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DUKE POWER

August 6, 1991

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Subject: Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413 and 50-414
Technical Specification Amendment
Boron Dilution Mitigation System

Attached is a proposed amendment to the Technical Specifications for the Facility Operating License Nos. NPF-35 and NPF-52 for Catawba Nuclear Station, Units 1 and 2, respectively. The request involves changing the maximum allowable combined flowrates from both reactor makeup water pumps in Modes 3-5 with one or both trains of the Boron Dilution Mitigation System (BDMS) inoperable. The restriction to either isolate or limit the flowrate from both reactor makeup water pumps with one or both trains of the BDMS inoperable is being added to the Mode 6 BDMS Technical Specification. Administrative controls are currently in place to ensure that the revised maximum allowable values for combined reactor makeup water pump output will not be exceeded. This request also includes administrative changes to the BDMS Technical Specifications for Modes 3-5 and Mode 6.

The attachments contain a discussion of the Justification and No Significant Hazards Analysis (Attachment I), the marked-up Technical Specifications (Attachment II), and a summary of all the proposed changes (Attachment III). The analysis is included pursuant to 10 CFR 50.91 and it has been concluded that the proposed amendment does not involve significant hazards consideration.

Pursuant to 10 CFR 50.91 (b) 1, the appropriate South Carolina state official is being provided a copy of this amendment request.

Very truly yours,

M. S. Tuckman

M. S. Tuckman

Attachments
CRL/BDMS

xc: S. D. Ebneter
Regional Administrator, Region II

Heyward Shealy, Chief
Bureau of Radiological Health SC

R. E. Martin, ONRR

W. T. Orders
Senior Resident Inspector

American Nuclear Insurers

M & M Nuclear Consultants

INPO Records Center

M. S. Tuckman, being duly sworn, states that he is Vice President, Nuclear Operations of Duke Power Company; that he is authorized on the part of said Company to sign and file with the Nuclear Regulatory Commission this revision to the Catawba Nuclear Station Facility Operating License, License Nos. NPF-35 and NPF-52; and that all statements and matters set forth therein are true and correct to the best of his knowledge.

M. S. Tuckman

M. S. Tuckman, Vice President

Subscribed and sworn to before me this 6th day of August, 1991.

Mary P. Nelms

Notary Public

My Commission Expires:

January 22, 1996

Attachment I

Justification for Proposed Changes and
No Significant Hazards Consideration

Catawba Nuclear Station, Units 1 and 2

Justification for Proposed Changes and
Evaluation of No Significant Hazards Consideration

The proposed revisions in this submittal would change the maximum allowable combined flowrates from both reactor makeup water pumps for Modes 3-5 with one or both trains of the Boron Dilution Mitigation System (BDMS) inoperable. The restriction to either isolate or limit the flowrate from both reactor makeup water pumps with one or both trains of the BDMS inoperable is being added to the Mode 6 BDMS Technical Specification. Administrative controls are currently in place to ensure that the revised maximum allowable values for combined reactor makeup water pump output will not be exceeded. This request also includes administrative changes to the BDMS Technical Specifications for Modes 3-5 and Mode 6. Attachment II provides proposed revisions to Catawba Technical Specifications 3/4.3.3.12 and 3/4.9.2. Attachment III provides a summary of all the proposed changes.

Catawba Units 1 and 2 are equipped with a Boron Dilution Mitigation System (BDMS) which serves to detect uncontrolled dilution events in Modes 3-6 of plant operation. The BDMS uses two source range detectors to monitor the subcritical multiplication of the reactor core. An alarm setpoint is continually calculated as four times the lowest count rate, including compensation for background and the statistical variation in the count rate. Once the alarm setpoint is exceeded, each train of the BDMS will automatically shut off both reactor makeup water pumps, align the suction of the charging pumps to highly borated water from the Refueling Water Storage Tank, and isolate flow to the charging pumps from the Volume Control Tank. Since these functions are automatically actuated by the BDMS, no operator action is necessary to terminate the dilution event and recover the shutdown margin.

Changes 1 and 2

1. Technical Specification (TS) 3.3.3.12 (a)(2) and (b)(2) and TS 4.3.3.12.2 (b) have been changed to reflect the new required flowrates.

2. TS 3.9.2.1 (a)(1), (a)(2), (b), and (c) have been modified and TS 4.9.2.1.2 (d) has been added to include isolating or limiting the flowrate from the Reactor Makeup Water Pumps.

The evaluation of dilution events in Modes 3-6 must demonstrate that the dilution will be terminated, either by the BDMS or by the operator, before criticality occurs. In the event that one or both trains of the BDMS is inoperable in these modes, the flowrate of the Reactor Makeup Water System is limited to values which have been shown to allow adequate operator action time to terminate the dilution before criticality occurs. This

accident was reanalyzed based on a Westinghouse bulletin concerning potential non-conservatism in the existing boron dilution analysis. Reanalysis of the boron dilution event in Modes 3-6 shows a need to change the Technical Specification flowrates to the following values:

Mode	Old Value (gpm)	New Value (gpm)
3	200	150
4	80	150
5	80	75
6	N/A	70

The new flowrates result from changes in two of the flowrate calculation parameters. For all modes, the increase in temperature of the diluting water as it reaches the Reactor Coolant System (RCS) was factored into the calculation of the dilution rate. Since the diluting water is typically colder than the RCS inventory, the diluting water expands within the RCS. This expansion causes a given volumetric flowrate measured at the colder temperature to correspond to a larger volumetric flowrate dilution flowrate within the RCS. This temperature increase was not accounted for in the original analysis. The diluting water source is conservatively assumed to be 36 °F and 0 ppm boron. This reduced the maximum allowable combined reactor makeup water pump output from 200 gpm to 150 gpm for Mode 3 and from 80 gpm to 75 gpm for Mode 5.

The second flowrate calculation parameter change increased the minimum water volume in the RCS for Mode 4 from 3588 ft^3 to 9029 ft^3. The original Mode 4 analysis had incorrectly used the Mode 5 and 6 minimum RCS water volume of 3588 ft^3 instead of the correct Mode 4 value of 9029 ft^3. This change overshadowed the temperature difference correction and resulted in an increase in the maximum allowable combined reactor makeup water pump output from 80 gpm to 150 gpm. It should be noted that the Mode 5 and 6 minimum RCS water volume has been procedurally changed to 3517 ft^3. 3517 ft^3 is the RCS volume when the level is drained to 22 inches above the bottom of the hot leg piping which corresponds to 5.5% RCS level. The Mode 5 and 6 analyses which support 75 gpm and 70 gpm, respectively, were done using 3517 ft^3. The Mode 5 and 6 calculations include an instrument uncertainty of $\pm$ 0.38%, with 1% equal to 4 inches of RCS level.

The additional formalized requirement for Mode 6 is considered appropriate to ensure that the 30 minute operator action time for mitigation of a dilution event is available.

The following safety evaluation has been prepared to justify the revision in allowable flowrates during operation in Modes 3-6 with one or both trains of the BDMS inoperable.

Chemical and Volume Control System Malfunction that Results in a Decrease in Boron Concentration in the Reactor Coolant (presented in FSAR Section 15.4.6)

This ANS condition II event is analyzed to show that adequate time exists to terminate a dilution event prior to loss of shutdown margin. Termination of a dilution event can result

from actuation of the BDMS in Modes 3-6 or by operator action following a high flux at shutdown alarm in case the BDMS is inoperable.

A reanalysis of the dilution events with the BDMS inoperable was performed to demonstrate that, given bounding assumptions made on flowrates from the Reactor Makeup Water System, conservative temperature differences between the diluted water source and the Reactor Coolant System, and conservative ratios of initial to critical boron concentrations, the operator would have adequate time to terminate the dilution before criticality occurs. The ratios of initial to critical boron concentrations assumed in the safety evaluation for the different modes of operation are confirmed to be bounded during cycle specific evaluations.

The evaluation of the boron dilution accident shows that the operator will be able to terminate a dilution event in Modes 3-6 prior to recriticality and that all Standard Review Plan section 15.4.6 acceptance criteria for the boron dilution event are satisfied.

10 CFR 50.92 states that a proposed amendment involves no significant hazards consideration if operation in accordance with the proposed amendment would not:

(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or

(2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or

(3) Involve a significant reduction in a margin of safety.

The proposed amendment does not involve an increase in the probability or consequences of any previously evaluated accident. No accident initiators are affected by this change so the probability of a previously evaluated accident is not increased. The consequence of a boron dilution accident is recriticality of the reactor core. The flowrate reduction in Modes 3 and 5 due to temperature differences between the diluting water source and the RCS adds more conservatism to the analysis which decreases the chance that the reactor core will become critical due to a boron dilution accident. The overall increase in the Mode 4 flowrate results from using the correct minimum RCS water volume, thus removing unnecessary conservatism. The added restriction that requires either isolating or limiting the combined flowrate from both reactor makeup water pumps for Mode 6 ensures that the 30 minute operator action time is available for mitigation of a dilution event. The calculated consequences of the boron dilution accident are unchanged.

The proposed amendment does not create the possibility of a new or different kind of accident from any accident previously evaluated. This proposed Technical Specification change will not cause any physical changes to the plant. The plant will continue to operate the same way it does now with the exception of the new reactor makeup water flowrates. These new flowrates are necessary to ensure that the Standard Review Plan operator action times are available for the mitigation of a dilution event.

The proposed amendment does not involve a significant reduction in a margin of safety. The flowrate reduction in Modes 3 and 5 due to temperature differences between the diluting water source and the RCS adds more conservatism to the analysis which increases the margin of safety. The overall increase in the Mode 4 flowrate results from using the correct Mode 4 minimum RCS water volume, thus removing unnecessary conservatism. The added restriction that requires either isolating or limiting the combined flowrate from both reactor makeup water pumps for Mode 6 ensures that the 30 minute operator action time is available for mitigation of a dilution event. The calculated margin of safety remains unchanged.

Change 3

3. ACTION (d) is being removed from TS 3.9.2.1 because it is no longer required based on the issuance of Amendment 48/41 which was made using the guidance of Generic Letter 87-09.

The exemption from the requirements of TS 3.0.4 are no longer necessary because of the issuance of Amendment 48/41 to the Catawba Technical Specifications. This amendment was made using the guidance contained in NRC Generic Letter 87-09. The NRC has already concluded that the changes made using the guidance of Generic Letter 87-09 contain no significant hazards.

Change 4

4. The footnote in TS's 3.3.3.12 and 3.9.1.2 that refers to applicability for Unit 2 has been removed since this time has passed.

The footnote regarding applicability for Unit 2 after entering Mode 2 following the first refueling outage has been removed since this time has passed. This change is administrative in nature and does not involve significant hazards consideration.

Change 5

5. The addition of "(square root of 10)" to TS 3.3.3.12 (a)(2) and (b)(2) is to provide additional clarity and consistency with TS's 4.3.3.12.2 (a), 3.9.2.1 (2) and 4.9.2.1.2 (c).

The addition of the phrase "square root of 10" clarifies the meaning of "one-half decade." This was inadvertently left out in some of the actions that require verifying the Alarm Setpoints on the Source Range Neutron Flux Monitors. The addition of the phrase "square root of 10" is administrative in nature and does not involve significant hazards consideration.

Change 6

6. The removal of "3/4.3.3.12" from the title of the TS provides consistency with other TS in this section.

The removal of the number 3/4.3.3.12 from the title of the Technical Specification provides formatting consistency with other titles in this section. This change is administrative in nature and does not involve significant hazards consideration.

Change 7

7. The spelling of the word "least" has been corrected in TS 4.9.2.1.2 (c).

The word "least" had been misspelled "lest." This spelling correction is administrative in nature and does not involve significant hazards consideration.

For the above reasons, Duke Power concludes that this proposed amendment does not involve any significant hazards consideration.

The proposed Technical Specification change has been reviewed against the criteria of 10 CFR 51.22(c)(9) for environmental considerations. The proposed change does not involve any significant hazards consideration, nor increase the types or amounts of effluents that may be released offsite, nor increase the individual or cumulative occupational radiation exposure. Based on this, the proposed Technical Specification change meets the criteria given in 10 CFR 51.22(c)(9) for categorical exclusion from the requirement for an Environmental Impact Statement.