JERSEY CENTRAL POWER & LIGHT COMPANY
OYSTER CREEK NUCLEAR GENERATING STATION
PROVISIONAL OPERATING LICENSE NO. DPR-16
DOCKET NO. 50-219

Applicant hereby requests the Commission to change Appendix A to the License as follows:

1. Sections to be changed:

   Sections 2.3, 3.1 (Table 3.1.1), 3.7, 4.1, and 4.7.

2. Extent of changes:

   New specifications for undervoltage protection systems and station batteries.

3. Changes requested:

| Add/Replace Page | With Attached Page |
|---|---|
| 2.3-3 | 2.3-3 |
| 2.3-3a | - |
| 2.3-7 | 2.3-7 |
| 2.3-8 | 2.3-8 |
| 3.1-11b | - |
| 3.1-12a | 3.1-12a |
| 3.1-12b | - |
| 3.7-1 | 3.7-1 |
| 3.7-1a | - |
| 3.7-2 | 3.7-2 |
| 3.7-3 | 3.7-3 |
| 4.1-6a | 4.1-6a |
| 4.7-1 | 4.7-1 |
| 4.7-1a | - |
| 4.7-2 | 4.7-2 |

4. Discussion:

   The changes requested with regard to undervoltage are proposed in order to incorporate Technical Specifications pertaining to undervoltage protection systems which were installed during the 1980 refueling outage. These protection systems are as described in our letters of September 25, 1979, and November 1, 1979, which were in response to your letters of June 2, 1977 and August 11, 1979.

   A description of a modification to the 125V DC distribution system at Oyster Creek Nuclear Generating Station was submitted by letter dated April 14, 1978 from Ivan R. Finfrock, Jr. to the Director of Nuclear Reactor Regulation.

   The safety related loads which were previously powered from 125V DC distribution center "A", are now powered from 125V DC distribution center "C".

The Safety related loads that were previously powered from panel E are now powered from Panel DC-F. An additional motor control center, DC-2, has been added. The changes to Section 3.7 are editorial changes to reflect these new power supplies for safety related loads.

The change to Section 4.7 updates the battery surveillance requirements to reflect today's standards. This specification also requires that the battery be tested only when the reactor is shutdown. At all times when the plant is operating, both batteries will be at full capacity; thereby, increasing the safety margin due to increased availability of the station battery.

| FUNCTION | LIMITING SAFETY SYSTEM SETTINGS |
|---|---|
| 7) Low Pressure Main Steam Line, MSIV Closure | ≥825 psig |
| 8) Main Steam Line Isolation Valve Closure, Scram | ≤ 10% Valve Closure from full open |
| 9) Reactor Low Water Level, Scram | ≥ 11',5" above the top of the active fuel as indicated under normal operating conditions. |
| 10) Reactor Low-Low Water Level, Main Steam Line Isolation Valve Closure. | ≥ 7',2" above the top of the active fuel as indicated under normal operating conditions. |
| 11) Reactor Low-Low Water Level, Core Spray Initiation | ≥ 7'2" above the top of the active fuel |
| 12) Reactor Low-Low Water Level, Isolation Condenser Initiation | ≥ 7'2" above the top of the active fuel with time delay ≤ 3 seconds. |
| 13) Turbine Trip Scram | 10 percent turbine stop valve(s) closure from full open. |
| 14) Generator Load Rejection Scram | Initiation upon loss of oil pressure from turbine acceleration relay. |
| 15) Loss of Power | |
| a. 4.16 KV Emergency Bus Undervoltage (Loss of Voltage) | 0 volts with 3 seconds ± 0.5 seconds time delay. |
| b. 4.16 KV Emergency Bus Undervoltage (Degraded Voltage) | 3671 ± 1% (36.7) volts 10 ± 1% (.1) second time delay. |

BASES: Safety limits have been established in Specifications 2.1 and 2.2 to protect the integrity of the fuel cladding and reactor coolant system barriers. Automatic protective devices have been provided in the plant design to take corrective action to prevent the safety limits from being exceeded in normal operation or operational transients caused by reasonable expected single operator error or equipment malfunction. This Specification establishes the trip settings for these automatic protection devices.

The Average Power Range Monitor, APRM[1], trip setting has been established to assure never reaching the fuel cladding integrity safety limit. The APRM system responds to changes in neutron flux. However, near rated thermal power the APRM is calibrated, using a plant heat balance, so that the neutron flux that is sensed is read out as percent of rated thermal power. For slow maneuvers, those where core thermal power, surface heat flux, and the power transferred to the water follow the neutron flux, the APRM will read reactor thermal power. For fast transients, the neutron flux will lead the power transferred from the cladding to the water due to the effect of the fuel time constant. Therefore when the neutron flux increases to the scram setting, the percent increase in heat flux and power transferred to the water will be less than the percent increase in neutron flux.

The APRM trip setting will be varied automatically with recirculation flow with the trip setting at rated flow $61.0 \times 10^5$ lb/hr or greater being 115.7% of rated neutron flux. Based on a complete

The low water level trip setting of 11°5" above the top of the active fuel has been established to assure that the reactor is not operated at a water level below that for which the fuel cladding integrity safety limit is applicable. With the scram set at this point, the generation of steam, and thus the loss of inventory, is stopped. For example, for a loss of feedwater flow a reactor scram at the value indicated and isolation valve closure at the low-low water level set point results in more than 4 feet of water remaining above the core after isolation. (11).

During periods when the reactor is shut down, decay heat is present and adequate water level must be maintained to provide core cooling. Thus, the low-low level trip point of 7°2" above the core is provided to actuate the core spray system to provide cooling water should the level drop to this point. In addition, the normal reactor feedwater system and control rod drive hydraulic system provide protection for the water level safety limit both when the reactor is operating at power or in the shutdown condition.

The turbine stop valve (s) scram anticipates the pressure, neutron flux, heat flux increase caused by the rapid closure of the turbine stop valve(s) and failure of the turbine bypass system. With a scram setting of 10% of valve closure from full open and with a failure of the turbine bypass system at 1930 MWt, the peak pressure will remain well below the first safety valve setting and no thermal limits are approached (7,10).

The generator load rejection scram is provided to anticipate the rapid increase in pressure and neutron flux resulting from fast closure of the turbine control valves to a load rejection and failure of the turbine bypass system. This scram is initiated by the loss of turbine acceleration relay oil pressure. The timing for this scram is almost identical to the turbine trip and the resultant peak pressure and MCHFR are essentially the same.

The undervoltage protection system is a 2 out of 3 coincident logic relay system designed to shift emergency buses C and D to on site power should normal power be lost or degraded to an unacceptable level. The trip points and time delay settings have been selected to assure an adequate power source to emergency safeguards systems in the event of a total loss of normal power or degraded conditions which would adversely affect the functioning of engineered safety features connected to the plant emergency power distribution system.

References


(1) FDSAR. Volume I, Section VII-4.2.4
(2) FDSAR, Volume I, Section I-5.6
(3) Licensing Application Amendment 28, Item III.A-12
(4) Licensing Application Amendment 32, Question 13
(5) Letters, Peter A. Morris, Director, Division of Reactor Licensing, USAEC to John E. Logan, Vice President, Jersey Central Power & Light Company, dated November 22, 1967 and January 9, 1968.
(6) Licensing Application Amendment 11, Question V-9.
(7) License Application Amendment 76, Supplement No. 1
(8) License Application Amendment 65, Section B.XI.
(9) License Application Amendment 69, Section III-D-5
(10) License Application Amendment 65, Section B.IV.
(11) License Application Amendment 65, Section B.IX.
(12) License Application Amendment 76, Supplement No. 3, Section 2.0.
(13) License Application Amendment 76, Supplement No. 4.

TABLE 3.1.1 PROTECTIVE INSTRUMENTATION REQUIREMENTS (CONTD)

| Function | Trip Setting | Reactor Modes in which Function Must be Operable: Shutdown | Refuel | Startup | Run | Min. No. of Operable or Operating (Tripped) Trip Systems | Min. No. of Operable Instrument Channels Per Operable Trip Systems | Action Required* |
|---|---|---|---|---|---|---|---|---|
| N. Loss of Power | | | | | | | | |
| a. 4.16KV Emergency Bus Undervoltage (Loss of Voltage) | ** | X (aa) | X(aa) | X (aa) | X (aa) | 2 | 1 | |
| b. 4.16 KV Emergency Bus undervoltage (Degraded Voltage) | ** | X (aa) | X(aa) | X (aa) | X (aa) | 2 | 3 | See Note Z |

TABLE 3.1.1 (CON'D)

i. The interlock is not required during the start-up test program and demonstration of plant electrical output but shall be provided following these actions.

j. Not required below 40% of turbine rated steam flow.

k. All four (4) drywell pressure instrument channels may be made inoperable during the integrated primary containment leakage rate test (See Specification 4.5), provided that primary containment integrity is not required and that no work is performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8" above the top of the active fuel.

l. Bypassed in IRM Ranges 8, 9, & 10.

m. There is one time delay relay associated with each of two pumps.

n. One time delay replay per pump must be operable.

o. There are two time delay relays associated with each of two pumps.

p. Two time delay relays per pump must be operable.

q. Manual initiation of affected component can be accomplished after the automatic load sequencing is completed.

r. Time delay starts after closing of containment spray pump circuit breaker.

s. These functions not required to be operable with the reactor temperature less than 212°F and the vessel head removed or vented.

t. These functions may be inoperable or bypassed when corresponding portions in the same core spray system logic train are inoperable per Specification 3.4.A.

u. These functions not required to be operable when primary containment integrity is not required to be maintained.

v. These functions not required to be operable when the ADS is not required to be operable.

w. These functions must be operable only when irradiated fuel is in the fuel pool or reactor vessel and secondary containment integritv is required per specification 3.5.B.

y. The number of operable channels may be reduced to 2 per Specification 3.9-E and F.

z. With the number of operable channels one less than the Min. No. of Operable Instrument Channels per Operable Trip Systems, operation may proceed until performance of the next required Channel Functional Test provided the inoperable channel is placed in the tripped condition within 1 hour.

aa. This function is not required to be operable when the associated safety bus is not required to be energized or fully operable as per applicable sections of these technical specifications.

## 3.7 AUXILIARY ELECTRICAL POWER

Applicability: Applies to the operating status of the auxilary electrical power supply.

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

Specification: 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 1A2, 1B2, 1A21, 1B21 vital MCC 1A2 and 1B2 in the reactor building switchgear room: 1A3 and 1B3 at the intake structure; 1A21A, 1B21A, 1A21B, and 1B21B and vital MCC 1AB2 on 23'6" elevation in the reactor building; 1A24 and 1B24 at the stack.
   c. 208/120 volt panels 3, 4, 4A, 4B, 4C and VACP-1 in the reactor building switchgear room.
   d. 120 volt protection panel 1 and 2 in the cable room.
   e. 125 volt DC distribution centers C and B, and panel D, Panel DC-F, isolation valve motor control center DC-1 and 125V DC motor control center DC-2.
   f. 24 volt D.C. power panels A and B in the cable 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 second 230 KV line fully operational.
   b. One 34.5 KV line fully operational.

4. The station batteries B and C are available for normal service and a battery charger is in service for each battery.

5. Bus tie breaker ED or EC is in the open position.

B. The reactor shall be placed in the cold shutdown position if the availability of power falls below that required by Specification A above, except that the reactor may remain in operation for a period not to exceed 7 days in any 30 day period 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.

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 20% rated power until repairs are completed. The reactor may remain in operation for a period not to exceed 7 days in any 30-day period 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.

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 there shall be a minimum of 14,500 gallons of diesel fuel in the standby diesel generator fuel tank.

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 four active (two 230 KV and two 34.5 KV lines) and either of two standby (two diesel generators) sources of power. 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 power is normally supplied by two batteries, 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 as standby sources. (1)

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.

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. This 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. Since the requirements for operation of the required engineered safety features after an accident or for safe shutdown can be supplied by one diesel generator the specification requirement for 14,500 gallons of diesel fuel can operate one diesel at a load of 2640 KW for 3 days. As indicated in Amendment 32 of the Licensing Application, the load requirement for the loss of offsite power would require 11,750 gallons for a three day supply. For the case of loss of offsite power plus loss-of-coolant plus bus failure 11,300 gallons would be required for a three day supply. In the case of loss of offsite power plus loss-of-coolant with both diesel generators starting the load requirements (all equipment operating) shown there would not be three days' supply. However, not all of this load is required for three days and, after evaluation of the conditions, loads not required on the diesel will be curtailed. It is reasonable to expect that within 8 hours conditions can be evaluated and the following loads curtailed:

1. One Reactor Building Closed Cooling Water Pump.
2. One Core Spray Pump.
3. One Core Spray Booster Pump.
4. One Control Rod Drive Pump.
5. One Service Water Pump.
6. One Containment Spray Pump
7. One Emergency Service Water Pump.

With these pieces of equipment taken off at 8 hours after the incident it would require a total consumption of 14,230 gallons for a three day supply.

References:

(1) Letter, Ivan R. Finfrock, Jr. to the Director of Nuclear Reactor Regulations dated April 14, 1978.

| | Instrument Channel | Check | Calibrate | Test | Remarks (Applies to Test & Calibration) |
|---|---|---|---|---|---|
| 19. | Manual Scram Buttons | N A | N A | 1/3 Mo | |
| 20. | High Temperature Main Steamline Tunnel | N A | Each Refueling outage | Each refueling outage | Using heat source box |
| 21. | SRM | * | * | * | Using built-in calibration equipment |
| 22. | Isolation Condenser High Flow P (Steam and Water) | N A | 1/3 mo | 1/3 mo | By application of test pressure |
| 23. | Turbine Trip Scram | N A | | Every 3 months | |
| 24. | Generator Load Rejection Scram | N A | Every 3 months | Every 3 months | |
| 25. | Recirculation Loop Flow | N A | Each Refueling Outage | N A | By application of test pressure |
| 26. | Low Reactor Pressure Core Spray Valve Permissive | N A | Every 3 months | Every 3 months | By application of test pressure |
| 27. | Loss of Power | | | | |
| | a. 4.16 KV Emergency Bus Undervoltage (loss of voltage) | Daily | 1/18 mos. | 1/mo. | |
| | b. 4.16 KV Emergency Bus Undervoltage (Degraded Voltage) | Daily | 1/18 mos. | 1/mo. | |

*Calibrate prior to startup and normal shutdown and thereafter check 1/s and test 1/wk until no longer required.

## 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 20% rated power every two weeks.

2. Each diesel generator shall be automatically activated (by simulating a loss of offsite power in conjunction with a safety injection actuation test signal) and functionally tested during each refueling outage by:

   a. Verifying de-energization of the emergency busses and load shedding from the emergency busses.
   b. Verifying the diesel starts from ambient conditions on the auto-start signal, energizes the emergency busses with permanently connected loads, energizes the auto-connected emergency loads through the load sequence timers listed in Table 3.1.1 and operates for ≥ 5 minutes while its generator is loaded with the emergency loads.
   c. Verifying that on diesel generator trip, the loads are shed from the emergency busses and the diesel restarts on the auto-start signal, the emergency busses are energized with permanently connected loads, the auto-connected emergency loads are energized through the load sequences and the diesel operates for ≥ 5 minutes while its generator is loaded with the emergency loads.

3. Each diesel generator shall be given a thorough inspection at least annually.

4. The diesel generators' fuel supply shall be checked following the above tests.

5. The diesel generators' starting batteries shall be tested and monitored the same as the station batteries, Specification 4.7.B.

B. Station 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 and

   c. The overall battery voltage is greater than or equal to 120 volts (Diesel battery; 112 volts).

   d. Pilot cell specific gravity, corrected to 77°F, shall be recorded for surveillance review.

2. Quarterly 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 voltage of each connected cell is greater than or equal to 2.0 volts under float charge and

   c. The overall battery voltage is greater than or equal to 120 volts (Diesel battery; 112 volts)

   d. The specific gravity, corrected to 77°F, for each cell and the electrolyte temperature of every fifth cell (Diesel; every fourth cell) shall be recorded for surveillance review.

3. At least once per 18 months during shutdown, the following tests will be performed to verify battery capacity.

   a. Battery capacity shall be demonstrated to be at lest 80% of the manufacturers° rating when subjected to a battery capacity discharge test.

   b. Battery low voltage annunicators are verified to pick up at 115 volts ±1 volt and to reset at 125 volts ±1 volt (Diesel; 120 volts ± 1 volt).

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 20% of rated power until engine and generator temperatures have stabilized (about one hour). The minimum 20% 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 annual, thorough inspection will detect any signs of wear long before failure.

The manufacturer's instructions for battery care and maintenance with regard to the floating charge, the equalizing charge, and the addition of water will be followed. In addition, written records will be maintained of the battery performance. Station batteries will deteriorate with time, but prec itous failure is unlikely. The station surveillance procedures follow the recommended maintenance and testing practices of IEEE STD. 450 which have demonstrated, thorough experience, the ability to provide positive indications of cell deterioration tendencies long before such tendencies cause cell irregularity or improper cell performance.