March 22, 1994

Docket Nos. 50-369
and 50-370

Mr. T. C. McMeekin
Vice President, McGuire Site
Duke Power Company
12700 Hagers Ferry Road
Huntersville, North Carolina 28078-8985

Dear Mr. McMeekin:

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E.Merschoff, RII
D. Matthews

SUBJECT: ISSUANCE OF AMENDMENTS - McGUIRE NUCLEAR STATION, UNITS 1 AND 2 (TAC NOS. M88120 AND M88121)

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 141 to Facility Operating License NPF-9 and Amendment No. 123 to Facility Operating License NPF-17 for the McGuire Nuclear Station, Units 1 and 2. The amendments consist of changes to the Technical Specifications (TSs) in response to your application dated October 25, 1993, as supplemented December 3, 1993, and February 14, 1994.

The amendments reduce the required minimum measured reactor coolant system flow from 385,000 gallons per minute (gpm) to 382,000 gpm.

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

ORIGINAL SIGNED BY:

Victor Nerses, Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 141 to NPF-9
2. Amendment No. 123 to NPF-17
3. Safety Evaluation

cc w/enclosures:
See next page

OFFICE	PDII-3/LA	PDII-3/PM	OGC	PDII-3/D	
NAME	L. BERRY	V. NERSES:dt		D.MATTHEWS ~~xxxxxxxx~~	
DATE	2/12/94	2/23/94	3/2/94	3/22/94	

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

March 22, 1994

Docket Nos. 50-369
and 50-370

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Vice President, McGuire Site
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12700 Hagers Ferry Road
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Victor Nerses

Victor Nerses, Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 141 to NPF-9
2. Amendment No. 123 to NPF-17
3. Safety Evaluation

cc w/enclosures:
See next page

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DUKE POWER COMPANY

DOCKET NO. 50-369

McGUIRE NUCLEAR STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 141
License No. NPF-9

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the McGuire Nuclear Station, Unit 1 (the facility), Facility Operating License No. NPF-9 filed by the Duke Power Company (licensee) dated October 25, 1993, as supplemented December 3, 1993, and February 14, 1994, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. NPF-9 is hereby amended to read as follows:

   Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. **141** , are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

DBMatthews

David B. Matthews, Director
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
Changes

Date of Issuance: **March 22, 1994**

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

DUKE POWER COMPANY

DOCKET NO. 50-370

McGUIRE NUCLEAR STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 123
License No. NPF-17

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the McGuire Nuclear Station, Unit 1 (the facility), Facility Operating License No. NPF-17 filed by the Duke Power Company (licensee) dated October 25, 1993, as supplemented December 3, 1993, and February 14, 1994, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and Paragraph 2.C.(2) of Facility Operating License No. NPF-17 is hereby amended to read as follows:

   Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 123 , are hereby incorporated into this license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of its date of issuance and shall be implemented within 30 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

DBMatthews

David B. Matthews, Director
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Technical Specification
  Changes

Date of Issuance: **March 22, 1994**

ATTACHMENT TO LICENSE AMENDMENT NO. 141

FACILITY OPERATING LICENSE NO. NPF-9

DOCKET NO. 50-369

AND

TO LICENSE AMENDMENT NO. 123

FACILITY OPERATING LICENSE NO. NPF-17

DOCKET NO. 50-370

Replace the following pages of the Appendix "A" Technical Specifications with the enclosed pages. The revised pages are identified by Amendment number and contain vertical lines indicating the areas of change.

Remove Pages	Insert Pages
2-2	2-2
2-3	2-3
2-5	2-5
2-8	2-8
2-9	2-9
2-10	2-10
2-11	2-11
3/4 2-24	3/4 2-24

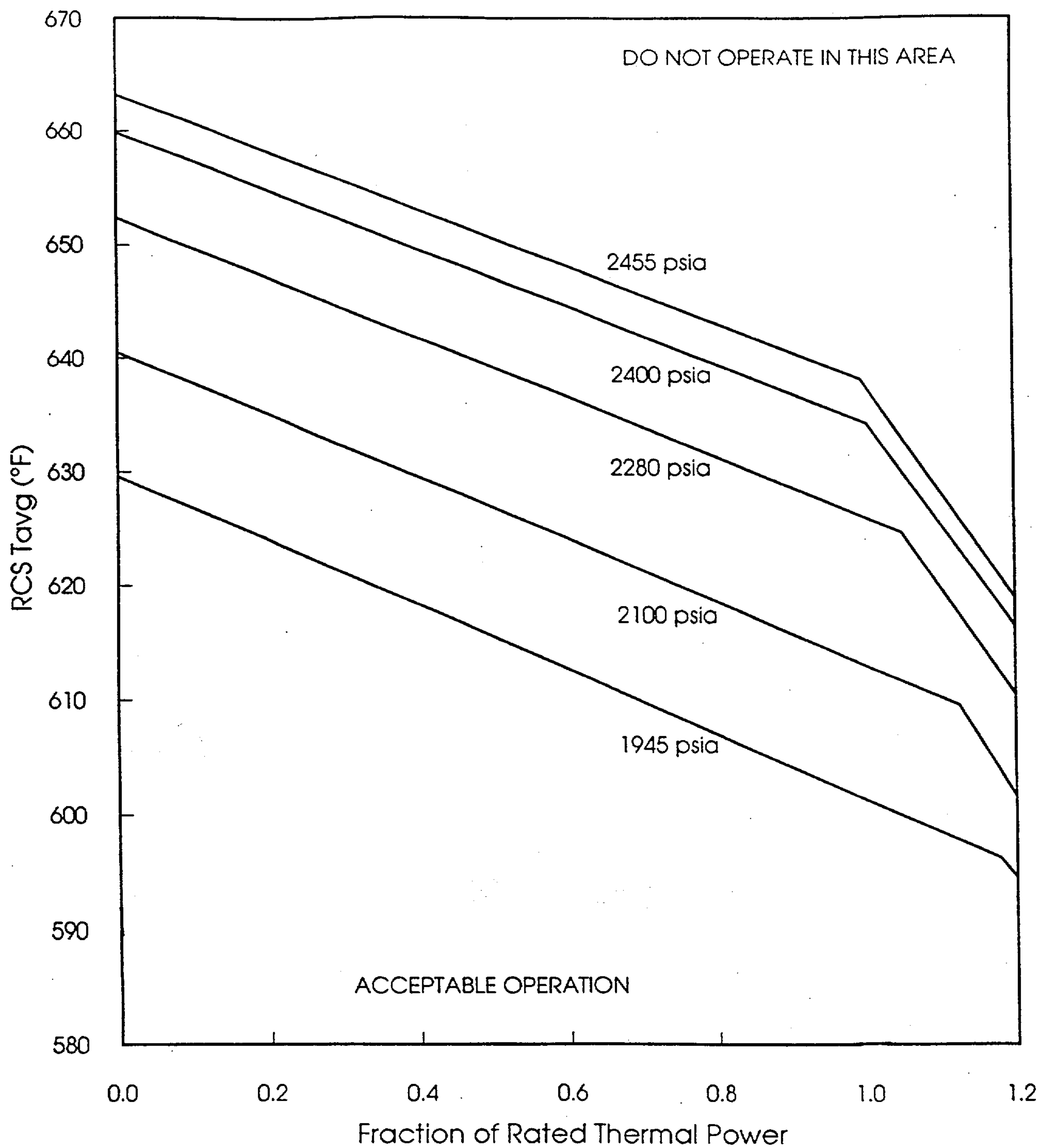

Figure 2.1-1
REACTOR CORE SAFETY LIMITS - FOUR LOOPS IN OPERATION

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TABLE 2.2-1

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABL VALUES
1. Manual Reactor Trip	N.A.	N.A.
2. Power Range, Neutron Flux	Low Setpoint - ≤ 25% of RATED THERMAL POWER	Low Setpoint - ≤ 26% of RATED THERMA POWER
	High Setpoint - ≤ 109% of RATED THERMAL POWER	HighSetpoint - ≤ 110% of RATED THERMA POWER
3. Power Range, Neutron Flux, High Positive Rate	≤ 5% of RATED THERMAL POWER with a time constant ≥ 2 seconds	≤ 5.5% of RATED THERMAL POWER with a time constant ≥ 2 seconds
4. Intermediate Range, Neutron Flux	≤ 25% of RATED THERMAL POWER	≤ 30% of RATED THERMAL POWER
5. Source Range, Neutron Flux	≤ 10^5 counts per second	≤ 1.3 x 10^5 counts per second
6. Overtemperature ΔT	See Note 1	See Note 3
7. Overpower ΔT	See Note 2	See Note 4
8. Pressurizer Pressure--Low	≥ 1945 psig	≥ 1935 psig
9. Pressurizer Pressure--High	≤ 2385 psig	≤ 2395 psig
10. Pressurizer Water Level--High	≤ 92% of instrument span	≤ 93% of instrument span
11. Low Reactor Coolant Flow	≥ 90% of minimum measured flow per loop*	≥ 88.8% of minimum measured flow per loop*

*Minimum measured flow is 95,500 gpm per loop.

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

NOTATION

NOTE 1: OVERTEMPERATURE ΔT

$$(\Delta T/\Delta T_0)\ \left(\frac{1+\tau_1 S}{1+\tau_2 S}\right)\left(\frac{1}{1+\tau_3 S}\right) \le K_1 - K_2\left(\frac{1+\tau_4 S}{1+\tau_5 S}\right)\left[T\left(\frac{1}{1+\tau_6 S}\right)-T_1\right] + K_3\,(P-P^1) - f_1(\Delta I)$$

Where:

ΔT	=	Measured ΔT by Loop Narrow Range RTD,
ΔT_0	=	Indicated ΔT at RATED THERMAL POWER,
$\frac{1+\tau_1 S}{1+\tau_2 S}$	=	Lead-lag compensator on measured ΔT,
τ_1, τ_2	=	Time constants utilized in the lead-lag controller for ΔT, $\tau_1 \ge 8$ sec., $\tau_2 \le 3$ sec.,
$\frac{1}{1+\tau_3}$	=	Lag compensator on measured ΔT,
τ_3	=	Time constants utilized in the lag compensator for ΔT, $\tau_3 \le 2$ sec.*
K_1	≤	1.1988,
K_2	=	0.03354,
$\frac{1+\tau_4 S}{1+\tau_5 S}$	=	The function generated by the lead-lag controller for T_{avg} dynamic compensation,
τ_4, τ_5	=	Time constants utilized in the lead-lag controller for T_{avg}, $\tau_4 \ge 28$ sec., $\tau_5 \le 4$ sec.,
T	=	Average temperature, °F,
$\frac{1}{1+\tau_6 S}$	=	Lag compensator on measured T_{avg},

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

NOTATION (Continued)

NOTE 1: (Continued)

τ_6 = Time constant utilized in the measured T_{avg} lag compensator, $\tau_6 \leq 2$ sec.

T^1 = $\leq$ 588.2 °F Reference T_{avg} at RATED THERMAL POWER,

K_3 = 0.001522,

P = Pressurizer pressure, psig,

P^1 = 2235 psig (Nominal RCS operating pressure),

S = Laplace transform operator, sec^{-1},

and $f_1(\Delta I)$ is a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between -44.0% and +12.0%ΔI; $f_1(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;

(ii) for each percent imbalance that the magnitude of $q_t - q_b$ is more negative than -44.0%ΔT, the ΔT Trip Setpoint shall be automatically reduced by 3.436% of ΔT_o; and

(iii) for each percent imbalance that the magnitude of $q_t - q_b$ is more positive than +12.0%ΔI, the ΔT Trip Setpoint shall be automatically reduced by 1.619% of ΔT_o.

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

NOTATION (Continued)

NOTE 2: OVERPOWER ΔT

$$(\Delta T/\Delta T_0)\left(\frac{1+\tau_1 S}{1+\tau_2 S}\right)\left(\frac{1}{1+\tau_3 S}\right) \le K_4 - K_5\left(\frac{\tau_7 S}{1+\tau_7 S}\right)\left(\frac{1}{1+\tau_6 S}\right) T - K_6\left[T\left(\frac{1}{1+\tau_6 S}\right) - T''\right] - f_2(\Delta I)$$

Where:	ΔT	=	As defined in Note 1,
	ΔT_o	=	As defined in Note 1,
	$\frac{1 + \tau_1 S}{1 + \tau_2 S}$	=	As defined in Note 1
	τ_1, τ_2	=	As defined in Note 1
	$\frac{1}{1 + \tau_3 S}$	=	As defined in Note 1,
	K_4	$\le$	1.0851,
	K_5	=	0.02/°F for increasing average temperature and 0 for decreasing average temperature,
	$\frac{\tau_7 S}{1 + \tau_7 S}$	=	The function generated by the rate-lag controller for T_{avg} dynamic compensation,
	τ_7	=	Time constant utilized in the rate-lag controller for T_{avg}, $\tau_7 \ge 5$ sec,
	$\frac{1}{1 + \tau_6 S}$	=	As defined in Note 1,
	τ_6	=	As defined in Note 1,
	K_6	=	0.001207/°F for T > T" and K_6 = 0 for T ≤ T",

TABLE 2.2-1 (Continued)

REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS

NOTATION (Continued)

T = As defined in Note 1,

T'' = ≤ 588.2 °F Reference T_{avg} at RATED THERMAL POWER,

S = As defined in Note 1, and

$f_2(\Delta I)$ is a function of the indicated difference between top and bottom detectors of the power-range nuclear ion chambers; with gains to be selected based on measured instrument response during plant startup tests such that:

(i) for $q_t - q_b$ between -35% and +35% ΔI; $f_2(\Delta I) = 0$, where q_t and q_b are percent RATED THERMAL POWER in the top and bottom halves of the core respectively, and $q_t + q_b$ is total THERMAL POWER in percent of RATED THERMAL POWER;

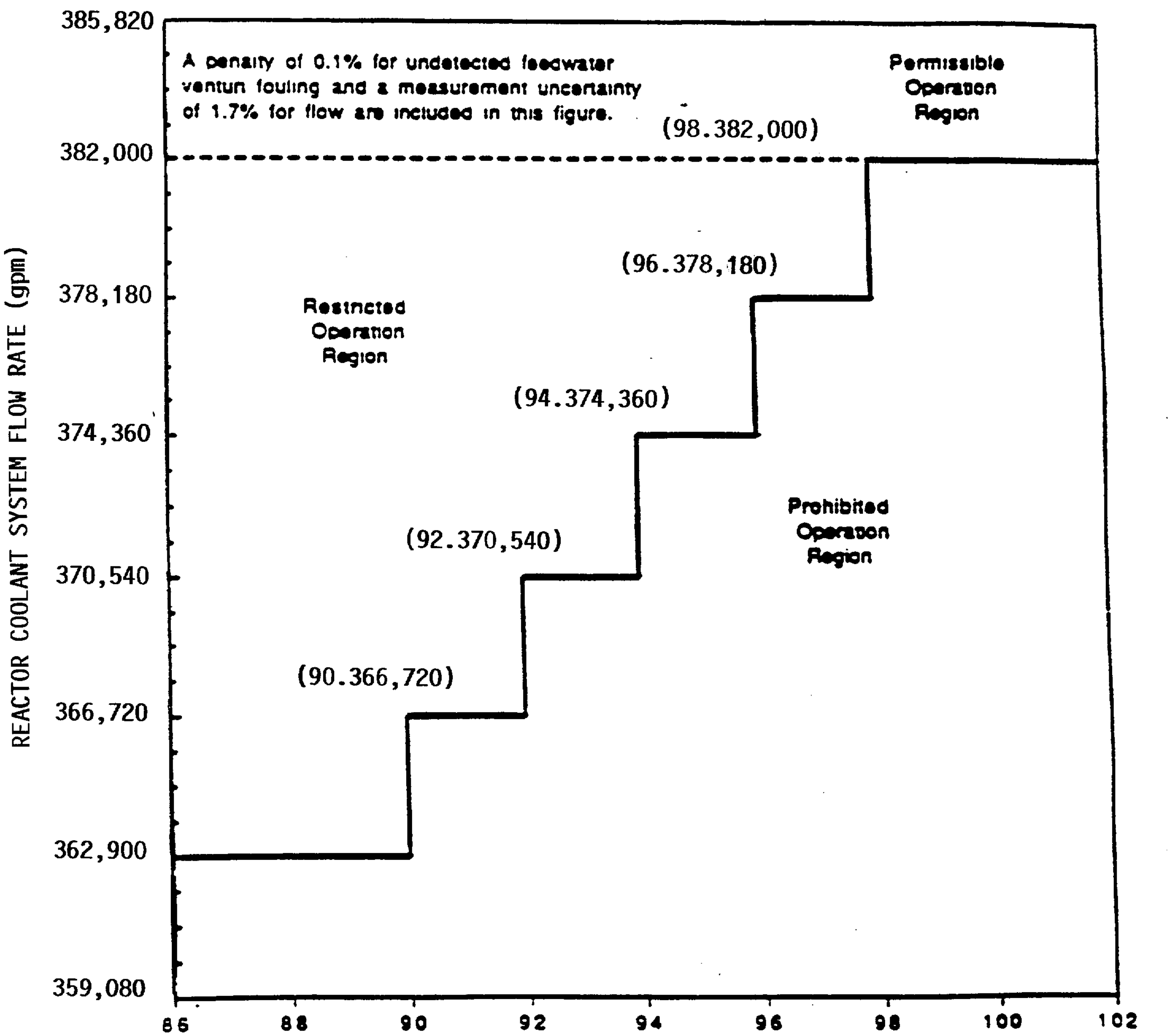
(ii) for each percent imbalance that the magnitude of $q_t - q_b$ is more negative than -35% ΔI, the ΔT Trip Setpoint shall be automatically reduced by 7.0% of ΔT_o; and

(iii) for each percent imbalance that the magnitude of $q_t - q_b$ is more positive than +35% ΔI, the ΔT Trip Setpoint shall be automatically reduced by 7.0% of ΔT_o.

Note 3: The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 4.4% of Rated Thermal Power.

Note 4: The channel's maximum Trip Setpoint shall not exceed its computed Trip Setpoint by more than 3.0% of Rated Thermal Power.

Figure 3.2-1 Reactor Coolant System Total Flow Rate Versus Reated Thermal Power - Four Loops in Operation



Fraction of Rated Thermal Power

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 141 TO FACILITY OPERATING LICENSE NPF-9

AND AMENDMENT NO. 123 TO FACILITY OPERATING LICENSE NPF-17

DUKE POWER COMPANY

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

DOCKET NOS. 50-369 AND 50-370

1.0 INTRODUCTION

By letter dated October 25, 1993 (Reference 1), as supplemented December 3, 1993 (Reference 2), and February 14, 1994 (Reference 3), Duke Power Company (the licensee) submitted a request for changes to the McGuire Nuclear Station, Units 1 and 2, Technical Specifications (TS). The requested changes would reduce the required minimum measured reactor coolant system flow from 385,000 gallons per minute (gpm) to 382,000 gpm. The December 3, 1993, letter provided information in response to the staff's November 19, 1993, request for additional information. The February 14, 1994, letter requested NRC staff approval that the flow-reduction portion of the requested TS change be separated from the approval of the safety limit portion of the requested TS change. Therefore, the remaining changes to TS Figures 2.1-1 and 3.2-1, and TS Table 2.2-1, to reflect a reduction in the reactor coolant system minimum required flow rate, are approved as discussed below. The licensee's February 14, 1994, requested change reduced the scope of the October 25, 1993, application and reduced the scope of the initial proposed no significant hazards consideration determination, but otherwise did not change the NRC staff's initial determination that the three standards of 10 CFR 50.92(c) are satisfied.

The reasons for the licensee's request in the October 25, 1993, application, as supplemented December 3, 1993, and February 14, 1994, are that the degrading of the steam generator tubes in McGuire, Units 1 and 2, have necessitated that tubes be plugged or sleeved, which reduces the available flow area in the steam generators and consequently reduces flow through the core. In addition, a hot leg temperature streaming phenomenon has affected the ability to accurately measure flow. As a result of these effects, it was difficult to ensure meeting the TS minimum flow requirements to maintain 100% power operation.

The following TS were modified to reflect the reduction in reactor coolant system (RCS) flow:

1) Figure 2.1-1, Reactor Core Protection Limits - Four Loops in Operation,

2) Figure 3.2-1, Reactor Coolant System Total Flow Rate Versus Rated Thermal Power - Four Loops in Operation, and

3) The overtemperature delta T (OTΔT) and overpower delta T (OPΔT) setpoint equation constants in Table 2.2-1, Reactor Trip System Instrumentation Trip Setpoints.

These revisions are applicable to McGuire, Units 1 and 2.

2.0 EVALUATION

2.1 Revision of OTΔT and OTΔP Parameters in Table 2.2-1

To support the reduction in measured minimum RCS flow (MMF), changes were required for the OPΔT setpoints for McGuire, Units 1 and 2. These changes involved recalculation of the TS allowable values of the trip functions. The revised core thermal limits were generated to reflect the reduced MMF of 382,000 gpm. Based on these new protection limits, the OTΔT setpoint constants (Note 1 of Table 2.2-1), and the OPΔT setpoint equation constants (Notes 2 and 3 of Table 2.2-1) were revised to reflect the necessary changes. The impact of the reduced flow on the coefficients was partially offset by a reduction in the margin assumed in the calculation of the coefficients.

The revised OPΔT allowable values are more restrictive than the existing values. In the course of the these calculations, a minor error was discovered by the licensee that affected the existing allowable values. This resulted in a recalculation of the allowable value affected by the flow reduction.

The revision required for the McGuire OTΔT allowable value is less restrictive than the existing value. To improve clarity, the maximum trip setpoint limit in Notes 2 and 4 of TS Table 2.2-1 will be expressed in percent of rated thermal power (RTP) instead of percent instrument span.

In response to a request for additional information, the licensee responded (Reference 2) with information which provided the approved methodology (Reference 4) for the changes made relating to OPΔT and OTΔT. The staff, therefore, finds these changes to be acceptable.

2.2 The Effect of Reduced Flow on the Final Safety Analysis Report Analyses

The licensee performed analyses to justify reduction in the minimum RCS flow to 382,000 gpm. These analyses were to show that the reduced flow rate will not have a significant impact on any accident analyses presented in the Final Safety Analysis Report (FSAR) Chapters 4, 6, or 15.

2.2.1 Thermal Hydraulic Design, FSAR Section 4.4

The thermal hydraulic design for the McGuire units was analyzed by the licensee with the reduction in RCS MMF to 382,000 gpm. The reduced flow rate resulted in a slight reduction of the margin in the core DNB limits. TS Figure 3.2-1, Reactor Coolant System Total Flow Rate Versus Rated Thermal Power - Four Loops in Operation, was revised to reflect the lower allowable flow rate. For the changes made in RCS flow at reduced power, the licensee stated (Reference 2) that the RCS flow values were determined using the same 2% power per 1% flow reduction factor used in the existing TS figure. The axial Flux Difference Limits, TS Section 3.2.1, are unchanged and all the current thermal hydraulic design criteria are satisfied at the reduced flow conditions.

2.2.2 Mass and Energy Releases for Containment Analyses, FSAR Chapter 6

Duke Power stated that the reduction in MMF flow affects the mass and energy releases for containment analysis only through a change in the RCS temperature input assumption. As the RCS average temperature will remain unchanged with the change in MMF, the RCS initial fluid and metal stored energy will remain unchanged. Also, a constant RCS average temperature implies that the driving temperature difference for primary-to-secondary heat transfer will remain unchanged. These two parameters, initial energy content and rate of energy transfer, are the means by which mass and energy releases influence containment response for the transients analyzed in Chapter 6 of the FSAR. Since the reduction in MMF is being made with a negligible change in RCS temperature, the licensee stated that the mass and energy releases calculated in FSAR Chapter 6 will not be affected.

2.2.3 Accident Analyses, FSAR Chapter 15

All of the FSAR Chapter 15 accident analyses which are applicable to the McGuire units were explicitly analyzed by the licensee with an initial RCS flow assumption that corresponds to an MMF of 382,000 gpm, or have been evaluated to determine the impact of a reduction in MMF of 3,000 gpm.

The following analyses were reanalyzed by DPC with an initial RCS flow assumption which is less than or equal to an MMF flow of 382,000 gpm.

15.1.5	Steam System Piping Failure
15.2.3b	Turbine Trip - Peak Primary Pressure
15.2.6	Loss of Non-emergency AC Power
15.2.7	Loss of Normal Feedwater Flow
15.2.8	Feedwater System Pipe Break
15.3.1	Partial Loss of Reactor Coolant System Flow
15.3.2	Complete Loss of Reactor Coolant System Flow
15.3.3	Locked Rotor
15.4.1	Uncontrolled Bank Withdrawal from Subcritical
15.4.2	Uncontrolled Bank Withdrawal at Power
15.4.3	Rod Assembly Misoperation
15.4.8	Rod Ejection
15.6.3	Steam Generator Tube Rupture
15.6.5	Loss of Coolant Accident

Events that were not reanalyzed included those that are bounded by other more limiting events as stated in the licensee's Topical Report DPC-NE-3002-A and events which are analyzed with the acceptance criteria of no departure from nucleate boiling.

As noted above, the licensee has performed reanalyses or has made evaluations that determine that the reduction in MMF will not adversely affect the steady state or transient analyses documented in Chapters 4, 6, and 15 of the McGuire FSAR. Duke Power stated (Reference 2) that the reanalyses used approved codes (References 5 to 9). Therefore, the staff finds the decrease in the MMF from 385,000 gpm to 382,000 gpm in the McGuire, Units 1 and 2, TS to be acceptable.

The staff has reviewed the licensee's submittal to support the reduction in the required minimum measured reactor coolant system flow and finds the TS changes to be acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the North 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. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluent 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 67842 dated December 22, 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.

Principal Contributors: H. Balukjian
R. Martin

Date: March 22, 1994

REFERENCES

1. Letter from M. S. Tuckman, DPC, to USNRC, dated October 25, 1993.

2. Letter from M. S. Tuckman, DPC, to USNRC, dated December 3, 1993.

3. Letter from M. S. Tuckman, DPC, to USNRC, dated February 14, 1994.

4. Letter from T. C. McMeekin, DPC, to USNRC, dated April 26, 1993.

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

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

7. DPC-NE-3000P-A, Rev. 1, "Thermal-Hydraulic Transient Analysis Methodology," November 1991.

8. DPC-NE-3001P-A, "Multidimensional Reactor Transients and Safety Analysis Physics Parameter Methodology," November 1991.

9. DPC-NE-3002-A, "FSAR Chapter 15 System Transient Analysis Methodology," November 1991.