



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 183 TO FACILITY OPERATING LICENSE NPF-35

AND AMENDMENT NO. 175 TO FACILITY OPERATING LICENSE NPF-52

DUKE ENERGY CORPORATION, ET AL.

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

1.0 INTRODUCTION

By letter dated September 16, 1999, and supplemented by letter dated November 3, 1999, Duke Energy Corporation (the licensee) requested an amendment to the Technical Specification (TS) Section 3.8.4, "DC Sources - Operating" for Catawba Nuclear Station, Units 1 and 2. The supplemental letter provides a corrected TS Bases page and does not change the scope of the original request for amendment. The proposed TS amendment would modify Surveillance Requirements (SRs) 3.8.4.8 and 3.8.4.9 and the associated Bases SR 3.8.4.8 and 3.8.4.9 to allow testing of the direct current (dc) channel batteries with the units on line. The proposed change to SR 3.8.4.8 would also prohibit the diesel generator (DG) batteries from being service tested while the units are on line.

2.0 DISCUSSION AND EVALUATION

2.1 Background

The Class 1E 125-volt dc vital instrumentation and control (I&C) power system for each unit at Catawba is comprised of four independent and physically separate channels. The four channels are designated A, B, C, and D. Each channel consists of a dc channel battery (EBA, EBB, EBC, EBD), a battery charger (ECA, ECB, ECC, ECD), a 125-volt dc distribution center (EDA, EDB, EDC, EDD), and a 125-volt dc power panelboard (EPA, EPB, EPC, EPD). The four independent channels are separated into two redundant safety trains, such that the loss of any one channel does not interfere with the performance of the required safety function of the system. Channels A and C comprise safety train A, while channels B and D comprise safety train B. In addition to the normal battery charger associated with its respective channel, a spare battery charger serves as a backup should one of the normal battery chargers fail or be otherwise unavailable.

The 125-volt dc vital I&C power system channel batteries are lead calcium batteries. Each battery assembly consists of 60 cells and has a capacity of 1495 ampere-hours. Each battery is sized to supply the continuous emergency loads and momentary loads fed from its associated distribution center plus supply loads associated with another train-related distribution center. The system is designed to allow two load channels of the same safety train to be tied to a single battery via installed tie breakers.

Technical Specification 3.8.4 governs dc source requirements for Modes 1, 2, 3, and 4. In particular, SR 3.8.4.8 delineates requirements for the battery service test. The service test is a test to demonstrate the capability of the battery to meet the design requirement of the systems to which it is connected. This test is performed on an 18-month frequency. SR 3.8.4.9 delineates requirements for the performance of the discharge test or modified performance discharge test. The purpose of this test is to demonstrate overall battery capacity and to detect degradation and is normally performed on a 60-month frequency (18 months when battery is degraded or when the battery has reached 85 percent of its expected life). SR 3.8.4.8 currently requires the service test to be performed when the units are shut down for the dc channel batteries. SR 3.8.4.9 currently requires the performance discharge test/modified performance discharge test for both the dc channel batteries and the DG batteries be performed during unit shutdown conditions. This is achieved via notes to both SRs which state that the surveillance shall not be performed in Modes 1, 2, 3, or 4.

The licensee proposed to modify SR 3.8.4.8 by substituting the phrase "DG batteries" for "DC channel" in Note 2. This change would allow the service test of the dc channel batteries to be performed while in Mode 1, 2, 3, or 4, but would prohibit the service test of the DG batteries from being performed while the units are on line. The licensee also proposed to modify SR 3.8.4.9 by adding the phrase "for the DG batteries" to the note, which effectively eliminates this note from applying to the dc channel batteries. The licensee also proposed changes to the associated 3.8.4.8 Bases and 3.8.4.9 Bases to make them consistent with the TS changes.

2.2 Proposed Change and Evaluation

In reviewing the licensee's proposed changes the staff evaluated a number of factors. These factors are relevant to the ability of 125-volt dc vital I&C power system to supply uninterrupted power to safety-related loads during normal operation and design basis accidents while a battery is removed from service for maintenance or testing. The staff considered the capacity and capability of 125-volt dc vital I&C power system. The staff also considered the typical time to complete the service test or performance of the discharge test/modified performance discharge test relative to the allowable outage time (AOT) of an inoperable dc channel. These factors are discussed in more detail below.

The Catawba 125-volt dc vital instrumentation and control power system was designed with excess capacity and capability. Each dc channel battery is of sufficient capacity so that one battery can supply all required loads to two channels (its own load channel plus another load channel) for a specified duration and the system is designed to allow two load channels of the same safety train to be tied to a single battery via installed tie breakers. The provision for battery testing while the units are shut down were based on systems with less capability and flexibility than that employed at Catawba. In the event that a battery must be removed from service at Catawba, its associated 125-volt dc distribution center can be connected to the spare charger and the other 125-volt dc distribution center of the same train, using tie breakers and the appropriate breaker on the spare charger distribution center. This way backup battery power will be available to all distribution centers should ac power to the battery charger fail. The tie breakers are key-interlocked in such a way that any two channels associated with opposite trains cannot be connected together.

Due to the extra battery capacity and the capability of the system design, Catawba's TS currently allow a dc channel to be inoperable for a period of up to 10 days. When a dc channel

is inoperable, TS 3.8.4 Required Action A.1 requires closing the tie breakers so that the inoperable channel can be powered from the other train-related dc channel. The closing of the tie breakers must be accomplished within eight hours. The unit can then operate in this configuration for the remainder of the 10-day period. The battery design requirements were established with the conservative assumption that a design basis accident would occur while a battery is removed from service for maintenance or testing. Consequently, each battery is sized to simultaneously supply the design load channel and the loads associated with the other train-related load channel for two hours. The battery service test simulates the combined load of two load channels during worst-case design basis accident conditions. This test verifies each battery's ability, as found, to satisfy the design requirements (i.e., battery duty cycle) of the 125-volt dc vital I&C power system.

The performance of a battery service test or the performance discharge test/modified performance discharge test can be accomplished in a short period of time relative to the 10-day AOT for an inoperable dc channel. To conduct the battery service test or performance test/modified performance discharge test with the unit on line, the licensee first declares the battery and dc channel to be tested inoperable. That dc channel will then be tied to the other train-related dc channel using the above mentioned tie-breaker. The required test will then be performed on the inoperable battery. During the performance of the required tests, both safety trains will continue to remain operable.

The licensee stated that approximately 50 to 60 hours are required to conduct the battery service test or the performance discharge test/modified performance discharge test. This time includes recharging the battery and functional verification to ensure that the battery meets all TS requirements before it is returned to service. These test completion times are well within the 10-day AOT for an inoperable dc channel. Furthermore, the licensee stated that it maintains some spare battery cells, which are tested and kept on float charge. In the event that any cells fail to recover following testing, the non-recoverable cells can be quickly replaced with the spare cells, well within the 10-day AOT for an inoperable dc channel.

The staff has considered all the factors discussed above, and concludes that removing a battery from service for testing with the units on line has minimal impact on the ability of the 125-volt dc vital I&C power system to supply uninterrupted power to safety-related loads during normal operation and design basis accidents.

In the proposed TS amendment, SR 3.8.4.8 is modified to substitute the phrase "DG batteries" for "DC channel" in Note 2. This wording change will now explicitly prohibit testing of the DG batteries while the units are on line. The proposed TS is more conservative with respect to the DG batteries and therefore, is acceptable.

In the original submittal, the licensee did not propose to modify the current SR 3.8.4.9 Bases. When SR 3.8.4.9 is revised, the current SR 3.8.4.9 Bases would no longer be consistent with the changes in TS SR 3.8.4.9. The staff communicated this observation to the licensee in a telephone discussion. By letter dated November 3, 1999, the licensee submitted a revision to the Bases for SR 3.8.4.9 to make it consistent with the proposed change to SR 3.8.4.9. The staff reviewed the revised SR 3.8.4.9 Bases and finds them acceptable.

On the basis of the above evaluation, the staff finds the proposed TS amendment acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, South Carolina State official Mr. Virgil Autrey was notified of the proposed issuance of the amendments to Catawba. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to surveillance of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The staff has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (64 FR 56529, dated October 20, 1999). Accordingly, the revisions of TS Section 3.8.4 meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

The staff has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

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