February 27, 1991

Docket Nos. 50-369
and 50-370

Distribution
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Mr. M.S. Tuckman
Vice President -
Nuclear Operations
Duke Power Company
P.O. Box 1007
Charlotte, North Carolina 28201-1007

Dear Mr. Tuckman:

SUBJECT: ISSUANCE OF AMENDMENT NO. 117 TO FACILITY OPERATING LICENSE NPF-9 AND AMENDMENT NO. 99 TO FACILITY OPERATING LICENSE NPF-17 - MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 (TACS 79337)

The Nuclear Regulatory Commission has issued the enclosed Amendment No. 117 to Facility Operating License NPF-9 and Amendment No. 99 to Facility Operating License NPF-17 for the McGuire Nuclear Station, Units 1 and 2. These amendments consist of changes to the Technical Specifications (TSs) in response to your application dated December 19, 1990, as supplemented February 15, 1991.

The amendments reduce from 75% to 50% the number of moveable incore detector thimbles required for the Moveable Incore Detection System to be operable, thus allowing continued operation of Unit 1 should the current problem with sticking detector thimbles become worse. The amendments are applicable to Unit 1, Cycle 7 only.

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

Sincerely,

Timothy A. Reed, Project Manager
Project Directorate II-3
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 117to NPF-9
2. Amendment No. 99to NPF-17
3. Safety Evaluation

cc w/enclosures:
See next page

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DATED: February 27, 1991

AMENDMENT NO. 117 TO FACILITY OPERATING LICENSE NPF-9 - McGuire Nuclear Station, Unit 1
AMENDMENT NO. 99 TO FACILITY OPERATING LICENSE NPF-17 - McGuire Nuclear Station, Unit 2

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

DUKE POWER COMPANY

DOCKET NO. 50-369

McGUIRE NUCLEAR STATION, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 117
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 (the licensee) dated December 19, 1990, as supplemented February 15, 1991 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.

cc:
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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. 117, are hereby incorporated into the 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.

FOR THE NUCLEAR REGULATORY COMMISSION

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: February 27, 1991

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

DUKE POWER COMPANY

DOCKET NO. 50-370

McGUIRE NUCLEAR STATION, UNIT 2

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 99
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 2 (the facility) Facility Operating License No. NPF-17 filed by the Duke Power Company (the licensee) dated December 19, 1990, as supplemented February 15, 1991 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. 99 , are hereby incorporated into the 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.

FOR THE NUCLEAR REGULATORY COMMISSION

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: February 27, 1991

ATTACHMENT TO LICENSE AMENDMENT NO. 117

FACILITY OPERATING LICENSE NO. NPF-9

DOCKET NO. 50-369

AND

TO LICENSE AMENDMENT NO. 99

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
3/4 2-7	3/4 2-7
3/4 2-9	3/4 2-9
3/4 2-9b	3/4 2-9b
3/4 2-14	3/4 2-14
3/4 3-45	3/4 3-45

SURVEILLANCE REQUIREMENTS

4.2.2.1 The provisions of Specification 4.0.4 are not applicable.

4.2.2.2 For RAOC operation, $F_Q(z)$ shall be evaluated to determine if $F_Q(z)$ is within its limit by:

a. Using the movable incore detectors to obtain a power distribution map at any THERMAL POWER greater than 5% of RATED THERMAL POWER.

b. Increasing the measured $F_Q(z)$ component of the power distribution map by 3% to account for manufacturing tolerances and further increasing the value by 5%** to account for measurement uncertainties. Verify the requirements of Specification 3.2.2 are satisfied.

c. Satisfying the following relationship:

$$F_Q^M(z) \leq \frac{F_Q^{RTP} \times K(z)}{P \times W(z)} \text{ for } P > 0.5$$

$$F_Q^M(z) \leq \frac{F_Q^{RTP} \times K(z)}{W(z) \times 0.5} \text{ for } P \leq 0.5$$

where $F_Q^M(z)$ is the measured $F_Q(z)$ increased by the allowances for manufacturing tolerances and measurement uncertainty, F_Q^{RTP} is the F_Q limit, K(z) is the normalized $F_Q(z)$ as a function of core height, P is the relative THERMAL POWER, and W(z) is the cycle dependent function that accounts for power distribution transients encountered during normal operation. F_Q^{RTP}, K(z), and W(z) are specified in the CORE OPERATING LIMITS REPORT per Specification 6.9.1.9.

d. Measuring $F_Q^M(z)$ according to the following schedule:

1. Upon achieving equilibrium conditions after exceeding by 10% or more of RATED THERMAL POWER, the THERMAL POWER at which $F_Q(z)$ was last determined,* or

2. At least once per 31 Effective Full Power Days, whichever occurs first.

*During power escalation at the beginning of each cycle, power level may be increased until a power level for extended operation has been achieved and a power distribution map obtained.

**For Unit 1, Cycle 7, when the number of available moveable detector thimbles is greater than or equal to 50% and less than 75% of the total, the 5% measurement uncertainty shall be increased to [5% + (3-T/14.5)(2%)] where T is the number of available thimbles.

g. The limits specified in Specifications 4.2.2.2c, 4.2.2.2e., and 4.2.2.2f. above are not applicable in the following core plane regions:

1. Lower core region from 0 to 15%, inclusive.
2. Upper core region from 85 to 100%, inclusive.

4.2.2.3 Base load operation is permitted at powers above APL^{ND*} if the following conditions are satisfied:

a. Prior to entering base load operation, maintain THERMAL POWER above APL^{ND} and less than or equal to that allowed by Specification 4.2.2.2 for at least the previous 24 hours. Maintain base load operation surveillance (AFD within the target band about the target flux difference of Specification 3.2.1) during this time period. Base load operation is then permitted providing THERMAL POWER is maintained between APL^{ND} and APL^{BL} or between APL^{ND} and 100% (whichever is most limiting) and FQ surveillance is maintained pursuant to Specification 4.2.2.4. APL^{BL} is defined as:

$$APL^{BL} = \underset{\text{over } Z}{\text{minimum}} \left[\frac{F_Q^{RTP} \times K(Z)}{F_Q^M(Z) \times W(Z)_{BL}} \right] \times 100\%$$

where: $F_Q^M(z)$ is the measured $F_Q(z)$ increased by the allowances for manufacturing tolerances and measurement uncertainty. F_Q^{RTP} is the F_Q limit. $K(z)$ is the normalized $F_Q(z)$ as a function of core height. $W(z)_{BL}$ is the cycle dependent function that accounts for limited power distribution transients encountered during base load operation. F_Q^{RTP}, $K(z)$, and $W(z)_{BL}$ are specified in the CORE OPERATING LIMITS REPORT per Specification 6.9.1.9.

b. During base load operation, if the THERMAL POWER is decreased below APL^{ND} then the conditions of 4.2.2.3.a shall be satisfied before re-entering base load operation.

4.2.2.4 During base load operation $F_Q(Z)$ shall be evaluated to determine if $F_Q(Z)$ is within its limit by:

a. Using the movable incore detectors to obtain a power distribution map at any THERMAL POWER above APL^{ND}.

b. Increasing the measured $F_Q(Z)$ component of the power distribution map by 3% to account for manufacturing tolerances and further increasing the value by 5%** to account for measurement uncertainties. Verify the requirements of Specification 3.2.2 are satisfied.

---

*APL^{ND} is the minimum allowable (nuclear design) power level for base load operation in Specification 3.2.1.

**For Unit 1, Cycle 7, when the number of available moveable detector thimbles is greater than or equal to 50% and less than 75% of the total, the 5% measurement uncertainty shall be increased to [5% + (3-T/14.5)(2%)] where T is the number of available thimbles.

SURVEILLANCE REQUIREMENTS (Continued)

2. Comply with the requirements of Specification 3.2.2 for $F_Q(Z)$ exceeding its limit by the percent calculated with the following expression:

$$[(\text{max. over z of } [\ \frac{F_Q^M(Z) \times W(Z)_{BL}}{\frac{F_Q^{RTP}}{P} \times K(Z)}\ ]\ ) -1\ ] \times 100 \text{ for } P \geq APL^{ND}$$

g. The limits specified in 4.2.2.4.c, 4.2.2.4.e, and 4.2.2.4.f above are not applicable in the following core plan regions:

1. Lower core region 0 to 15 percent, inclusive.

2. Upper core region 85 to 100 percent, inclusive.

4.2.2.5 When $F_Q(Z)$ is measured for reasons other than meeting the requirements of specification 4.2.2.2 an overall measured $F_Q(z)$ shall be obtained from a power distribution map and increased by 3% to account for manufacturing tolerances and further increased by 5%* to account for measurement uncertainty.

*For Unit 1, Cycle 7, when the number of available moveable detector thimbles is greater than or equal to 50% and less than 75% of the total, the 5% measurement uncertainty shall be increased to [5% + (3-T/14.5)(2%)] where T is the number of available thimbles.

POWER DISTRIBUTION LIMITS

3/4.2.3 RCS FLOW RATE AND NUCLEAR ENTHALPY RISE HOT CHANNEL FACTOR

LIMITING CONDITION FOR OPERATION

3.2.3 The combination of indicated Reactor Coolant System (RCS) total flow rate and R shall be maintained within the region of allowable operation specified in the CORE OPERATING LIMITS REPORT (COLR) for four loop operation:

Where:

a. $R = \dfrac{F^N_{\Delta H}}{F^{RTP}_{\Delta H} \quad [1.0 + MF_{\Delta H} (1.0 - P)]}$,

b. $P = \dfrac{\text{THERMAL POWER}}{\text{RATED THERMAL POWER}}$,

c. $F^N_{\Delta H}$ = Measured values of $F^N_{\Delta H}$ obtained by using the movable incore detectors to obtain a power distribution map. The measured values of $F^N_{\Delta H}$ shall be used to calculate R since the figure specified in the COLR includes penalties for undetected feedwater venturi fouling of 0.1% and for measurement uncertainties of 1.7% for flow and 4%* for incore measurement of $F^N_{\Delta H}$,

d. $F^{RTP}_{\Delta H}$ = The $F^N_{\Delta H}$ limit at RATED THERMAL POWER (RTP) specified in the COLR, and

e. $MF_{\Delta H}$ = The power factor multiplier specified in the COLR.

APPLICABILITY: MODE 1.

ACTION:

With the combination of RCS total flow rate and R outside the region of acceptable operation specified in the COLR:

a. Within 2 hours either:

1. Restore the combination of RCS total flow rate and R to within the above limits, or

2. Reduce THERMAL POWER to less than 50% of RATED THERMAL POWER and reduce the Power Range Neutron Flux - High Trip Setpoint to less than or equal to 55% of RATED THERMAL POWER within the next 4 hours.

*For Unit 1, Cycle 7, when the number of available moveable detector thimbles is greater than or equal to 50% and less than 75% of the total, the 4% measurement uncertainty shall be increased by changing the value of $F^{RTP}_{\Delta H}$ in the R equation to [(0.0149/14.5)T + 1.4453] where T is the number of available thimbles.

INSTRUMENTATION

MOVABLE INCORE DETECTORS

LIMITING CONDITION FOR OPERATION

3.3.3.2 The Movable Incore Detection System shall be OPERABLE with:

a. At least 75%* of the detector thimbles,

b. A minimum of two** detector thimbles per core quadrant, and

c. Sufficient movable detectors, drive, and readout equipment to map these thimbles.

APPLICABILITY: When the Movable Incore Detection System is used for:

a. Recalibration of the Excore Neutron Flux Detection System,

b. Monitoring the QUADRANT POWER TILT RATIO, or

c. Measurement of $F\Delta_H^N$ and $F_Q(Z)$

ACTION:

With the Movable Incore Detection System inoperable, do not use the system for the above applicable monitoring or calibration functions. The provisions of Specification 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.2 The Movable Incore Detection System shall be demonstrated OPERABLE at least once per 24 hours by normalizing each detector output when required for:

a. Recalibration of the Excore Neutron Flux Detection System, or

b. Monitoring the QUADRANT POWER TILT RATIO, or

c. Measurement of $F_{\Delta H}^N$ and $F_Q(Z)$

*For Unit 1, Cycle 7, the minimum percentage of detector thimbles may be reduced to 50% provided the applicable provisions for >50% and <75% of the total detector thimbles of specifications 4.2.2.2.b, 4.2.4.b, 4.2.2.5, 3.2.3.c, and 3.3.3.2.b are followed.

**For Unit 1, Cycle 7, when the number of available moveable detector thimbles is ≥ 50% and <75% of the total, a minimum of four detector thimbles per quadrant is required (where quadrant includes both horizontal-vertical quadrants and diagonally bounded quadrants).

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 117 TO FACILITY OPERATING LICENSE NPF-9

AND AMENDMENT NO. 99 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 December 19, 1990 as supplemented February 15, 1991, Duke Power Company (the licensee) requested amendments to the Technical Specifications (TSs) appended to Facility Operating License Nos. NPF-9 and NPF-17 for the McGuire Nuclear Station, Units 1 and 2. The proposed amendments would reduce from 75% to 50% the number of moveable incore detector thimbles required for the Moveable Incore Detection System to be operable. The amendments are applicable only to McGuire Unit 1, Cycle 7. The supplemental information provided by letter dated February 15, 1991, was clarifying in nature and did not affect the scope of the noticed action or the staff's proposed no significant hazards consideration determination.

These changes would allow continued operation of Unit 1 should the current problem with sticking detector thimbles become worse.

2.0 EVALUATION

Essentially all PWR Technical Specifications contain a requirement for operability of 75% of the incore detector locations for periodic mapping of the core power distribution. On a number of occasions, for various reasons, failures of thimbles in operating PWRs have approached or exceeded the 25%, and relaxation of the 75% requirement has been permitted for the duration of the affected operating cycle.

The licensee's proposed change allows for the increase in the moveable incore map measurement uncertainty on Fq above the 5% normal allowance by the relationship 5% + [3-T/12.5]2%, where T is the number of unfailed detectors. This relationship increases the uncertainty allowance to 7% when half the thimbles are used. The uncertainty in the measurement of F delta H is 4% and is proposed to increase to 5% if only half of the detectors are used. These allowances are similar to those used for other reactors.

The licensee has provided the results of recent core maps which show that there currently is approximately 5% margin in F delta H to the Technical Specification limits for steady state operating conditions. Since the unit does not load follow and the peaking factors normally tend to decrease with burnup, we would expect the margin to increase from now till the end of cycle.

Recently, the licensee has had to take additional penalties on the measured total peaking factors Fq. These penalties are an approximate 5% for uncertainty in the LOCA analysis and a 2% penalty due to Technical Specification 4.2.2.2.(e). There will be the additional penalty due to using fewer than 75% of the incore detectors. The licensee has stated that, in spite of these, the total Fq limit will be met by reducing the axial offset limit. Furthermore, the licensee stated that the measured Fq will continue to decrease throughout the remainder of the cycle, and that the Westinghouse analysis for operation with fewer than 75% thimble detectors is still valid with the additional LOCA analysis penalty and the 2% penalty.

Another safety concern relating to degradation of incore mapping ability is the ability to detect anomalous conditions in the core. One of these is inadvertent loading of a fuel assembly into an improper position. Since this is a loading problem, it is not of concern for the remainder of the operating cycle. Other anomalous conditions are conceived to produce either an axial or radial effect, which would cause either a change in quadrant tilt ratio or axial offset ratio. These are monitored by the excore detectors that would help identify problems not fully detectable with reduced incore mapping capability. Furthermore, the core exit thermocouples in the reactor provide a useful supplement to the incore detectors to detect problems.

If one of the power range neutron flux detectors (excore detector) is inoperable power operation may continue if the power level and the trip setpoint are reduced or the quadrant tilt is monitored by the incore detectors every 12 hours. During operation with fewer than 75% of the incore detectors operable, the lower power option must be the one used.

Our review of the suitability of operation of the McGuire Nuclear Station Unit 1 reactor for the remainder of the Cycle 7 with a reduced number of movable incore thimble locations to as few as 50% indicated that adequate margin exists at this time in Cycle 7 and sufficiently increased uncertainty allowances have been made to ensure that Technical Specification peaking factor limits will be met. In addition, there are adequate supplemental indicators of anomalous conditions to preclude an unsafe condition from escaping detection in the absence of full incore detector mapping capability.

Based on the above considerations we conclude that the proposed Technical Specification changes are acceptable. The licensee has agreed to go to the lower power option if one excore detector is inoperable. Also the licensee will use all available thimbles on each map taken.

3.0 ENVIRONMENTAL CONSIDERATION

These amendments involve changes in requirements with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20 and changes in surveillance requirements. The 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. 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 these amendments.

4.0 CONCLUSION

The Commission's proposed determination that the amendments involve no significant hazards consideration was published in the Federal Register (56 FR 2957) on January 25, 1991. The Commission consulted with the State of North Carolina. No public comments were received, and the State of North Carolina did not have any comments.

The staff 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, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of these amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: M. Chatterton, DST/SRXB

Dated: February 27, 1991