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OPPD
Omaha Public Power District

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December 14, 2001
LIC-01-0115

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

References:
1. Docket No. 50-285
2. Letter from NRC (L. R Wharton) to OPPD (S. K. Gambhir), "Fort Calhoun Station, Unit No. 1 Issuance of Amendment Re: Reactor Coolant System Flow Rate (TAC NO. MA5318)," dated October 6, 1999 (NRC-99-145)
3. XN-75-21(P)(A) Revision 2, "XCOBRA-IIIC, A Computer Code to Determine the Distribution of Coolant During Steady-State and Transient Core Operation," Exxon Nuclear Company, dated January 1986
4. EMF-2062(P), "Guidelines for PWR Safety Analysis," Siemens Power Corporation

SUBJECT: Fort Calhoun Station Unit No. 1 – License Amendment Request, "Minimum Reactor Coolant System (RCS) Flow Rate"

Pursuant to 10 CFR 50.90, Omaha Public Power District (OPPD) hereby requests the following amendment to Technical Specification (TS) 2.10.4, which will decrease the minimum required reactor coolant system (RCS) flow rate from 206,000 gallons per minute (gpm) to 202,500 gpm. Assuming that calculations (currently in progress) substantiate assumptions and statements in the attached evaluation, OPPD concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c).

In order to expedite replacement of fuel with fuel assemblies manufactured by Framatome ANP, the start of the 2002 refueling outage has been rescheduled from September to May, thus reducing the time available to complete the analyses and to process the needed license amendment. There is high confidence that the in-progress analyses and calculations will support the attached evaluation. Before January 15, 2002, OPPD will provide supplemental information on the basis for the minimum flow rate and update the attached evaluation accordingly. Before April 1, 2002, OPPD will provide confirmation that the fuel design parameters are maintained for the next operating fuel cycle, cycle 21.

A001

Precedence for Fort Calhoun Station (FCS) operation as proposed by this amendment request has been established by: 1) FCS operations with a minimum acceptable RCS flow rate of 202,500 gpm prior to NRC issuance of TS Amendment 193 (Reference 2), and 2) NRC approval of FRA-ANP DNBR and XCOBRA-IIIC methodologies (Reference 3) and event-specific guidelines (Reference 4), which have been subsequently used for safety analyses at Robinson Unit 2, Shearon Harris, St. Lucie Units 1 and 2, and Millstone Unit 2 plants.

OPPD requests approval of the proposed amendment by May 1, 2002, to support startup from the spring 2002 refueling outage. Once approved, the amendment shall be implemented prior to criticality for cycle 21.

I declare under penalty of perjury that the foregoing is true and correct. (Executed on December 14, 2001)

If you have any questions or require additional information, please contact Dr. Richard Jaworski at (402) 533-6833.

Sincerely,

W. G. Gates

W. G. Gates
Vice President

WGG/RLJ/rlj

Attachments:
1. Fort Calhoun Station's Evaluation
2. Markup of Technical Specification Pages and Bases Changes
3. Clean Copy of Technical Specification Pages and Bases Changes

c: E. W. Merschoff, NRC Regional Administrator, Region IV
A. B. Wang, NRC Project Manager
W. C. Walker, NRC Senior Resident Inspector
Division Administrator, Public Health Assurance, State of Nebraska
Winston & Strawn

ATTACHMENT 1

Fort Calhoun Station's Evaluation
for
Amendment of Operating License

1.0 INTRODUCTION

This letter is a request to amend Operating License DPR-40 for Fort Calhoun Station (FCS) Unit No. 1 Technical Specifications Limiting Conditions for Operation, Section 2.10.4, "Reactor Core, Power Distribution Limits," (5) (a) (iii), "Reactor Coolant Flow Rate," from the current minimum value of 206,000 gpm to 202,500 gpm. This proposed amendment will accommodate the new fuel assemblies from Framatome-ANP that have a higher flow resistance than the Westinghouse fuel assemblies for operating cycles 21 and 22. The proposed change in the RCS flow rate will also accommodate the reduced RCS flow rate due to the anticipated need to plug steam generator tubes during future refueling outages.

2.0 DESCRIPTION OF PROPOSED AMENDMENT

The proposed changes to FCS Unit No. 1 Technical Specifications Limiting Conditions for Operation Section 2.10.4 (5) (a) (iii) will reduce the reactor coolant minimum flow rate from an indicated value of 206,000 gpm to 202,500 gpm. The proposed change will replace the value "206,000" with "202,500" in TS 2.10.4 (5) (a) (iii) and in the Basis section of TS 2.10.4.

3.0 BACKGROUND

The proposed amendment is needed to accommodate the projected decrease in RCS flow rate due to: (1) the loading of higher flow-resistant Framatome-ANP (FRA-ANP) fuel assemblies into the core, which will result in a larger pressure drop than that experienced by the current Westinghouse fuel assemblies, and (2) the anticipated need to plug steam generator tubes during future refueling outages. Currently there are 53 FRA-ANP and 80 Westinghouse fuel assemblies in the core. FCS is planning to replace the Westinghouse fuel assemblies with FRA-ANP fuel assemblies during the next two refueling outages. FCS also anticipates that additional steam generator tubes will need to be plugged during future refueling outages as a result of testing.

In 1998 OPPD removed the steam generator orifice plates (modification MR-FC-97-005), which resulted in an increase in RCS flow rate to an estimated value of 207,500 gpm. Associated with this modification, FCS was granted Technical Specification change Amendment 193 (References 10.1 and 10.2), which increased the minimum required RCS flow rate and changed the surveillance requirements for RCS flow rate. Amendment 193 increased the RCS minimum flow rate for departure from nucleate boiling ratio (DNBR) margin during power operation above 15 percent of rated power from 197,000 gpm, which corresponds to an indicated flow rate of 202,500 gpm, to an indicated flow rate of 206,000 gpm. In addition, the surveillance frequency was changed from monthly to refueling. The increased flow rate provided increased margin over the previous indicated flow rate of 202,500 gpm. Margin to DNB and margin to peak cladding temperature was maintained with the increased flow rate.

The flow rate is measured by periodic surveillance testing and includes +3.6% one-sided 95/95 volumetric flow uncertainty, which addresses uncertainty due to measurements of power, pressurizer pressure, cold and hot leg temperatures, and hot leg stratification. In order to assure that the actual flow rate is above the minimum flow rate used in the accident analysis, the measured or indicated flow rate must be above 202,500 gpm to assure that the actual flow rate is above the accident analysis minimum flow rate, with uncertainties, of 195,210 gpm.

The proposed amendment will maintain the minimum indicated RCS flow rate at the level of 202,500 gpm, which was the value prior to the steam generator orifice plate removal modification.

4.0 REGULATORY REQUIREMENTS AND GUIDANCE

The proposed amendment for changes in RCS flow rate must comply with Criterion 10 of 10 CFR 50, Appendix A, General Design Criteria for Nuclear Power Plants. The proposed change will comply with the criteria such that the RCS with the new flow rate will provide appropriate margin to assure that the specified acceptable fuel design limits (SAFDLs) are not exceeded during any condition of normal operation, including the effects of anticipated operational occurrences (AOOs).

5.0 TECHNICAL ANALYSIS

Note: OPPD will confirm the analysis results noted below by April 1, 2002.

5.1 Design Basis

The proposed change to the minimum RCS flow rate will not affect the design bases of the plant and is therefore acceptable.

Framatome-ANP, Inc. performed a detailed analysis in support of the proposed reduction in RCS flow rate. The analysis includes the effect on RCS flow rate of increased pressure drop across the FRA-ANP fuel assemblies and the anticipated increase in the number of steam generator tubes that will be plugged during future refueling outages.

The FRA-ANP analysis demonstrates that the proposed reduction in RCS flow rate does not degrade the margin to the mechanical fuel design limits and that the fuel design criteria continue to be met. The DNB limiting accident events and DNB limiting anticipated operational occurrences, including the Reactor Coolant Pump Rotor Seizure, Control Element Assembly (CEA) Ejection, and Loss of Forced Reactor Coolant Flow event were analyzed using the reduced RCS flow rate to confirm sufficient DNB margin for plant operation. The impact of the reduction in RCS flow rate on the fuel rod peak cladding temperatures (PCTs) and maximum oxidation during the large break loss of coolant accident (LBLOCA) and the small break loss of coolant accident (SBLOCA) was not significant.

The FRA-ANP analysis was performed using DNBR methods (Reference 10.3) described in the current XCOBRA-IIIC methodology and event-specific guidelines (Reference 10.4).

5.2 Risk Information

The proposed amendment does not involve application or use of risk-informed decisions.

6.0 REGULATORY ANALYSIS

Note: OPPD will confirm the analysis results noted below by April 1, 2002.

The technical analysis by Framatome-ANP satisfies all regulatory requirements and guidance as mentioned in Section 4. The analysis confirms that the proposed reduction in RCS flow rate does not degrade the margin to the mechanical fuel design limits and that the fuel design criteria continue to be met.

In conclusion, based on the considerations discussed above: (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 amendment will not be inimical to the common defense and security.

7.0 NO SIGNIFICANT HAZARDS CONSIDERATION

Note: OPPD will confirm the analysis results noted below by April 1, 2002.

OPPD has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. **Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?**

   Response: No.

The proposed amendment to the RCS flow rate is the same as the indicated RCS flow rate prior to the TS Amendment 193 (Reference 10.1). The plant was operated with the same RCS flow rate as the proposed value prior to Amendment 193. Chapter 14 events and design basis accidents were analyzed with the RCS flow rate of 202,500 gpm using NRC approved methodology.

In 1999 Fort Calhoun Station was granted TS Amendment 193 to increase the minimum indicated RCS flow rate to 206,000 gpm as a result of the removal of the steam generator orifice plates. Transient and thermal hydraulic analyses were performed using the amended RCS flow rate to verify that the minimum departure from nucleate boiling ratio (MDNBR) does not fall below the limiting value that supports the DNB specified acceptable fuel design limits.

The FRA-ANP analysis confirms that the proposed reduction in RCS flow rate does not degrade the margin to the mechanical fuel design limits and that the fuel design criteria continue to be met.

In view of the above confirmation, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. **Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?**

Response: No.

The proposed change to the RCS flow rate is not new since the plant was operating with the same value prior to TS Amendment 193. The proposed revision does not change any equipment required to mitigate the consequences of an accident. OPPD will continue to analyze all applicable USAR Chapter 14 events and design basis accidents as part of the reload analyses to establish the safety margin to the mechanical fuel design limits and confirm that all the fuel design criteria continue to be met. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. **Does the proposed change involve a significant reduction in a margin of safety?**

Response: No.

The decreased RCS flow rate has been analyzed for thermal hydraulic effects on the reactor core. The analysis has confirmed that the proposed amendment does not degrade the margin to the mechanical fuel design limits and meets the fuel design criteria. The RCS flow rate surveillance requirements will continue to assure that the design functions are met. Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above, OPPD concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and, accordingly, a finding of "no significant hazards consideration" is justified.

8.0 ENVIRONMENTAL CONSIDERATION

Based on the above considerations, the proposed amendment does not involve, and will not result in, a condition that significantly alters the impact of the Station on the environment. Thus, the proposed change meets the eligibility criteria for categorical exclusion set forth in 10 CFR Part 51.22(c)(9) and, pursuant to 10 CFR Part 51.22(b), no environmental assessment need be prepared.

9.0 PRECEDENCE

Prior to TS Amendment 193 (Reference 10.1), the plant operated with the same RCS flow rate of 202,500 gpm. Amendment 193 changed the indicated RCS flow rate to 206,000 gpm to accommodate the increase in flow rate due to the removal of the steam generator orifice plates in 1998.

The FRA-ANP analysis was performed using the DNBR methods (Reference 10.3) described in the current XCOBRA-IIIC methodology and event-specific guidelines described in Reference 10.4. This NRC-approved methodology is currently used for safety analyses at Robinson Unit 2, Shearon Harris, St. Lucie Units 1 and 2, and Millstone Unit 2 plants.

10.0 REFERENCES

10.1 Letter from NRC (L. R Wharton) to OPPD (S. K. Gambhir), "Fort Calhoun Station, Unit No. 1 Issuance of Amendment Re: Reactor Coolant System Flow Rate (TAC NO. MA5318)," dated October 6, 1999 (NRC-99-145)

10.2 Letter from OPPD (W. G. Gates) to NRC (Document Control Desk), "Application for Amendment of Facility Operating License No. DPR-40," dated March 31, 1999 (LIC-99-0031)

10.3 XN-75-21(P)(A) Revision 2, "XCOBRA-IIIC, A Computer Code to Determine the Distribution of Coolant During Steady-State and Transient Core Operation," Exxon Nuclear Company, dated January 1986

10.4 EMF-2062(P), "Guidelines for PWR Safety Analysis," Siemens Power Corporation

ATTACHMENT 2

Markup of
Technical Specification Pages
and
Bases Changes

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.10 Reactor Core (Continued)
2.10.4 Power Distribution Limits (Continued)

(5) DNBR Margin During Power Operation Above 15% of Rated Power

(a) The following limits on DNB-related parameters shall be maintained:

(i)	Cold Leg Temperature (Core Inlet Temperature)	as specified in the COLR
(ii)	Pressurizer Pressure	≥2075 psia*
(iii)	Reactor Coolant Flow rate	≥202,500~~206,000~~ gpm indicated
(iv)	Axial Shape Index	as specified in the COLR

(b) With any of the above parameters exceeding the limit, restore the parameter to within its limit within 2 hours or reduce power to less than 15% of rated power within the next 8 hours.

Basis

The limitation on linear heat rate ensures that in the event of a LOCA, the peak temperature of the fuel cladding will not exceed 2200°F.

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System or the Incore Detector Monitoring System, provides adequate monitoring of the core power distribution and is capable of verifying that the linear heat rate does not exceed its limit. The Excore Detector Monitoring System performs this function by continuously monitoring the axial shape index (ASI) with the operable quadrant symmetric excore neutron flux detectors. The axial shape index is maintained within the allowable limits of the Limiting Condition for Operation for Excore Monitoring of LHR Figure provided in the COLR. This ASI is adjusted by Specification 2.10.4(1)(c) for the allowed linear heat rate of the Allowable Peak Linear Heat Rate vs. Burnup Figure provided in the COLR and the F_R^T and Core Power Limitations Figure provided in the COLR. In conjunction with the use of the excore monitoring system and in establishing the axial shape index limits, the following assumptions are made: (1) the CEA insertion limits of Specification 2.10.1(6) and long term insertion limits of Specification 2.10.1(7) are satisfied, and (2) the flux peaking augmentation factors are as shown in Figure 2-8.

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* Limit not applicable during either a thermal power ramp in excess of 5% of rated thermal power per minute or a thermal power step of greater than 10% of rated thermal power.

2.0 **LIMITING CONDITIONS FOR OPERATION**

2.10 Reactor Core (Continued)

2.10.4 Power Distribution Limits (Continued)

In order for these objectives to be met, the reactor must be operated consistent with the operating limits specified for margin to DNB.

The parameter limits given in (5) and the F_R^T, and Core Power Limitations Figure provided in the COLR along with the parameter limits on quadrant tilt and control element assembly position (Power Dependent Insertion Limit Figure provided in the COLR) provide a high degree of assurance that the DNB overpower margin will be maintained during steady state operation.

The actions specified assure that the reactor is brought to a safe condition.

The Reactor Coolant System flow rate of 202,500~~206,000~~ gallons per minute is the indicated value. It does not include instrumentation uncertainties.

The calorimetric methodology shall be used to measure the Reactor Coolant System flow rate.

ATTACHMENT 3

Clean Copy of
Technical Specification Pages
and
Bases Changes

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.10 Reactor Core (Continued)
2.10.4 Power Distribution Limits (Continued)

(5) DNBR Margin During Power Operation Above 15% of Rated Power

(a) The following limits on DNB-related parameters shall be maintained:

(i)	Cold Leg Temperature (Core Inlet Temperature)	as specified in the COLR
(ii)	Pressurizer Pressure	$\geq$2075 psia*
(iii)	Reactor Coolant Flow rate	$\geq$202,500 gpm indicated
(iv)	Axial Shape Index	as specified in the COLR

(b) With any of the above parameters exceeding the limit, restore the parameter to within its limit within 2 hours or reduce power to less than 15% of rated power within the next 8 hours.

Basis

The limitation on linear heat rate ensures that in the event of a LOCA, the peak temperature of the fuel cladding will not exceed 2200°F.

Either of the two core power distribution monitoring systems, the Excore Detector Monitoring System or the Incore Detector Monitoring System, provides adequate monitoring of the core power distribution and is capable of verifying that the linear heat rate does not exceed its limit. The Excore Detector Monitoring System performs this function by continuously monitoring the axial shape index (ASI) with the operable quadrant symmetric excore neutron flux detectors. The axial shape index is maintained within the allowable limits of the Limiting Condition for Operation for Excore Monitoring of LHR Figure provided in the COLR. This ASI is adjusted by Specification 2.10.4(1)(c) for the allowed linear heat rate of the Allowable Peak Linear Heat Rate vs. Burnup Figure provided in the COLR and the F_R^T and Core Power Limitations Figure provided in the COLR. In conjunction with the use of the excore monitoring system and in establishing the axial shape index limits, the following assumptions are made: (1) the CEA insertion limits of Specification 2.10.1(6) and long term insertion limits of Specification 2.10.1(7) are satisfied, and (2) the flux peaking augmentation factors are as shown in Figure 2-8.

* Limit not applicable during either a thermal power ramp in excess of 5% of rated thermal power per minute or a thermal power step of greater than 10% of rated thermal power.

2.0 **LIMITING CONDITIONS FOR OPERATION**
2.10 Reactor Core (Continued)
2.10.4 Power Distribution Limits (Continued)

In order for these objectives to be met, the reactor must be operated consistent with the operating limits specified for margin to DNB.

The parameter limits given in (5) and the F_R^T, and Core Power Limitations Figure provided in the COLR along with the parameter limits on quadrant tilt and control element assembly position (Power Dependent Insertion Limit Figure provided in the COLR) provide a high degree of assurance that the DNB overpower margin will be maintained during steady state operation.

The actions specified assure that the reactor is brought to a safe condition.

The Reactor Coolant System flow rate of 202,500 gallons per minute is the indicated value. It does not include instrumentation uncertainties. |

The calorimetric methodology shall be used to measure the Reactor Coolant System flow rate.