UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENTS NOS. 40 AND 22 TO

FACILITY OPERATING LICENSES NOS. DPR-53 AND DPR-69

BALTIMORE GAS AND ELECTRIC COMPANY

CALVERT CLIFFS NUCLEAR POWER PLANT, UNITS NOS. 1 AND 2

DOCKETS NOS. 50-317 AND 50-318

INTRODUCTION

By applications dated June 17 and August 5, 1977 and supplemental information as listed in the reference section, Baltimore Gas & Electric Company (BG&E or the licensee) requested amendments to Facility Operating Licenses Nos. DPR-53 and DPR-69 for the Calvert Cliffs Nuclear Power Plant (CCNPP), Units Nos. 1 and 2. The amendments requested consist of changes to the Appendix A Technical Specifications (TS) to: (1) implement the degraded grid voltage condition requirements and (2) allow battery capacity testing during operation of the facilities.

DISCUSSION AND EVALUATION

1. Grid Voltage Degradation

As a result of an event at Millstone Unit No. 2, the NRC requested all utilities to investigate the vulnerability of each facility to similar degraded voltage conditions (Ref. 1). In References 2 and 3, BG&E provided responses to our Reference 1 request for information and stated that modifications would be made to improve the grid voltage profiles during the expected range of grid voltage. BG&E further described certain proposed design modifications and changes to the TS in Reference 6. Our evaluation of this submittal is based on: (1) General Design Criteria 17 (GDC-17), "Electrical Power System," of Appendix A, "General Design Criteria for Nuclear Power Plants," of 10 CFR Part 50; (2) IEEE Std. 279-1971, "Criteria for Protection System for Nuclear Power Generating Station;" (3) IEEE Std. 308-1974 "Criteria for Class 1E Power Systems"; and (4) our staff positions as detailed in Reference 4 which deals with the susceptibility of the onsite emergency power systems and their associated redundant safety-related electrical equipment to sustained degraded grid voltage conditions at the offsite power source, and interaction between the offsite and onsite emergency power systems.

As part of its response to our staff positions, BG&E has installed certain design modifications and changes to the TS for the CCNPP, Units 1 and 2. These proposed changes are as follows:

(1) the installation of a dual level undervoltage protection with a higher undervoltage setpoint and a time delay to detect sustained degradation of voltage on the safety related 4160 volt buses;

(2) changing the fuse types used in control transformer secondaries which supply power to motor starters;

(3) TS setting the second level undervoltage relay trip setpoint at a value of 3628 $\pm$ 25 volts with a time delay of 8 $\pm$ 0.4 seconds on 4160 volt emergency bus, configured in a two-out-of-four coincidence logic; and

(4) TS that require calibration and testing of the second level undervoltage protection systems and equipment.

The licensee has installed a second level of undervoltage protection for each of the two 4160 volt safety-related buses of each unit from a sustained degradation of grid voltage which exceeds the design value for the equipment. The second level of undervoltage protection consists of an undervoltage relay and a timer. The undervoltage monitor will have a trip setpoint at about 88% of the rated voltage, i.e., 4160 volts, with an eight second time delay. This monitor will be configured in a two-out-of-four coincidence logic per bus.

The licensee also modified the fuse types used in the secondaries of the transformer supplying power to motor starters to prevent burn out of the fuses while the undervoltage protection circuits are timing out.

The modifications associated with the second level of undervoltage protection satisfy the following criteria:

(1) The undervoltage setpoint and the allowable time duration of a degraded voltage shall not result in failure of safety related systems and/or equipment;

(2) the time delay shall minimize the effect of short duration disturbances from reducing the availability of power to the safety related systems and equipment;

(3) the time delay shall not exceed the maximum time delay considered in the FSAR accident analyses;

(4) the undervoltage protection shall include coincidence logic to preclude spurious tripping of the offsite or onsite power source;

(5) the time delay shall override voltage dips on emergency buses due to the sequenced pick-up of load by a diesel generator;

(6) the time delay shall be short enough to prevent burnout of fuses in the secondaries of the 480 V/120V power transformer and

(7) the voltage sensors shall be designed to satisfy the applicable requirements of IEEE Std. 279-1971.

The modifications will provide an additional means for monitoring the conditions of the offsite power system to detect not only the loss-of-offsite power, but an unacceptable sustained degradation of the offsite voltage that could adversely affect safety-related equipment. Moreover, the modifications will not degrade the availability of the offsite power system below an acceptable level and will increase the capability of the onsite power system to provide power to safety-related equipment.

The fuse-type change will increase the availability of vital power to motor starters in the secondaries of the 480V/120V control transformer by means of preventing the burn out of fuses due to overcurrent conditions in the contactor coils.

The modification satisfies the requirement of: (1) General Design Criterion 17, "Electrical Power Systems" which requires provisions to minimize the probability of losing electric power from any of the remaining supplies as a result of or coincident with the loss of power generation at the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies; and (2) IEEE Std. 308-1974, "Class IE Power System for Nuclear Power Generating Stations," which requires availability of the standby power supply following loss of the preferred power supply within a time consistent with the requirements of the engineered safety features and the shutdown system under both normal and accident conditions.

The proposed revision to the TS includes the trip setpoint(s) for the second-level undervoltage protection sensors and the associated time delay devices, and surveillance requirements shown on Tables 3.3-3, 3.3-4, 3.3-5 and 4.3-2.

The present TS satisfy the staff's requirements with respect to tests, which require: (1) simulating the loss of offsite power; (2) simulating the loss of offsite power in conjunction with an engineered safety feature actuation signal; and (3) simulating interruption and subsequent reconnection of the onsite power sources to their respective buses.

The modifications have been implemented by the licensee in accordance with the requirements of IEEE Std. 279-1971, "Criteria for Protection System for Nuclear Power Generating Stations"; IEEE Std. 308-1974, "Class IE Power Systems for Nuclear Power Generating Stations"; and 10 CFR Part 50, Appendix A, General Design Criteria 17, "Electric Power Systems."

Based on our evaluation of the information provided by the licensee, we conclude that the completed modifications are in conformance with the Commission's requirements with regard to: (1) sustained degraded grid voltage condition; and (2) interaction between the offsite and onsite emergency power systems, and are therefore acceptable. We further conclude that these modifications increase the reliability of the safety equipment being supplied power from the station generated power.

We also find that the proposed changes to the TS as modified to meet our requirements, are acceptable.

2. Battery Capacity Testing

In Reference 5, BG&E requested, among other changes, that the words "during shutdown" be deleted from TS 4.8.2.3.2.e. This would allow the 125-volt DC battery performance discharge test, required once per 60 months, to be performed during operation of one or both CCNPP units. During a meeting on August 31, 1977, as documented in Reference 7, we informed BG&E that this proposed change is unacceptable to the staff since running the battery capacity test during the operation of either unit would leave the DC bus in a degraded condition for an extended period of time. The NRC staff and BG&E representatives agreed to postpone evaluation of this part of the Reference 5 request until such time as BG&E submits additional information. This was documented in our Reference 8 letter issuing the other changes requested by Reference 5.

In a second meeting on December 6, 1978, BG&E proposed design modifications that would install a fully qualified spare battery in its own room (Ref. 9). However, in February 1979, BG&E informed us that due to the length of time necessary for the construction of the battery room in

which the spare battery will be located, the battery capacity discharge test schedule could not be met. In Reference 10, BG&E proposed to install the battery at an interim temporary installation on the turbine deck directly outside the future permanent location. This application also contains proposed changes to the TS.

This proposed design modification of the 125-volt DC system of CCNPP, Units 1 and 2, was submitted by the licensee in order that the system, after implementation of the modification, will be able to undergo its battery capacity discharge testing without degradation of the DC system. The CCNPP units have four safety-related 125-volt DC buses (buses 11, 12, 21, and 22) that are shared by both the units. Each bus has its associated 1350 ampere-hour battery and 400 ampere battery chargers. The proposed design modification involves the procurement and installation of a fully qualified 1500 ampere-hour spare battery capable of replacing any of the four safety-related batteries during plant operation.

The present TS allow battery capacity discharge testing only during unit shutdown and the proposed changes to the TS would allow these tests to be performed during plant operation.

The proposed modification to the facility 125-volt DC system consists of a spare, fully qualified, 1500 ampere-hour battery, a 1200 ampere transfer switch, and 1200 ampere disconnect switches. The associated charger and its disconnect switches are non-safety related and are only used to keep the spare battery continuously float charged until the battery is required to backup a safety-related 125-volt DC battery.

The new system will be installed such that no permanent connections will be made to the existing 125v dc buses thus preventing any cross-connections between different buses. At the time of the battery discharge tests the cables will be connected between the 1200 ampere disconnect switch and the bus of the battery which is to be tested.

The temporary battery will be seated on 1/2 inch thick plywood and 1/4 inch thick rubber mat directly on the turbine deck, and will be enclosed by a temporary barrier. The temporary cables from the battery to its 1200 ampere disconnect switch will be routed above a drop ceiling until they drop into the permanent conduit. All switching equipment will be located in the cable spreading room where the existing DC switchgear is located.

The licensee has stated that the spare battery is safety-related and fully qualified and tested in the same manner as the original batteries.

The proposed modification of the 125-volt DC system and the proposed interim temporary installation of a spare battery will allow battery capacity discharge testing of the safety related batteries, one at a time, without any degradation of the 125v dc system.

The new spare battery is rated at 1500 ampere-hour and hence has sufficient capacity to replace the existing batteries, one at a time, during discharge tests. The charger associated with the new spare battery will keep the spare battery fully charged at all times.

The spare battery, and associated transfer switch and disconnect switches are fully qualified, safety-related equipment. The spare battery will be temporarily located on the turbine deck for the duration of the first series of battery capacity discharge tests. All other equipment (the transfer switch, disconnect switches, battery charger and associated switches) will be located in its permanent location in the cable spreading room where the existing DC switchgear is located. The proposed new system will be installed such that no permanent connections will be made to the existing 125-volt DC buses. This will ensure that no cross-connections exist between different buses. Only at the time of the tests will the cables from the disconnect switch to the 125-volt DC bus be connected. The arrangement of the disconnect switch, transfer switch and cable connections of the cable, will assure that the modified system, discharge tests, meet the plant single failure criterion.

The licensee has committed to keep the spare battery be under constant surveillance during the tests.

The duration of the battery capacity discharge test would require 24 hours for each battery or approximately four days for all four batteries. The temporary location of the spare battery and the temporary cables will only be required for this period. Once the tests are complete, all temporary cables will be removed and the battery will be relocated in its permanent location. The licensee will provide details of the permanent location of the spare battery, the permanent cable details and other relevant details prior to permanent installation.

Based on our review, we find that:

(1) The proposed design modification to the 125-volt DC system of CCNPP, Units 1 and 2, will enable battery capacity discharge tests to be performed on the existing batteries during plant operation without any degradation of the 125-volt DC system.

(2) The proposed modification and the proposed temporary installation does not violate the plant single failure criterion.

(3) The spare battery has sufficient capacity to perform the function of the battery it replaces during the tests.

(4) The spare battery and associated equipment required to implement the proposed modification will be a fully-qualified, safety-related backup battery system.

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(5) Except for the location of the spare battery, the interim (temporary) installation of the spare battery system meets the installation requirement of the safety-related 125-volt DC system. The temporary connections will only be required for a period of approximately four days during the discharge tests of the plant four safety related 125-volt DC batteries.

(6) The proposed change to the TS, as modified to meet our requirements, will assure that the battery to be tested is replaced by the spare 125-volt DC battery bank and an operable charger.

Accordingly, we conclude that the proposed interim (temporary) installation of a spare battery, the associated proposed design modification to CCNPP, Units 1 and 2, 125-volt DC system, and the proposed change to the TS are acceptable. Performing the battery surveillance test with a single 125-volt DC buss being supplied by the spare battery and charger has no affect on the reliability of the electrical system.

ENVIRONMENTAL CONSIDERATION

We have determined that the amendments do not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendments involve an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR §51.5(d)(4) that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of these amendments.

CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) because the amendments do not involve a significant increase in the probability or consequences of accidents previously considered and do not involve a significant decrease in a safety margin, the amendments do not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) such activities will be conducted in compliance with the Commission's regulations and the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Date: July 31, 1979

REFERENCES

1. NRC description of degraded grid voltage condition, D. L. Ziemann to A. E. Lundvall, August 13, 1976.

2. BG&E response on degraded grid voltage condition, A. E. Lundvall to D. L. Ziemann, September 15, 1976.

3. BG&E additional response on degraded grid voltage condition, A. E. Lundvall to D. L. Ziemann, December 20, 1976.

4. NRC request on degraded grid voltage condition, D. K. Davis to A. E. Lundvall, June 3, 1977.

5. BG&E application for seven Technical Specification changes including battery testing, A. E. Lundvall to D. K. Davis, June 17, 1977.

6. BG&E application for Technical Specification changes on degraded grid voltage condition, A. E. Lundvall to E. G. Case, August 5, 1977.

7. NRC summary of August 31, 1977, meeting on battery capacity testing, E. L. Conner to Dockets Nos. 50-317/318, September 15, 1977.

8. NRC Amendments Nos. 30 and 15 on five of the seven requested TS changes, R. W. Reid to A. E. Lundvall, March 17, 1978.

9. NRC summary of December 6, 1978 meeting on battery capacity testing, E. L. Conner to Dockets Nos. 50-318/318, December 21, 1978.

10. BG&E proposed Technical Specifications on temporary battery installation, R. F. Ash to R. W. Reid, March 12, 1979.