



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D. C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION  
RELATED TO AMENDMENT NO. 110 TO FACILITY OPERATING LICENSE NPF-35  
AND AMENDMENT NO. 104 TO FACILITY OPERATING LICENSE NPF-52

DUKE POWER COMPANY, ET AL.

CATAWBA NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-413 AND 50-414

1.0 INTRODUCTION

By letter dated October 5, 1993, as supplemented November 15 and 22, 1993, Duke Power Company, et al. (the licensee), submitted a request for changes to the Catawba Nuclear Station, Units 1 and 2, Technical Specifications (TS). The requested changes would revise the TS to reflect the appropriate operability requirements for cold leg accumulator water volume and surveillance requirements values for the centrifugal charging pumps, safety injection pumps, and residual heat removal pumps to prevent possible runout conditions during a loss of coolant accident event. The November 15 and 22, 1993, letters provided clarifying information that did not change the initial proposed no significant hazards consideration determination.

2.0 EVALUATION

It was proposed that the cold leg accumulator (CLA) contained borated water volume requirement given in TS 3.5.1.b, be revised from between 7,704 and 8,004 gallons to between 7,630 and 8,079 gallons. The proposed change would begin with the operation of Catawba Unit 1 Cycle 8 and apply to Units 1 and 2.

It was also proposed that the following ECCS subsystem surveillance requirements be revised beginning with operation of Catawba Unit 1 Cycle 8 and apply to Units 1 and 2:

- (1) Increase the centrifugal charging pump minimum developed head requirement given in surveillance 4.5.2.f.1) from 2,223 psid to 2,349 psid.
- (2) Increase the safety injection pump minimum developed head requirement given in surveillance 4.5.2.f.2) from 1,341 psid to 1,418 psid.
- (3) For the centrifugal charging pumps, decrease the sum of the injection line flow rates, excluding the highest flow rate, given in surveillance 4.5.2.h.1)a) from 345 gpm to 320 gpm.

- (4) For the safety injection pumps, decrease the sum of the injection line flow rates, excluding the highest flow rate, given in surveillance 4.5.2.h.2)a) from 450 gpm to 423 gpm.
- (5) For the residual heat removal pump lines with a single pump running, increase the sum of the injection line flow rates (all lines) given in surveillance 4.5.2.h.3) from 3,648 gpm to 3,900 gpm.

## 2.1 Cold Leg Accumulator

The CLAs are part of a passive system that ensures a sufficient volume of boroated water will be immediately forced into the reactor core in the event the Reactor Coolant System (RCS) falls below the pressure of the accumulators. The proposed TS change only affects the allowable water volume band of the CLAs. The previous loss of coolant accident (LOCA) analysis for Catawba Units 1 and 2 supported a CLA water volume uncertainty of  $\pm 20$  ft<sup>3</sup>. The most recent LOCA analysis performed in accordance with NRC-approved methodology for the McGuire and Catawba Nuclear Stations justifies a CLA water volume uncertainty of  $\pm 30$  ft<sup>3</sup>. The volume range of 7,630 to 8,079 gallons, which is the requested change, corresponds to a tolerance of  $\pm 30$  ft<sup>3</sup>. Increasing the Catawba CLA tolerance to  $\pm 30$  ft<sup>3</sup> will provide more operating margin on the CLAs, with potentially less entrances into the action statement for TS 3.5.1. The staff finds this change in tolerance acceptable as the results of the LOCA analysis performed utilizing the larger water volume band on the CLAs indicates that all accident analysis requirements are satisfied.

## 2.2 ECCS Surveillance Requirements

In the letter of November 15, 1993 (Reference 2), the licensee stated that they were notified by Westinghouse and Dresser/Pacific Pumps in a letter dated October 3, 1991 (Attachment 1 to Reference 3), of changes in the generic runout limits for centrifugal charging and safety injection pumps utilized at the McGuire and Catawba Nuclear Stations. These changes were related to pump cavitation and motor horsepower capability. The licensee was informed of changes based on review of pump designs with sand cast and investment cast impellers and consideration of recent information on impeller net positive suction head (NPSH) margin to avoid cavitation. The investment cast impellers were found to have somewhat lower NPSH requirements and are able to operate at higher runout flows than the sand cast impellers. Another consideration was avoidance of extended operation under conditions that would cause motor overheating. The implementation of this information resulted in changes which decreased the centrifugal charging pump (CCP) runout limit from 564 gpm to 560 gpm, and increased the safety injection pump (SIP) runout limit from 660 gpm to 675 gpm. Westinghouse and Dresser/Pacific recommended a NPSH of 30 feet (Reference 3) in order to support runout limits of 560 and 675 gpm of the CCPs and SIPs, respectively. In consideration of this information, the licensee has proposed surveillance requirements to stay within the recommended NPSH limits provided by the pump vendor. The licensee stated (Reference 2) that the available NPSH for each is approximately 60 ft. which well exceeds the 30 ft. requirement. Previously, administrative limits were instituted until a TS change could be developed.

Pump head curves that support the proposed TS changes were selected from the most recent McGuire Nuclear Station (MNS) and Catawba Nuclear Station (CNS) CCP and SIP head curve data. The strongest CCP and SIP head curves were selected in evaluating runout conditions for the proposed TS changes for conservatism. The weakest CCP and SIP head curves were selected for developing the LOCA injected flow predictions. For the CCP lines, with a single pump running, the minimum developed head requirement in surveillance 4.5.2.f.1) was increased from 2,223 psid to 2,349 psid, and the sum of the injection line flow rates, excluding the highest flow rate, given surveillance 4.5.2.h.1)a) was decreased from 345 gpm to 320 gpm. For the safety injection pump lines, with a single pump running, the minimum developed head requirement given in surveillance 4.5.2.f.2) was increased from 1,341 psid to 1,418 psid, and the sum of the injection pump line flow rates, excluding the highest flow rate, was decreased from 450 gpm to 423 gpm.

The proposed TS changes were outside the assumption for ECCS performance during a LOCA for the previous LOCA analysis. Therefore, a new LOCA analysis was performed in accordance with NRC-approved LOCA methodology. This included reanalysis for Large and Small Break LOCA design basis events with ECCS injection flow rates that reflect the proposed changes to the TS surveillance requirements. The calculated peak clad temperature (PCT) for the Large Break LOCA was 1945 °F and for the Small Break LOCA the value was 1264 °F. These values meet the 10 CFR 50.46(b)(1) acceptance criteria.

The residual heat removal (RHR) pump head curve that supports the proposed TS changes was based upon the weakest vendor data RHR head curve with additional degradation of approximately 12%. This head curve bounds the weakest RHR pump at MNS or CNS. For the RHR pump lines, with a single pump running, the sum of the injection line flow rates was changed from 3,648 gpm to 3,900 gpm in surveillance requirement 4.5.2.h.3). In response to a question on the impact of increased RHR flow rate on vortexing during mid-loop operation, the licensee stated that there would be no impact. It was also stated that the latest RHR injected flow test data, which is corrected for uncertainties, indicates the 3,900 gpm proposed for the TS will be acceptable as the licensee has information that indicates that there is no vortexing at RHR flow rate of 4,000 gpm.

The staff has found the changes to the surveillance requirements of TS 4.5.2.f.1, 4.5.2.f.2, 4.5.2.h.1)a), 4.5.2.h.2)a), and 4.5.2.h.3) to be acceptable as they are based on meeting the pump manufacturers' requirements and also meeting the LOCA requirements by preventing possible runout conditions during a LOCA event.

The staff has reviewed the licensee's submittal to support changes to the Catawba TS affecting the cold leg accumulator contained borated water volume and ECCS subsystem surveillance requirements and finds it acceptable.

### 3.0 STATE CONSULTATION

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

### 4.0 ENVIRONMENTAL CONSIDERATION

The amendments change requirements with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20 and change surveillance requirements. 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 Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (58 FR 57848 dated October 27, 1993). Accordingly, the amendments 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 Commission 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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REFERENCES

1. Letter from D. L. Rehn (DPC) to USNRC, dated October 5, 1993.
2. Letter from D. L. Rehn (DPC) to USNRC, dated November 15, 1993.
3. Letter from D. L. Rehn (DPC) to USNRC, dated November 22, 1993, with attached letter: DAP-91-074, DCP-91-074, D. L. Fuller (Westinghouse) to R. C. Futrell (Duke), "Emergency Core Cooling System Pump Runout Limit Issues," October 3, 1991.