

April 3, 1995

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SUBJECT: AMENDMENT NO. 117 TO FACILITY OPERATING LICENSE NO. DPR-43 -
KEWAUNEE NUCLEAR POWER PLANT (TAC NO. M89275)

Dear Mr. Marchi:

The Commission has issued the enclosed Amendment No. 117 to Facility Operating License No. DPR-43 for the Kewaunee Nuclear Power Plant (KNPP). This amendment revises the Technical Specifications (TS) in response to your application dated April 11, 1994, as supplemented November 30 and December 22, 1994, and March 3, 1995.

The amendment revises KNPP TS 3.1.f, "Minimum Conditions for Criticality," and its associated basis, by specifying that the moderator temperature coefficient (MTC) shall be no greater than 5.0 pcm/ °F when at or below 60% rated thermal power and shall be zero or negative when above 60% rated thermal power. Additionally, the MTC shall be no less negative than -8 pcm/ °F for 95% of the cycle time at full power. The amendment also incorporates required actions to be implemented if the MTC specification is not met.

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

Sincerely,

Original signed by:

Richard J. Laufer, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

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Docket No. 50-305

- Enclosures: 1. Amendment No. 117 to License No. DPR-43
- 2. Safety Evaluation

cc w/encls: See next page

DOCUMENT NAME: G:\KEWAUNEE\KEW89275.AMD

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Handwritten initials and signature

Mr. M. L. Marchi
Wisconsin Public Service Corporation

Kewaunee Nuclear Power Plant

cc:

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

WISCONSIN PUBLIC SERVICE CORPORATION

WISCONSIN POWER AND LIGHT COMPANY

MADISON GAS AND ELECTRIC COMPANY

DOCKET NO. 50-305

KEWAUNEE NUCLEAR POWER PLANT

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 117
License No. DPR-43

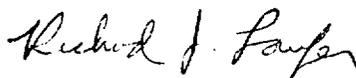
1. The Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Wisconsin Public Service Corporation, Wisconsin Power and Light Company, and Madison Gas and Electric Company (the licensees) dated April 11, 1994, as supplemented November 30 and December 22, 1994, and March 3, 1995, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations 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;
 - 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 amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-43 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No.117, are hereby incorporated in the license. The licensees shall operate the facility in accordance with the Technical Specifications.

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

FOR THE NUCLEAR REGULATORY COMMISSION



Richard J. Laufer, Project Manager
Project Directorate III-3
Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical
Specifications

Date of issuance: April 3, 1995

ATTACHMENT TO LICENSE AMENDMENT NO. 117

FACILITY OPERATING LICENSE NO. DPR-43

DOCKET NO. 50-305

Revise Appendix A Technical Specifications by removing the pages identified below and inserting the enclosed pages. The revised pages are identified by amendment number and contain marginal lines indicating the area of change.

REMOVE

TS 3.1-11

TS B3.1-12

TS B3.1-13

INSERT

TS 3.1-11

TS B3.1-12

TS B3.1-13

TS B3.1-14

f. Minimum Conditions for Criticality

1. The reactor shall not be brought to a critical condition until the pressure-temperature state is to the right of the criticality limit line shown in Figure TS 3.1-1.
2. The reactor shall be maintained subcritical by at least 1% $\Delta k/k$ until normal water level is established in the pressurizer.
3. When the reactor is critical and $\leq 60\%$ RATED POWER, the moderator temperature coefficient shall be ≤ 5.0 pcm/ $^{\circ}$ F, except during LOW POWER PHYSICS TESTING. When the reactor is $> 60\%$ RATED POWER, the moderator temperature coefficient shall be zero or negative.
4. The reactor will have a moderator temperature coefficient no less negative than -8 pcm/ $^{\circ}$ F for 95% of the cycle time at full power.
5. If the limits of 3.1.f.3 cannot be met, power operation may continue provided the following actions are taken:
 - A. Within 24 hours, develop and maintain administrative control rod withdrawal limits sufficient to restore the moderator temperature coefficient to within the limits specified in TS 3.1.f.3. These withdrawal limits shall be in addition to the insertion limits specified in TS 3.10.d.
 - B. If the actions specified in TS 3.1.f.4.A are not satisfied, be in HOT STANDBY within the next 6 hours.

If these limits are exceeded, measures can be taken to correct the condition, e.g., replacement of ion exchange resin or adjustment of the hydrogen concentration in the volume control tank⁽²⁰⁾. Because of the time-dependent nature of any adverse effects arising from oxygen, chloride, and fluoride concentration in excess of the limits, it is unnecessary to shut down immediately since the condition can be corrected. Thus, the time periods for corrective action to restore concentrations within the limits have been established. If the corrective action has not been effective at the end of the time period, reactor cooldown will be initiated and corrective action will continue.

The effects of contaminants in the reactor coolant are temperature dependent. The reactor may be restarted and operation resumed if the maximum concentration of any of the contaminants did not exceed the permitted transient values; otherwise a safety review by the Plant Operations Review Committee is required before startup.

Minimum Conditions for Criticality (TS 3.1.f)

During the early part of the fuel cycle, the moderator temperature coefficient may be calculated to be positive at $\leq 60\%$ RATED POWER. The moderator coefficient will be most positive at the beginning of life of the fuel cycle, when the boron concentration in the coolant is greatest. Later in the fuel cycle, the boron concentrations in the coolant will be lower and the moderator coefficients either will be less positive or will be negative.⁽²¹⁾⁽²²⁾

The requirement that the reactor is not to be made critical except as specified in TS 3.1.f.1 provides increased assurance that the proper relationship between reactor coolant pressure and temperature will be maintained during system heatup and pressurization whenever the reactor vessel is in the nil-ductility temperature range. Heatup to this temperature will be accomplished by operating the reactor coolant pumps and by the pressurizer heaters.

The shutdown margin specified in TS 3.10 precludes the possibility of accidental criticality as a result of an increase in moderator temperature or a decrease in coolant pressure.⁽²¹⁾

The requirement that the pressurizer is partly voided when the reactor is $< 1\%$ subcritical assures that the Reactor Coolant System will not be solid when criticality is achieved.

⁽²⁰⁾USAR Section 9.2

⁽²¹⁾USAR Table 3.2-1

⁽²²⁾USAR Figure 3.2-8

The requirement that the reactor is not to be made critical when the moderator coefficient is > 5.0 pcm/°F has been imposed to prevent any unexpected power excursion during normal operation, as a result of either an increase in moderator temperature or a decrease in coolant pressure. The moderator temperature coefficient limits are required to maintain plant operation within the assumptions contained in the USAR analyses. Having an initial moderator temperature coefficient no greater than 5.0 pcm/°F provides reasonable assurance that the moderator temperature coefficient will be negative at 60% rated thermal power. The moderator temperature coefficient requirement is waived during low power physics tests to permit measurement of reactor moderator coefficient and other physics design parameters of interest. During physics tests, special operating precautions will be taken. In addition, the strong negative Doppler coefficient⁽²³⁾ and the small integrated $\Delta k/k$ would limit the magnitude of a power excursion resulting from a reduction in moderator density.

Suitable physics measurements of moderator coefficients of reactivity will be made as part of the startup testing program to verify analytical predictions.

Analysis has shown that maintaining the moderator temperature coefficient at criticality ≤ 5.0 pcm/°F will ensure that a negative coefficient will exist at 60% power. Current safety analysis supports operating up to 60% power with a moderator temperature coefficient ≤ 5.0 pcm/°F. At power levels greater than 60%, a negative moderator temperature coefficient must exist.

The calculated hot full power (HFP) moderator temperature coefficient will be more negative than -8.0 pcm/°F for at least 95% of a cycle's time at HFP to ensure the limitations associated with and Anticipated Transient Without Scram (ATWS) event are not exceeded. NRC approved methods⁽²⁴⁾⁽²⁵⁾ will be used to determine the lowest expected HFP moderator temperature coefficient for the 5% of HFP cycle time with the highest boron concentration. The cycle time at HFP is the maximum number of days that the cycle could be at HFP based on the design calculation of cycle length. The cycle time at HFP can also be expressed in terms of burnup by converting the maximum number of days at full power to an equivalent burnup. If this HFP moderator temperature coefficient is more negative than -8.0 pcm/°F, then the ATWS design limit will be met for 95% of the cycle's time at HFP. If this HFP moderator temperature coefficient design limit is still not met after excluding the 5% of the cycle burnup with the highest boron concentration, then the core loading must be revised.

⁽²³⁾USAR Figure 3.2-9

⁽²⁴⁾"NRC Safety Evaluation Report for Qualification of Reactor Physics, Methods for Application to Kewaunee," dated October 22, 1979.

⁽²⁵⁾"NRC Safety Evaluation Report for the Reload Safety Evaluation Methods for Application to Kewaunee," dated April 11, 1988.

The results of this design limit consideration will be reported in the Reload Safety Evaluation Report.

In the event that the limits of TS 3.1.f.3 are not met, administrative rod withdrawal limits shall be developed to prevent further increases in temperature with a moderator temperature coefficient that is outside analyzed conditions. In this case, the calculated HFP moderator temperature coefficient will be made less negative by the same amount the hot zero power moderator temperature coefficient exceeded the limit in TS 3.1.f.3. This will be accomplished by developing and implementing administrative control rod withdrawal limits to achieve a moderator temperature coefficient within the limits for HFP moderator temperature coefficient.

Due to the control rod insertion limits of TS 3.10.d and potentially developed control rod withdrawal limits, it is possible to have a band for control rod location at a given power level. The withdrawal limits are not required if TS 3.1.f.3 is satisfied or if the reactor is subcritical.

If after 24 hours, withdrawal limits sufficient to restore the moderator temperature coefficient to within the limits of TS 3.1.f.3 are not developed, the plant shall be taken to HOT STANDBY until the moderator temperature coefficient is within the limits of TS 3.1.f. The reactor is allowed to return to criticality whenever TS 3.1.f is satisfied.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATING TO AMENDMENT NO. 117 TO FACILITY OPERATING LICENSE NO. DPR-43

WISCONSIN PUBLIC SERVICE CORPORATION

WISCONSIN POWER AND LIGHT COMPANY

MADISON GAS AND ELECTRIC COMPANY

KEWAUNEE NUCLEAR POWER PLANT

DOCKET NO. 50-305

1.0 INTRODUCTION

By letter dated April 11, 1994, as supplemented November 30, and December 22, 1994, and March 3, 1995, Wisconsin Public Service Corporation (WPSC), the licensee, requested a revision to the Kewaunee Nuclear Power Plant (KNPP) Technical Specifications (TS). The proposed amendment would revise KNPP TS 3.1.f, "Minimum Conditions for Criticality," and its associated basis by specifying that the moderator temperature coefficient (MTC) shall be no greater than 5.0 pcm/ °F when at or below 60% rated thermal power and shall be zero or negative when above 60% rated thermal power. Additionally, the MTC would be required to be no less negative than -8 pcm/ °F for 95% of the cycle time at full power. The proposed amendment would also incorporate required actions to be implemented if the MTC specification is not met.

2.0 EVALUATION

WPSC will be extending the fuel cycle for the KNPP from 12 months to 18 months beginning with cycle 21, which is scheduled to start on May 7, 1995. The increased core reactivity required for the longer fuel cycle necessitates an increase in the reactor coolant's soluble boron concentration for reactivity control. This may result in a positive MTC early in core life. KNPP TS currently require a non-positive MTC for operation. The licensee's proposal would modify the TS to allow operation with an MTC up to +5 pcm/ °F for reactor power up to 60% of the rated thermal power. Above 60% power, the MTC would continue to be restricted to zero or negative values. Analyses have shown that with a +5 pcm/ °F MTC at zero power, the 60% power MTC restriction will be met. A further restriction for operation at full power, resulting from the review of ATWS analysis requirements, provides a limit requiring the MTC to be no less negative than -8 pcm/ °F for 95% of the cycle time at full power.

To justify the change in allowed MTC, WPSC reanalyzed the USAR events which could be significantly affected by the change, using NRC approved methods and the +5 pcm/ °F MTC value below 60% power. Reanalysis was performed on

the most limiting events: 1) control rod withdrawal and ejection; 2) loss of load; 3) boron dilution; and 4) loss of flow and locked rotor. The results of these analyses were within the limits specified in the USAR. For the rod ejection event at zero power, allowable values for the total power peaking factor were reduced from 9.0 to 8.2 to remain within the USAR specified limit on clad temperature. This change will be incorporated into the WPSC Reload Safety Methodology and the USAR. The analyses discussed above indicate that the proposed change in MTC limit is acceptable for the standard limiting USAR events.

WPSC also analyzed the effect of the proposed MTC change on the Anticipated Transient Without Scram (ATWS) analysis which formed the basis for the ATWS rule (10 CFR 50.62). In their April 11, 1994, submittal, WPSC cited the analysis provided in Westinghouse Topical Report, WCAP-11993, "Assessment of Compliance with ATWS Rule Basis for Westinghouse PWRs," dated December 1988, to justify their proposed MTC change. WCAP-11993 is a probability analysis of parameters important for ATWS, which had been developed during a previous review of positive MTC interaction with the analysis for the basis of the ATWS rule. This WCAP had not been previously submitted for NRC review and could not provide a basis for justification of the proposed Kewaunee TS change without an extensive review. Following discussions with the staff, WPSC made subsequent submittals on November 30, and December 22, 1994, and March 3, 1995, which resolved the ATWS concerns by limiting the MTC to within the values used in the Westinghouse calculations, which formed part of the input for the development of the ATWS rule. These calculations used a value of -8 pcm/°F for the MTC at the initial event conditions of full power and equilibrium xenon, to provide a value not to be exceeded for 95% of the cycle, as specified by the NRC. Information on ATWS analysis using a -8 MTC was submitted to the NRC by Westinghouse in letters dated December 30, 1979, and June 8, 1994 (NS-TMA-2096). To fall within the scope of these analyses, WPSC proposed to further restrict the MTC by providing another limitation in the TS stating that the MTC will be no less negative than -8 pcm/°F for 95% of the cycle time at full power. Thus, the MTC will be compatible with the analyses forming the bases for the ATWS rule. WPSC will design each fuel cycle to accomplish this using NRC approved methods for analysis as described in: 1) "NRC Safety Evaluation Report for Qualification of Reactor Physics Methods for Application to Kewaunee," dated October 23, 1979; and 2) "NRC Safety Evaluation Report for the Reload Safety Evaluation Methods for Applications to Kewaunee," dated April 11, 1988. The staff finds WPSC's proposal an acceptable solution to the ATWS concerns and finds that the proposed MTC TS change falls within the bases of the ATWS rule.

The proposed changes described above affect KNPP TS 3.1.f, "Minimum Conditions for Criticality." WPSC included the final version of the proposed TS and Bases with their March 3, 1995, submittal. The proposed changes would revise TS 3.1.f as follows:

- (1) TS 3.1.f.1 and TS 3.1.f.3 are replaced with a new TS 3.1.f.3, which specifies that the MTC shall not exceed $+5$ pcm/°F at or below 60% rated thermal power, and shall be zero or negative at power levels in excess of 60% rated thermal power.

- (2) Current TS 3.1.f.2 and TS 3.1.f.4 are renumbered to 3.1.f.1 and TS 3.1.f.2, respectively.
- (3) A new TS 3.1.f.4 is added, which states that the reactor core will be designed to have an MTC no less negative than -8 pcm/ °F for at least 95% of the cycle time at full power.
- (4) A new TS 3.1.f.5 is added to specify the actions required if the MTC cannot be met. Actions include the development of rod withdrawal limits in order to restore the MTC to within limits.

The licensee also proposed changes to the Bases for TS 3.1.f, which support the proposed TS changes and provide references for the applicable methodologies. The bases also state that the results of the design limit analyses will be reported in the Kewaunee Reload Safety Evaluation Report.

3.0 SUMMARY

The staff has reviewed WPSC's proposal to change the MTC requirements for the KNPP, and determined that the reexamination of relevant transients and analyses has appropriately demonstrated that the reactor will remain within safety limits, for such events, when operating within the extremes of the proposed MTC. Furthermore, with the specified restrictions on MTC at full power, the reactor will operate within the analyses forming the relevant bases for the ATWS rule. The staff, therefore, finds the proposed changes to the TS acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Wisconsin State official was notified of the proposed issuance of the amendment. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment involves 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding (59 FR 49442). Accordingly, this amendment meets 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 this amendment.

6.0 CONCLUSION

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, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: H. Richings

Date: April 3, 1995