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DUKE POWER

June 13, 1994

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

Subject: McGuire Nuclear Station
Docket Nos: 50-369 and 370
Supplement to Technical Specification Amendment
ECCS - Pump Runout

Dear Sir:

By letter dated November 11, 1993, Duke Power submitted a request for change to Technical Specification 4.5.2.f and 4.5.2.h. Based on the 4/26/94 NRC request for additional information and based on subsequent technical discussions regarding the subject matter, enclosed are technical responses from our engineering staff as requested.

A copy of this technical information will be provided to the appropriate North Carolina State official.

Should you have any questions, please contact Dwin Caldwell at (704) 875-4328 or John Sawyer (704) 382-6759.

Very truly yours,

T. C. McMeekin

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DUKE POWER RESPONSE
REQUEST FOR ADDITIONAL INFORMATION ON
NOVEMBER 11, 1993 APPLICATION RELATING TO
ECCS SUBSYSTEM SURVEILLANCE REQUIREMENTS

Q1. You state that the information provided by Westinghouse and Dresser/Pacific Pumps indicated that credit could not be taken for an increased pump runout limit due to an excess suction pressure, since cavitation is expected to occur on the second stage of the pump for flow rates above the initially proposed runout limits. When and in what documents was Duke Power notified by Westinghouse and Dresser/Pacific Pumps of the changed pump runout limits? Please provide information on the NPSH limit and the amount of conservatism you will now have on this limit to avoid cavitation.

A. Duke Power was notified by Westinghouse and Dresser/Pacific in letters DAP-91-074 and DCP-91-074 (Reference 1) dated October 3, 1991. Appendix 1 of Reference 1 discusses cavitation and NPSH requirements for the centrifugal charging pumps (CCPs) and the safety injection pumps (SIPs). Per Reference 1, Westinghouse and Dresser/Pacific recommend a NPSH of 30 feet in order to support runout limits of 560 and 675 gpm for the CCPs and SIPs, respectively. Page 6-158 of the MNS FSAR (Reference 2) lists the available NPSH values for the SIPs and CCPs for the most limiting conditions. The minimum available NPSH for the CCPs is 45.3 ft, and the minimum available NPSH for the SIPs is 48.3 ft, both of which exceed the 30 ft requirement.

Q2. Discuss the basis for the change in the residual heat removal (RHR) flow rate. You indicate that the RHR flow rate will be increased from 3975 gpm to 4025 gpm. GL 88-17 recommends that RHR flow be reduced for midloop operation to avoid vortexing. Will this proposed increase in flow rate have an impact on RHR operation in mid-loop operation?

A. As mentioned in the Technical Justifications supporting the proposed changes to the ECCS surveillance requirements, LOCA reanalyses were performed to demonstrate the acceptability of the proposed changes. The weakest MNS/CNS CCP and SIP plant data head curves were selected for developing the LOCA injected flow predictions. Additional degradation was applied to the weakest head curves in developing the injected flow predictions in order to build in conservatism and pump test margin. The strongest CCP and SIP head curves were selected in evaluating runout conditions for the proposed Technical Specification changes. The test dates for the selected CCP and SIP pump head curves are as follows:

Weakest CCP	12/91
Strongest CCP	5/91
Weakest SIP	9/91
Strongest SIP	7/90

The residual heat removal (RHR) pump head curve that supports the proposed TS changes is 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.

The LOCA reanalyses also incorporated changes other than just ECCS injected flow differences. These other changes include, but are not limited to, an increase in the maximum steam generator tube plugging percentage from 10% to 18%, an increase in cold leg accumulator (CLA) and refueling water storage tank (RWST) water temperatures and various Westinghouse LOCA EM improvements. The increased steam generator tube plugging and the increased CLA/RWST water temperature assumptions were expected to be penalties to the final PCTs. To offset the PCT penalties for the large break analysis, which was closer to the 2200 °F 10CFR50.46 PCT acceptance criteria, it was decided to take credit for more RHR injected flow. The proposed Technical Specification changes thus reflect this additional RHR injected flow.

The proposed increase in the RHR surveillance requirement will have no impact on RHR operation in mid-loop. The RHR flow rate during mid-loop operation will continue to be limited to ≤ 3000 gpm, as described in References 3 and 4. Physically, there will be no changes to the RHR system involved with the proposed TS changes. Analytically, credit will be taken for more RHR injection flow in the LOCA analyses for higher modes of operation. For these modes of operation, the suction sources of the RHR pumps are the RWST (injection phase) and the reactor building sump (sump recirculation phase). In order to take credit for more RHR injection flow, the surveillance requirement must be increased to ensure actual RHR performance remains above analysis assumptions. The latest MNS ND injected flow test data, which is corrected for uncertainties, indicates that the 4025 gpm proposed TS will be acceptable.

Q3. **You state that the LOCA reanalysis to determine the impact of the proposed TS change met the criteria of 10 CFR 50.46 including the PCT, which was below 2200 °F. Were the changes from the previous analysis such that they are small enough not to be considered to be a significant change (greater than 50 °F)? Specify the "NRC approved methodology" for the LOCA analysis. What were the changes in peak cladding temperature for the large and small break LOCAs as a result of the reanalysis?**

A. The LOCA reanalyses were performed by Westinghouse. The approved LOCA methodologies are given in WCAP-10266 (Reference 5) and WCAP-10054 (Reference 6). The current Westinghouse large break and small break peak clad temperatures, as given in Section 15.6.5 of the MNS FSAR (Reference 2), are 2132 and 1590 °F, respectively. For simplicity, the above PCTs do not include the effects discussed in Reference 7. The large break and small break PCTs as a result of the LOCA reanalyses are 1945 and 1264 °F, respectively. Therefore, the changes in PCTs from the previous analyses are large enough to involve significant changes (>50 °F). As mentioned in the response to question 2, the LOCA reanalyses incorporated changes other than the ECCS injected flow assumptions, and thus the differences in PCTs cannot be judged solely by the differences in the injected flow assumptions. Duke Power has notified the NRC of the significant PCT changes via submittal of References 8 and 9.

REFERENCES

1. 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.

2. Final Safety Analysis Report, McGuire Nuclear Station, September 1, 1993.

3. McGuire Nuclear Station Procedure OP/1/A/6200/04.

4. McGuire Nuclear Station Procedure OP/2/A/6200/04.

5. Kabadi, J. N., et al, "The 1981 Version of the Westinghouse ECCS Evaluation Model Using the BASH Code," WCAP-10266-P-A, Rev. 2, March 1987.

6. N. Lee, et al, "Westinghouse Small Break ECCS Evaluation Model Using the NOTRUMP Code," WCAP-10054-P-A, August 1985.

7. Letter from M. S. Tuckman (Duke) to USNRC, "McGuire Nuclear Station, Docket Numbers 50-369 and -370, Catawba Nuclear Station, Docket Numbers 50-413 and -414, Report Pursuant to 10 CFR 50.46, Changes to or Errors in an ECCS Evaluation Model," October 18, 1993.

8. Letter from D. L. Rehn (Duke) to USNRC, "Catawba Nuclear Station, Docket Nos. 50-413 and 50-414, Technical Specification Amendment, CLA Water Volume and ECCS Subsystem Surveillance Requirements," October 5, 1993.

9. Letter from T. C. McMeekin (Duke) to USNRC, "McGuire Nuclear Station, Units 1 and 2, Docket Nos. 50-369 and 50-370, Proposed Technical Specification (TS) Amendment, ECCS Subsystem Surveillance Requirements (TS 4.5.2f and 4.5.2h)," November 11, 1993.