 3.0.C.2 is not applicable to Auxiliary Electrical Power.

- A. The reactor shall not be made critical unless all of the following requirements are satisfied:
1. The following buses or panels energized.
 - a. 4160 volt buses 1C and 1D in the Turbine Building Switchgear Room.
 - b. 460 volt buses:

USS 1A2, USS 1B2, MCC 1A21, MCC 1B21, Vital MCC 1A2, and Vital MCC 1B2 in the Reactor Building 480 V Switchgear Room.

USS 1A3 and USS 1B3 in the Intake Structure.

MCC 1A21A, MCC 1A21B, MCC 1B21A, MCC 1B21B, and Vital MCC 1AB2 on Reactor Building Elevation 23' 6".

MCC 1A24 and 1B24 in the Boiler House.
 - c. 208/120 volt panels CIP-3, IP-4, IP-4A, IP-4B, IP-4C and VACP-1 in the Reactor Building Switchgear Room.
 - d. 120 volt protection panels PSP-1 and PSP-2 in the Lower Cable Spreading Room.
 - e. 125 VDC Distribution Centers DC-B and DC-C.
125 VDC Power Panels DC-D and DC-F.
125 VDC MCCs DC-1 and DC-2
 - f. 24 volt DC power panels DC-A and DC-B in the Lower Cable Spreading Room.
 2. One 230 KV line is fully operational and switch gear and both startup transformers are energized to carry power to the station 4160 volt AC buses and carry power to or away from the plant.
 3. An additional source of power consisting of one of the following is in service connected to feed the appropriate plant 4160 V bus or buses:
 - a. A 69 KV line fully operational.
 - b. A 34.5 KV line fully operational.

4. Station batteries B and C and an associated battery charger are OPERABLE. Switchgear control power for 4160 volt bus 1D and 460 volt buses 1B2 and 1B3 is provided by 125 VDC Distribution Center DC-B. Switchgear control power for 4160 volt bus 1C and 460 volt buses 1A2 and 1A3 is provided by 125 VDC Distribution Center DC-C.
 5. Bus tie breakers ED and EC are in the open position.
- B. The reactor shall be PLACED IN the COLD SHUTDOWN CONDITION if the availability of power falls below that required by Specification A above, except that
1. The reactor may remain in operation for a period not to exceed 7 days if a startup transformer is out of service. None of the engineered safety feature equipment fed by the remaining transformer may be out of service.
 2. The reactor may remain in operation for a period not to exceed 7 days if 125 VDC Motor Control Center DC-2 is out of service, provided the requirements of Specification 3.8 are met.
 3. The reactor may remain in operation provided the requirements of Specification 3.7.D are met.
- C. Standby Diesel Generators
1. The reactor shall not be made critical unless both diesel generators are operable and capable of feeding their designated 4160 volt buses.
 2. If one diesel generator becomes inoperable during power operation, repairs shall be initiated immediately and the other diesel shall be operated at least one hour every 24 hours at greater than 80% rated load until repairs are completed. The reactor may remain in operation for a period not to exceed 7 days if a diesel generator is out of service. During the repair period none of the engineered safety features normally fed by the operational diesel generator may be out of service or the reactor shall be placed in the cold shutdown condition. If a diesel is made inoperable for biennial inspection, the testing and engineered safety feature requirements described above must be met.
 3. If both diesel generators become inoperable during power operation, the reactor shall be placed in the cold shutdown condition.
 4. For the diesel generators to be considered operable:
 - A) There shall be a minimum of 14,000 gallons of diesel fuel in the standby diesel generator fuel tank,

OR

 - B) To facilitate inspection, repair, or replacement of equipment which would require full or partial draining of the standby diesel generator fuel tank, the following conditions must be met:
 - 1) There shall be a minimum of 14,000 gallons of fuel oil contained in temporary tanker trucks, connected and aligned to the diesel generator fill station.

-AND-

- 2) The reactor cavity shall be flooded above elevation 117 feet with the spent fuel pool gates removed, or all reactor fuel shall be contained in the spent fuel pool with spent fuel pool gates installed.

AND

- 3) The plant shall be placed in a configuration in which the core spray system is not required to be OPERABLE.

D. Station Batteries and Associated Battery Chargers

1. With one required station battery B or C charger inoperable:
 - a. Restore associated station battery terminal voltage to greater than or equal to the minimum established float voltage within 2 hours,
 - b. Verify affected station battery float current ≤ 2 amps once per 12 hours, and
 - c. Restore station battery charger to OPERABLE status within 7 days.
2. With one or more station B and C batteries inoperable due to:
 - a. One station battery B or C having one or more battery cells float voltage < 2.07 volts, perform 4.7.C.1.a and 4.7.C.1.b for the affected battery within 2 hours and restore affected cell(s) voltage ≥ 2.07 volts within 24 hours.
 - b. One station battery B or C float current > 2 amps, perform 4.7.C.1.a for the affected battery within 2 hours and restore affected battery float current to within limits within 12 hours.
 - c. One station battery B or C having one or more cells electrolyte level less than minimum established design limits, if electrolyte level was below the top of the plates restore electrolyte level to above top of plates within 8 hours and verify no evidence of leakage(*) within 12 hours. In all cases, restore electrolyte level to greater than or equal to minimum established design limits within 31 days.
 - d. One station battery B or C having pilot cell electrolyte temperature less than minimum established design limits, restore battery pilot cell temperature to greater than or equal to minimum established design limits within 12 hours.

(*) If electrolyte level was below the top of the plates, the verification that there is no evidence of leakage is required to be completed regardless of when electrolyte level is restored.

Bases:

The general objective is to assure an adequate supply of power with at least one active and one standby source of power available for operation of equipment required for a safe plant shutdown, to maintain the plant in a safe shutdown condition and to operate the required engineered safety feature equipment following an accident.

AC power for shutdown and operation of engineered safety feature equipment can be provided by any of three active (one or two 230 KV lines, one 69 KV line, and one 34.5 KV line) and either of two standby (two diesel generators) sources of power. In applying the minimum requirement of one active and one standby source of AC power, since both 230 KV lines are on the same set of towers, either one or both 230 KV lines are considered as a single active source. Normally all six sources are available. However, to provide for maintenance and repair of equipment and still have redundancy of power sources the requirement of one active and one standby source of power was established. The plant's main generator is not given credit as a source since it is not available during shutdown.

The plant 125V DC system consists of three batteries and associated distribution system. Batteries B and C are designated as the safety related subsystems while battery A is designated as a non-safety related subsystem. Safety related loads are supplied by batteries B and C, each with two associated full capacity chargers. One charger on each battery is in service at all times with the second charger available in the event of charger failure. These chargers are active sources and supply the normal 125V DC requirements with the batteries and standby sources. (1)

Action 3.7.D.1 is for one required safety related battery B or battery C charger (i.e., no station battery charger operable for the associated battery) inoperable (e.g., the battery float voltage limit of 4.7.C.1.a is not maintained for battery B or battery C). These Actions provide a tiered response that focuses on returning the battery to the fully charged state and restoring a fully qualified charger to OPERABLE status in a reasonable time period. Action 3.7.D.1.a requires that the battery terminal voltage be restored to greater than or equal to the minimum established float voltage within 2 hours. This time provides for returning the inoperable charger to OPERABLE status or providing an alternate means of restoring battery terminal voltage to greater than or equal to the minimum established float voltage. Restoring the battery terminal voltage to greater than or equal to the minimum established float voltage provides good assurance that, within 12 hours, the associated battery will be restored to its fully charged condition (as verified by Action 3.7.D.1.b) from any discharge that might have occurred due to the charger inoperability.

A discharged battery having terminal voltage of at least the minimum established float voltage indicates that the battery is on the exponential charging current portion (the second part) of its recharge cycle. The time to return a battery to its fully charged state under this condition is simply a function of the amount of the previous discharge and the recharge characteristic of the battery. Thus, there is good assurance of fully recharging the battery within 12 hours, avoiding a premature shutdown with its own attendant risk.

If established battery terminal float voltage cannot be restored to greater than or equal to the minimum established float voltage within 2 hours, and the charger is not operating in the current-limiting mode, a faulty charger is indicated. A faulty charger that is incapable of maintaining established battery terminal float voltage does not provide assurance that it can revert to and operate properly in the current limit mode that is necessary during the recovery period following a battery discharge event that the DC system is designed for.

test in accordance with manufacturers' recommendation are taken from Annex D of IEEE Standard 450-1995. They are performed following the restoration of the electrolyte level to above the top of the plates. Based on the results of the manufacturer's recommended testing, the battery may have to be declared inoperable and the affected cell(s) replaced.

Per Action 3.7.D.2.d, with one station battery with pilot cell temperature less than the minimum established design limits, 12 hours is allowed to restore the temperature to within limits. A low electrolyte temperature limits the current and power available. Since the battery is sized with margin, while battery capacity is degraded, sufficient capacity exists to perform the intended function and the affected battery is not required to be considered inoperable solely as a result of the pilot cell temperature not met.

Per Action 3.7.D.2.e, with both station batteries with battery parameters not within limits there is not sufficient assurance that battery capacity has not been affected to the degree that the batteries can still perform their required function, given that both safety related station batteries are involved. With both safety related station batteries involved, this potential could result in a total loss of function on multiple systems that rely upon the batteries. The longer restoration times specified for battery parameters on one safety related battery not within limits are therefore not appropriate, and the parameters must be restored to within limits on one required station battery within 2 hours.

Per Action 3.7.D.2.f, when any battery parameter is outside the allowances of Actions 3.7.D.2.a, b, c, d, or e, sufficient capacity to supply the maximum expected load requirement is not ensured and a 2 hour restoration time is appropriate. Additionally, per Action 3.7.D.2.g, discovering one or both station batteries with one or more battery cells float voltage less than 2.07 V and float current greater than limits indicates that the battery capacity may not be sufficient to perform the intended functions. The battery must therefore be restored within 2 hours or the reactor placed in the COLD SHUTDOWN CONDITION.

Action 3.7.D.3 imposes a 2-hour restoration time for one station battery that is inoperable for reasons other than addressed by the parameter degradation Actions provided. With one station battery inoperable, the battery charger is supplying the DC bus. The 2-hour limit allows sufficient time to effect restoration of an inoperable battery given that the majority of the conditions that lead to battery inoperability (e.g., loss of battery charger, battery cell voltage less than 2.07 V, etc.) are identified in Actions 3.7.D.2 together with additional specific completion times. Failing to correct this inoperability within 2 hours would require the plant to proceed to cold shutdown.

The probability analysis in Appendix "L" of the FDSAR was based on one diesel and shows that even with only one diesel the probability of requiring engineered safety features at the same time as the second diesel fails is quite small. The analysis used information on peaking diesels when synchronization was required which is not the case for Oyster Creek. Also the daily test of the second diesel when one is temporarily out of service tends to improve the reliability as does the fact that synchronization is not required.

As indicated in Amendment 18 to the Licensing Application, there are numerous sources of diesel fuel which can be obtained within 6 to 12 hours and the heating boiler fuel in a 75,000 gallon tank on the site could also be used. As indicated in Amendment 32 of the Licensing Application and including the Security System loads, the load requirement for the loss of offsite power would require 12,410 gallons for a three day supply. For the case of loss of offsite power plus loss-of-coolant plus bus failure 9790 gallons would be required for a three day supply.

4.7 AUXILIARY ELECTRICAL POWER

Applicability: Applies to surveillance requirements of the auxiliary electrical supply.

Objective: To verify the availability of the auxiliary electrical supply.

Specification:

A. Diesel Generator

1. Each diesel generator shall be started and loaded to not less than 80% rated load every two weeks.
2. The two diesel generators shall be automatically actuated and functionally tested during each refueling outage. This shall include testing of the diesel generator load sequence timers listed in Table 3.1.1.
3. Deleted.
4. The diesel generators' fuel supply shall be checked following the above tests.
5. The diesel generators' starting batteries shall be tested and monitored per Specification 4.7.B.

B. Diesel Generator Starting Batteries

1. Weekly surveillance will be performed to verify the following:
 - a. The active metallic surface of the plates shall be fully covered with electrolyte in all batteries.
 - b. The designated pilot cell voltage is greater than or equal to 2.0 volts.
 - c. The overall battery voltage is greater than or equal to 112 volts while the battery is on a float charge.
 - d. The pilot cell specific gravity, corrected to 77°F, is greater than or equal to 1.190.
2. Quarterly surveillance will be performed to verify the specific gravity for each fourth cell is greater than or equal to 1.190 when corrected to 77°F. The specific gravity and electrolyte temperature of every fourth cell shall be recorded for surveillance review.
3. Annual surveillance will be performed to verify the specific gravity for each cell is greater than or equal to 1.190 when corrected to 77°F. The electrolyte temperature and specific gravity for every cell shall be recorded for surveillance review.

4. At least once per 12 months, the diesel generator battery capacity shall be demonstrated to be able to supply the design duty loads (diesel start) during a battery service test.
5. At least once per 24 months, the following tests will be performed (perform during plant shutdowns or during 24-month Diesel Generator inspections):
 - a. Battery capacity shall be demonstrated to be at least 80% of the manufacturers' rating when subjected to a battery capacity discharge test.
 - b. If a Diesel Generator Starting Battery is demonstrated to have less than 85% of manufacturers ratings during a capacity discharge test, it shall be replaced within 2 years.

C. Station Batteries

1. Weekly surveillance will be performed to verify the following:
 - a. The overall battery voltage is greater than or equal to the minimum established float voltage.
 - b. Each station battery float current is ≤ 2 amps when battery terminal voltage is greater than or equal to the minimum established float voltage of 4.7.C.1.a.
2. Monthly Surveillance will be performed to verify the following:
 - a. The electrolyte level in each station battery is greater than or equal to minimum established design limits.
 - b. The voltage of each pilot cell is greater than or equal to 2.07 volts while the respective battery is on a float charge.
 - c. The electrolyte temperature of each station battery pilot cell is greater than or equal to minimum established design limits.
3. Quarterly surveillance will be performed to verify the voltage of each connected cell is greater than or equal to 2.07 volts while the respective battery is on a float charge.

Basis: The biweekly tests of the diesel generators are primarily to check for failures and deterioration in the system since last use. The manufacturer has recommended the two week test interval, based on experience with many of their engines. One factor in determining this test interval (besides checking whether or not the engine starts and runs) is that the lubricating oil should be circulated through the engine approximately every two weeks. The diesels should be loaded to at least 80% of rated load until engine and generator temperatures have stabilized (about one hour). The minimum 80% load will prevent soot formation in the cylinders and injection nozzles. Operation up to an equilibrium temperature ensures that there is no over-heat problem. The tests also provide an engine and generator operating history to be compared with subsequent engine-generator test data to identify and correct any mechanical or electrical deficiency before it can result in a system failure.

The test during refueling outages is more comprehensive, including procedures that are most effectively conducted at that time. These include automatic actuation and functional capability tests, to verify that the generators can start and assume load in less than 20 seconds and testing of the diesel generator load sequence timers which provide protection from a possible diesel generator overload during LOCA conditions.

The diesel generator batteries are challenged every two weeks to perform the 80% load test. This effectively performs an uninstrumented battery service test. The biweekly diesel start, when combined with the annual battery service test, provides an extensive amount of data on battery performance characteristics. This test data negates the need to lower the battery performance test interval from biennial to annually.

The diesel batteries shall be tested and monitored in accordance with the requirements of Specification 4.7.B to ensure their viability. The requirement to replace any battery in the next refueling outage or within 2 years which demonstrates less than 85% of manufacturers capacity during a capacity discharge test provides additional assurance of continued battery operability.

Verifying, per 4.7.C.1.a, battery terminal voltage while on float charge for the batteries helps to ensure the effectiveness of the battery chargers, which support the ability of the batteries to perform their intended function. Float charge is the condition in which the charger is supplying the continuous charge required to overcome the internal losses of a battery and maintain the battery in a fully charged state while supplying the continuous steady state loads of the associated DC subsystem. On float charge, battery cells will receive adequate current to optimally charge the battery. The voltage requirements are based on the minimum float voltage established by the battery manufacturer (2.17 V per cell average, or 130.2 V at the battery terminals). This voltage maintains the battery plates in a condition that supports maintaining the grid life (expected to be approximately 40 years for B station battery; 20 years for C station battery). The weekly frequency is consistent with manufacturer recommendations and IEEE Standard 450-1995.

9. Limitations on the annual and quarterly doses to a MEMBER OF THE PUBLIC from 1-131, 1-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluent released beyond the SITE BOUNDARY conforming to Appendix I of 10 CFR 50,
10. Limitations on the annual dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from Uranium fuel cycle sources conforming to 40 CFR Part 190.

b. Radiological Environmental Monitoring Program

A program shall be provided to monitor the radiation and radionuclides in the environs of the plant. The program shall provide (1) representative measurements of radioactivity in the highest potential exposure pathways, and (2) verification of the accuracy of the effluent monitoring program and modeling of environmental exposure pathways. The program shall (1) be contained in the ODCM, (2) conform to the guidance of Appendix I to 10 CFR Part 50, and (3) include the following:

1. Monitoring, sampling, analysis, and reporting of radiation and radionuclides in the environment in accordance with the methodology and parameters in the ODCM,
2. A Land Use Census to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the monitoring program are made if required by the results of this census, and
3. Participation in an Interlaboratory Comparison Program to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring.

6.8.5 Station Battery Monitoring and Maintenance Program

This Program provides for restoration and maintenance, based on the recommendations of IEEE Standard 450, "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries For Stationary Applications," of the following:

- a. Actions to restore station battery cells with float voltage < 2.13 volts, and
- b. Actions to equalize and test station battery cells that have been discovered with electrolyte level below the top of the plates.