

JANUARY 15 1979

Docket No. 50-305

Wisconsin Public Service Corporation  
ATTN: Mr. E. W. James  
Senior Vice President  
Post Office Box 1200  
Green Bay, Wisconsin 54305

Gentlemen:

The Commission has issued the enclosed Amendment No. *24* to Facility Operating License No. DPR-43 for the Kewaunee Nuclear Power Plant. This amendment consists of changes to the Appendix A Technical Specifications in response to your request dated July 12, 1977.

This amendment includes changes to the Technical Specifications related to fuel rod bow penalty. In addition, Technical Specifications related to Cycle 1 and 2 operation are deleted as they are obsolete.

Sincerely,

Original Signed By

A. Schwencer, Chief  
Operating Reactors Branch #1  
Division of Operating Reactors

Enclosures:

1. Amendment No. *24* to DPR-43
2. Safety Evaluation
3. Notice of Issuance

cc: w/enclosures  
See next page

See attached for Distribution

790215 0190

CP 1

TAC # 7038

\*SEE ATTACHED YELLOW FOR CONCURRENCE

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OFFICE	DOR:ORB1*	DOR:ORB1*		DOR:ORB1*	
SURNAME	MMMlynczak:jb	CSParrish		ASchwencer	
DATE	12/21/78	12/21/78		1/13/79	

DISTRIBUTION

Docket File 50-305

NRC PDR

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I&E (5)

B. Jones (8)

D. Brinkman

B. Scharf (10)

B. Harless

B. Grimes

ACRS (16)

TERA

J. Buchanan

OPA (Clare Miles)

OFFICE →

SURNAME →

DATE →


Docket No. 50-305

Wisconsin Public Service Corporation  
ATTN: Mr. E. W. James  
Senior Vice President  
Post Office Box 1200  
Green Bay, Wisconsin 54305

Gentlemen:

The Commission has issued the enclosed Amendment No. to Facility Operating License No. DPR-43 for the Kewaunee Nuclear Power Plant. This amendment consists of changes to the Appendix A Technical Specifications in response to your request dated July 12, 1977.

This amendment includes changes to the Technical Specifications related to fuel rod bow penalty. In addition, Technical Specifications related to Cycle 1 and 2 operation are deleted as they are obsolete. Finally, several editorial corrections are made to the Technical Specifications.

Sincerely,

A. Schwencer, Chief  
Operating Reactors Branch #1  
Division of Operating Reactors

Enclosures:

- 1. Amendment No. to DPR-43
- 2. Safety Evaluation
- 3. Notice of Issuance

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OFFICE	DOR:ORB1	DOR:ORB1	OELD	DOR:ORB1
SURNAME	M. Mlynczak:j.p.	C. Parrish		A. Schwencer
DATE	12/21/78	12/21/78	1/1/78	1/1/78



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

January 15, 1979

Docket No. 50-305

Wisconsin Public Service Corporation  
ATTN: Mr. E. W. James  
Senior Vice President  
Post Office Box 1200  
Green Bay, Wisconsin 54305

Gentlemen:

The Commission has issued the enclosed Amendment No. 24 to Facility Operating License No. DPR-43 for the Kewaunee Nuclear Power Plant. This amendment consists of changes to the Appendix A Technical Specifications in response to your request dated July 12, 1977.

This amendment includes changes to the Technical Specifications related to fuel rod bow penalty. In addition, Technical Specifications related to Cycle 1 and 2 operation are deleted as they are obsolete.

Sincerely,

A handwritten signature in cursive script, appearing to read "A. Schwencer", is written over the typed name.

A. Schwencer, Chief  
Operating Reactors Branch #1  
Division of Operating Reactors

Enclosures:

1. Amendment No. 24 to DPR-43
2. Safety Evaluation
3. Notice of Issuance

cc: w/enclosures  
See next page

Wisconsin Public Service Corporation - 2 - January 15, 1979

cc: Steven E. Keane, Esquire  
Foley and Lardner  
777 East Wisconsin Avenue  
Milwaukee, Wisconsin 53202

Kewaunee Public Library  
314 Milwaukee Street  
Kewaunee, Wisconsin 54216

Mr. Donald L. Quistorff  
Chairman Kewaunee County Board  
Kewaunee County Courthouse  
Kewaunee, Wisconsin 54216

Stanley LaCrosse  
Chairman, Town of Carlton  
Route 1  
Kewaunee, Wisconsin 54216

Chairman  
Public Service Commission of  
Wisconsin  
Hill Farms State Office Building  
Madison, Wisconsin 53702

Chief, Energy Systems  
Analyses Branch (AW-459)  
Office of Radiation Programs  
U. S. Environmental Protection Agency  
Room 645, East Tower  
401 M Street, S. W.  
Washington, D.C. 20460

U. S. Environmental Protection Agency  
Federal Activities Branch  
Region Y Office  
ATTN: EIS COORDINATOR  
230 South Dearborn Street  
Chicago, Illinois 60604

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

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. 24  
License No. DPR-43

1. The Nuclear Regulatory Commission (the Commission) having found that:
  - A. The application for amendment by the Wisconsin Public Service Corporation, Wisconsin Power and Light Company and Madison Gas and Electric Company (the licensee) dated July 12, 1977, 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

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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 Appendices A and B, as revised through Amendment No. 24, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. The license amendment is effective as of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



A. Schwencer, Chief  
Operating Reactors Branch #1  
Division of Operating Reactors

Attachment:  
Changes to the Appendix A  
Technical Specifications

Date of Issuance: January 15, 1979

ATTACHMENT TO LICENSE AMENDMENT NO. 24

FACILITY OPERATING LICENSE NO. DPR-43

DOCKET NO. 50-305

Revise Appendix A as follows:

Remove Pages

TS 2.3-1  
TS 3.10-1  
TS 3.10-7a  
TS 3.10-7b  
TS 3.10-7c  
TS 3.10-10  
TS 3.10-16  
TS 3.10-17  
TS 3.10-18

Insert Pages

TS 2.3-1  
TS 3.1-10  
TS 3.10-7a  
  
TS 3.10-10 & TS 3.10-10a  
TS 3.10-16  
TS 3.10-17

## 2.3 LIMITING SAFETY SYSTEM SETTINGS, PROTECTIVE INSTRUMENTATION

### Applicability

Applies to trip settings for instruments monitoring reactor power and reactor coolant pressure, temperature, flow, pressurizer level, and permissives related to reactor protection.

### Objective

To prevent the principal process variables from exceeding a safety limit.

### Specification

a. Reactor trip settings shall be as follows:

#### 1. Nuclear Flux

- A. Source Range (high set point) - within span of source range instrumentation
- B. Intermediate range (high set point)  $\leq$  25% of rated power
- C. Power range (low set point)  $\leq$  25% of rated power
- D. Power range (high set point)  $\leq$  109% of rated power
- E. Power range fast flux rate trip (positive) 15%  $\Delta q$ / 5 sec
- F. Power range fast flux rate trip (negative) 10%  $\Delta q$ / 5 sec

#### 2. Pressurizer

- A. High pressurizer pressure  $\leq$  2385 psig
- B. Low pressurizer pressure  $\geq$  1875 psig
- C. High pressurizer water level  $\leq$  90% of full scale

#### 3. Reactor Coolant Temperature

- A. Overtemperature  $\Delta T \leq \Delta T_o [K_1 - K_2(T-T') \left[ \frac{1 + \tau_1 s}{1 + \tau_2 s} \right] + K_3 (P-P') - f(\Delta I)]$

where

$\Delta T_o$  = Indicated  $\Delta T$  at rated power,  $^{\circ}F$

$T$  = Average temperature,  $^{\circ}F$

$T'$  = 567.3  $^{\circ}F$

$P$  = Pressurizer pressure, psig

$P'$  = 2235 psig

$K_1$  = 1.11

$K_2$  = 0.0090

$K_3$  = 0.000566

Applicability

Applies to the limits on core fission power distributions and to the limits on control rod operations.

Objective

To ensure 1) core subcriticality after reactor trip, 2) acceptable core power distribution during power operation in order to maintain fuel integrity in normal operation transients associated with faults of moderate frequency, supplemented by automatic protection and by administrative procedures, and to maintain the design basis initial conditions for limiting faults, and 3) limited potential reactivity insertions caused by hypothetical control rod ejection.

Specificationa. Shutdown Reactivity

When the reactor is subcritical prior to reactor startup, the hot shutdown margin shall be at least that shown in Figure TS 3.10-1. Shutdown margin as used here is defined as the amount by which the reactor core would be subcritical at hot shutdown conditions if all control rods were tripped, assuming that the highest worth control rod remained fully withdrawn, and assuming no changes in xenon, boron, or part length rod position.

b. Power Distribution Limits

1. At all times, except during low power physics tests, the hot channel factors defined in the basis must meet the following limits:

$$F_Q(Z) \leq (2.25/P) \times K(Z) \text{ for } P > .5$$

$$F_Q(Z) \leq (4.50) \times K(Z) \text{ for } P \leq .5$$

$$F_{\Delta H}^N \leq 1.55 \quad 1 + 0.2 (1-P) \quad \text{For 0 to 24,000 MWD/MTU burnup fuel}$$

$$F_{\Delta H}^N \leq 1.52 \quad 1 + 0.2 (1-P) \quad \text{For greater than 24,000 MWD/MTU burnup fuel}$$

\*Note: Pending submittal and NRC approval of a corrected ECCS analysis this value is limited to  $(2.16/P)$  in accordance with an Exemption to 10 CFR 50.46(a)(1) granted May 17, 1978.

- 3.10.k During steady state 100% power operation T inlet shall be maintained below 536.5°F.
- 3.10.l During steady state 100% power operation reactor coolant system pressure shall be maintained above 2200 psig.
- 3.10.m During steady state power operation reactor coolant flow rate shall be greater than or equal to 92560 gallons per minute average per loop; or the  $F_{\Delta}^N$  hot channel factor limit for fuel of greater than 15000 MWD/MTU shall be reduced 1% for every 1.8% of reactor coolant loop design flow below 92560 gallons per minute. Compliance with this flow requirement shall be demonstrated by verifying the reactor coolant flow after each refueling.

direct control over  $F_{\Delta}^H$  and (c) an error in the predictions for radial power shape, which may be detected during startup physics tests can be compensated for in  $F_Q$  by tighter axial control, but compensation for  $F_{\Delta}^N$  is less readily available. When a measurement of  $F_{\Delta}^N$  is taken, experimental error must be allowed for and 4% is the appropriate allowance.

The  $F_{\Delta}^H$  limits of specification 3.10.b.1 include consideration of fuel rod bow effects. Since the effects of rod bow are dependent on fuel burnup an additional penalty is incorporated in a decrease in the  $F_{\Delta}^N$  limit of 2% for 0-15000 MWD/MTU fuel burnup, 4% for 1500-24000 MWD/MTU fuel burnup, and 6% for greater than 24000 MWD/MTU fuel burnup. These penalties are counter-balanced by credits for increased Reactor Coolant flow and lower Core inlet temperature. The Reactor Coolant System flow has been determined to exceed design by greater than 8%. Since the flow channel protective trips are set on a percentage of full flow, significant margin to DNB is provided. One half of the additional flow is taken as a DNB credit to offset 2% of the  $F_{\Delta}^N$  penalty. The existence of 4% additional reactor coolant flow will be verified after each refueling at power prior to exceeding 95% power. If the reactor coolant flow measured per loop averages less than 92560 gpm, the  $F_{\Delta}^N$  limit shall be reduced at the rate of 1% for every 1.8% of reactor coolant design flow (89000 gpm design flow rate) for fuel with greater than 15000 MWD/MTU burnup. Uncertainties in reactor coolant flow have already been accounted for in the flow channel protective trips for design flow. The assumed  $T_{inlet}$  for DNB analysis was 540°F while the normal  $T_{inlet}$  at 100% power is approximately 532°F. The reduction of maximum allowed  $T_{inlet}$  at 100% power to 536.5°F as addressed in specification 3.10.k provides an additional 2% credit to offset the rod bow penalty. The combination of the penalties and offsets results in a required 2% reduction of allowed  $F_{\Delta}^N$  for high burnup fuel, 24000 MWD/MTU.

Measurements of the hot channel factors are required as part of startup physics tests, at least each full power month of operation, and whenever abnormal power distribution conditions require a reduction of core power to a level based on measured hot channel factors. The incore map taken following initial loading provides confirmation of the basic nuclear design bases including proper fuel loading patterns. The periodic monthly incore mapping provides additional assurance that the nuclear design bases remain inviolate and identify operational anomalies which would, otherwise, affect these bases.

For normal operation, it is not necessary to measure these quantities. Instead it has been determined that, provided certain conditions are observed, the hot channel factor limits will be met; these conditions are as follows:

1. Control rods in a single bank move together with no individual rod insertion differing by more than 15 inches from the bank demand position.
2. Control rod banks are sequenced with overlapping banks as shown in Figure TS 3.10-4.
3. The control bank insertion limits are not violated.
4. Axial power distribution control specifications which are given in terms of flux difference control and control bank insertion limits are observed. Flux difference refers to the difference in signals between the top and bottom halves of two-section excore neutron detectors. The flux difference is a measure of the axial offset which is defined as the difference in normalized power between the top and bottom halves of the core.

The rod position indicator channel is sufficiently accurate to detect a rod  $\pm 7\text{-}1/2$  inches away from its demand position. If the rod position indicator channel is not operable, the operator will be fully aware of the inoperability of the channel, and special surveillance of core power tilt indications, using established procedures and relying on excore nuclear detectors, and/or movable incore detectors, will be used to verify power distribution symmetry.

One inoperable control rod is acceptable provided the potential consequences of accidents are not worse than the cases analyzed in the safety analysis report. A 30 day period is provided for the re-analysis of all accidents sensitive to the changed initial condition.

The required drop time to dashpot entry is consistent with safety analysis.

The DNR related accident analysis assumed as initial conditions that the Tinlet was  $4^{\circ}\text{F}$  above nominal design or  $T_{\text{avg}}$  was  $4^{\circ}\text{F}$  above nominal design. The Reactor Coolant System pressure was assumed to be 30 psi below nominal design.

#### References

- (1) Section 4.3
- (2) Section 4.4
- (3) Section 14



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 24 TO FACILITY 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

Introduction

By letter dated July 12, 1977, Wisconsin Public Service Corporation (the licensee), requested revisions to the Kewaunee Nuclear Power Plant Appendix A Technical Specifications which would change the inlet temperature specification to offset a fuel rod bowing penalty; delete the Cycle 2 power distribution limit requirements; and increase the Cycle 2 constant  $K_1$  in the overtemperature trip equation from 1.08 to 1.11.

The last change to the Technical Specifications was approved in Amendment No. 23 issued December 12, 1978.

We have reviewed each of these changes as discussed below.

Evaluation

1. Wisconsin Public Service Corporation, in its letter of July 12, 1977 requested a reduction in the maximum allowed inlet temperature from 540°F to 536.5°F to partially offset the fuel rod bowing penalty. A 1°F decrease in core inlet temperature corresponds to a 1% increase in the DNBR. Thus, a change from 540°F to 536.5°F corresponds to a 3.5% increase in the DNBR value. This increase is used to partially offset the fuel rod bowing penalties using the conversion that a 1.8% change in DNBR corresponds to a 1% change in  $F_{\Delta H}$ . Since the licensee is restricting himself to the lower temperature, this change is acceptable to the staff.

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The licensee also proposes, based on our request, to take credit for the fact that the actual reactor coolant flow rate exceeds the minimum design flow rate by at least 4%. The proposed Technical Specifications to assure the availability of this flow rate are given below with accompanying bases.

- 3.10 m During steady state power operation reactor coolant flow rate shall be greater than or equal to 92,560 gallons per minute average per loop; or the  $F_{\Delta H}$  hot channel factor limit for fuel of greater than 15,000 MWD/MTU shall be reduced 1% for every 1.8% of reactor coolant loop design flow below 92,560 gallons per minute. Compliance with flow requirements shall be demonstrated by verifying the reactor coolant flow after each refueling.

#### Bases

The existence of 4% additional reactor coolant flow will be verified after each refueling by performing a Reactor Coolant calorimetric calculation at power prior to exceeding 95% power. If the reactor coolant flow measured per loop averages less than 92,560 gpm, the  $F_{\Delta H}$  limit shall be reduced at the rate of 1% for every 1.8% of reactor coolant design flow for fuel with greater than 15,000 MWD/MTU burnup. Uncertainties in reactor coolant flow have already been accounted for in the flow channel protective trips for design flow.

A 1% increase in reactor coolant flow rate corresponds to a 1% increase in the DNBR. Therefore, the proposed Technical Specification changes will result in a 4% increase in the DNBR which can be used to offset the fuel rod bowing penalty. Using the conversion that a 1% change in  $F_{\Delta H}$  corresponds to a 1.8% change in DNBR, this increase in flow corresponds to a 2.22% increase in  $F_{\Delta H}$ .

The total  $F_{\Delta H}$  reduction required to offset the fuel rod bowing penalty is 6%. The licensee has claimed a 2% credit for lower inlet temperature and a 2.2% credit for increased core flow. Thus, a 1.8%  $F_{\Delta H}$  reduction is required. Section 3.10.b of the Kewaunee Technical Specifications is proposed to be changed to provide this reduction.

2. The licensee has requested deletion of the existing Section 2.10.m Technical Specifications which related to Cycle 2 operation. Because the core analysis for Cycle 2 was not done with methods familiar to us, we required additional surveillance of the core power distribution for Cycle 2. Kewaunee is now in Cycle 4 and these restrictions are no longer required because the Cycle 4 analysis was done with Westinghouse standard methods. Therefore, it is acceptable to delete the Cycle 2 requirements of the existing Section 2.10.m.

3. The licensee has requested an increase in the Constant  $K_1$  in the Overtemperature Trip Equation from the Cycle 2 value of 1.08 to 1.11. During Cycle 2, because the licensee used methods not familiar to the staff, the  $K_1$  value in the Overtemperature Trip Equation was lowered to 1.08. The licensee has requested increasing this value to 1.11. The Cycle 4 analyses were done using usual Westinghouse methods. Therefore, it is acceptable to the staff to increase  $K_1$  to the value of 1.11.

#### Environmental Considerations

We have determined that this amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that this amendment involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR §51.5(d)(4) that an environmental impact statement, negative declaration, or environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

Conclusion

We have concluded, based on the considerations discussed above, that:

- (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration,
- (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and
- (3) 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.

Date: January 15, 1979

UNITED STATES NUCLEAR REGULATORY COMMISSIONDOCKET NO. 50-305WISCONSIN PUBLIC SERVICE CORPORATIONWISCONSIN POWER AND LIGHT COMPANYMADISON GAS AND ELECTRIC COMPANYNOTICE OF ISSUANCE OF AMENDMENT TO FACILITY  
OPERATING LICENSE

The U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 24 to Facility Operating License No. DPR-43 issued to Wisconsin Public Service Corporation, Wisconsin Power and Light Company, and Madison Gas and Electric Company which revised Technical Specifications for operation of the Kewaunee Nuclear Power Plant located in Kewaunee, Wisconsin. The amendment will become effective as of the date of issuance.

The amendment revises the Technical Specifications to include a change in inlet temperature to take into account the fuel rod bow penalty.

The application for the amendment complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Prior public notice of this amendment was not required since the amendment does not involve a significant hazards consideration.

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- 2. -

The Commission has determined that the issuance of this amendment will not result in any significant environmental impact and that pursuant to 10 CFR §51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

For further details with respect to this action, see (1) the application for amendment dated July 12, 1977, (2) Amendment No. 24 to Facility Operating License No. DPR-43, and (3) the Commission's related Safety Evaluation. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D. C. 20555, and at the Kewaunee Public Library, 314 Milwaukee Street, Kewaunee, Wisconsin 54216. A copy of items (2) and (3) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention, Director, Division of Operating Reactors.

Dated at Bethesda, Maryland, this 15th day of January, 1979.

FOR THE NUCLEAR REGULATORY COMMISSION



A. Schwencer, Chief  
Operating Reactors Branch #1  
Division of Operating Reactors