March 19, 1990

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Docket No. 50-305

Mr. Ken H. Evers
Manager - Nuclear Power
Wisconsin Public Service Corporation
Post Office Box 19002
Green Bay, Wisconsin 54307-9002

Dear Mr. Evers:

SUBJECT: AMENDMENT NO. 85 TO FACILITY OPERATING LICENSE NO. DPR-43
(TAC NO. 75891)

The Commission has issued the enclosed Amendment No. 85 to Facility Operating License No. DPR-43 for the Kewaunee Nuclear Power Plant. This amendment revises the Technical Specifications in response to your application dated January 29, 1990.

The amendment decreases the refueling shutdown margin from greater than or equal to 10% delta K/K, to greater than or equal to 5% delta K/K.

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,

/s/

Michael J. Davis, Project Manager
Project Directorate III-3
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 85 to
License No. DPR-43
2. Safety Evaluation

cc w/enclosures:
See next page

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| Surname: | PKreutzer | MDavis/tg | JHannon | |
| Date: | 2/21/90 | 2/28/90 | 2/28/90 | 3/5/90 |

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

March 19, 1990

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Manager - Nuclear Power
Wisconsin Public Service Corp.
P.O. Box 19002
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Michael J. Davis, Project Manager
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Office of Nuclear Reactor Regulation

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See next page

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Kewaunee, Wisconsin 54216

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

Attorney General
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Madison, Wisconsin 53702

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U.S. Nuclear Regulatory Commission
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555
March 19, 1990

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. 85
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 January 29, 1990, 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. 85, 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

John N. Hannon, Director
Project Directorate III-3
Division of Reactor Projects - III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: March 19, 1990

ATTACHMENT TO LICENSE AMENDMENT NO. 85

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 | INSERT |
|---|---|
| TS 1.1-4 | TS 1.1-4 |
| TS 3.6-4 | TS 3.6-4 |
| TS 3.8-1 | TS 3.8-1 |
| TS 3.8-3 | TS 3.8-3 |
| TS 3.8-5 | TS 3.8-5 |

2. Channel Functional Test

A channel functional test consists of injecting a simulated signal into the channel as close to the primary sensor as practicable to verify that it is operable, including alarm and/or trip initiating action.

3. Channel Calibration

Channel calibration consists of the adjustment of channel output such that it responds, with acceptable range and accuracy, to known values of the parameter which the channel monitors. Calibration shall encompass the entire channel, including alarm and/or trip, and shall be deemed to include the channel functional test.

4. Source Check

A Source Check shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity.

j. Operating Modes

| Mode | Reactivity $\Delta k/k$ | Coolant Temp $T_{avg}$ °F | Fission Power % |
|---|---|---|---|
| Refueling | $\leq$ -5% | $\leq$140 | $\sim$0 |
| Cold Shutdown | $\leq$ -1% | $\leq$200 | $\sim$0 |
| Intermediate Shutdown | (1) | >200 <540 | $\sim$0 |
| Hot Shutdown | (1) | $\geq$540 | $\sim$0 |
| Hot Standby | <0.25% | $\sim T_{oper}$ | <2 |
| Operating | <0.25% | $\sim T_{oper}$ | $\geq$2 |
| Low Power Physics Testing | (To be specified by specific tests) | | |

(1) Refer to Figure TS 3.10-1

k. Reactor Critical

The reactor is said to be critical when the neutron chain reaction is self-sustaining.

The cold shutdown condition precludes any energy releases or buildup of containment pressure from flashing of reactor coolant in the event of a system break. The restriction to fuel that has been irradiated during power operation allows initial testing with an open containment when negligible activity exists. The shutdown margin for the cold shutdown condition assures subcriticality with the vessel closed even if the most reactive RCC assembly were inadvertently withdrawn. Therefore, the two parts of Specification 3.6.a allow Containment System integrity to be violated when a fission product inventory is present only under circumstances that preclude both criticality and release of stored energy.

When the reactor vessel head is removed with the Containment System integrity violated, the reactor must not only be in the cold shutdown condition, but also in the refueling shutdown condition. A 5% shutdown margin is specified for refueling conditions to prevent the occurrence of criticality under any circumstances, even when fuel is being moved during refueling operations. The requirement of a 40°F minimum containment ambient temperature is to assure that the minimum containment vessel metal temperature is well above NDTT + 30° criterion for the shell material.

This specification also prevents positive insertion of reactivity whenever Containment System integrity is not maintained if such addition would violate the respective shutdown margins. Effectively, the boron concentration must be maintained at a predicted concentration of 2100 ppm[1] or more if the Containment System is to be disabled with the reactor pressure vessel open.

## 3.8 REFUELING

### Applicability

Applies to operating limitations during refueling operations.

### Objective

To ensure that no incident occurs during refueling operations that would affect public health and safety.

### Specification

a. During refueling operations:

1. The equipment hatch and at least one door in each personnel air lock shall be closed. In addition, each line that penetrates containment and which provides a direct air path from containment atmosphere to the outside atmosphere shall have a closed isolation valve or an operable automatic isolation valve.

2. Radiation levels in fuel handling areas, the containment and the spent fuel storage pool shall be monitored continuously.

3. The reactor will be subcritical for 100 hours prior to movement of its irradiated fuel assemblies. Core subcritical neutron flux shall be continuously monitored by at least TWO neutron monitors, each with continuous visual indication in the control room and ONE with audible indication in the containment whenever core geometry is being changed. When core geometry is not being changed at least ONE neutron flux monitor shall be in service.

4. At least ONE residual heat removal pump shall be operable.

5. When there is fuel in the reactor, a minimum boron concentration of 2100 ppm and a shutdown margin of $\geq$ 5% $\Delta k/k$ shall be maintained in the Reactor Coolant System during reactor vessel head removal or while loading and unloading fuel from the reactor. The required boron concentration shall be verified by chemical analysis daily.

12. A licensed senior reactor operator will be on site and designated in charge of the refueling operation.

b. If any of the specified limiting conditions for refueling are not met, refueling of the reactor shall cease. Work shall be initiated to correct the violated conditions so that the specified limits are met, and no operations which may increase the reactivity of the core shall be performed.

Basis

The equipment and general proceedures to be utilized during refueling are discussed in the USAR. Detailed instructions, the above specified precautions, and the design of the fuel handling equipment incorporating built-in interlocks and safety features, provide assurance that no incident occurs during the refueling operations that would result in a hazard to public health and safety.[1] Whenever changes are not being made in core geometry, one flux monitor is sufficient. This permits maintenance of the instrumentation. Continuous monitoring of radiation levels (2 above) and neutron flux provides immediate indication of an unsafe condition. The residual heat removal pump is used to maintain a uniform boron concentration.

A minimum shutdown margin of greater than or equal to 5% $\Delta k/k$ must be maintained in the core. A boron concentration of 2100 ppm, as required by TS 2.8.a.5, is sufficient to maintain a typical core shutdown by approximately 10% $\Delta k/k$ and is specified to ensure an adequate margin of safety. The specification for refueling shutdown margin is based on a dilution during refueling accident.[4] With an initial shutdown margin of 5% $\Delta k/k$, under the postulated accident conditions, it will take approximately 61 minutes for the reactor to go critical. This is ample time for the operator to recognize the audible high count rate signal, and isolate the reactor makeup water system. Periodic checks of refueling water boron concentration ensure that proper shutdown margin is maintained. Specification 3.8.a.6 allows the control room operator to inform the manipulator operator of any impending unsafe condition detected from the main control board indicators during fuel movement.

Interlocks are utilized during refueling to ensure safe handling. Only one assembly at a time can be handled. The fuel handling hoist is dead weight tested prior to use to assure proper crane operation. It will not be possible to lift or carry heavy objects over the spent fuel pool when fuel is stored

and DOP, respectively. The laboratory carbon sample test results indicate a radioactive methyl iodide removal efficiency under test conditions which are more severe than accident conditions.

Operation of the fans significantly different from the design flow will change the removal efficiency of the HEPA filters and charcoal adsorbers. If the performances are as specified, the calculated doses would be less than the guidelines stated in 10 CFR Part 100 for the accidents analyzed.

The spent fuel pool sweep system will be operated for the first month after reactor is shutdown for refueling during fuel handling and crane operations with loads over the pool. The potential consequences of a postulated fuel handling accident without the system are a very small fraction of the guidelines of 10 CFR Part 100 after one month decay of the spent fuel. Heavy loads greater than one fuel assembly are not allowed over the spent fuel.

In-place testing procedures will be established utilizing applicable sections of ANSI N510 - 1975 standard as a procedural guideline only.

The presence of a licensed senior reactor operator at the site and designated in charge provides qualified supervision of the refueling operation during changes in core geometry.(3)

References:

(1) USAR Section 9.5.2
(2) USAR Table 3.2-1
(3) USAR Section 13.2.1
(4) USAR Section 14.1

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555
March 19, 1990

# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

## RELATING TO AMENDMENT NO. 85 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 January 29, 1990, Wisconsin Public Service Corporation (the licensee) requested an amendment to change the Technical Specifications (TSs) appended to Facility Operating License No. DPR-43 for the Kewaunee Nuclear Power Plant (KNPP). The proposed amendment would change the TSs to decrease the refueling shutdown margin (SDM) from greater than or equal to 10% delta K/K, to greater than or equal to 5% delta K/K.

## 2.0 DISCUSSION

The licensee recognized the need to reduce the refueling SDM while preparing their response to NRC Bulletin No. 89-03, "Potential Loss of Required Shutdown Margin During Refueling Operations." The KNPP specification of greater than or equal to 10% delta K/K is more conservative than NRC Bulletin 89-03 and current standard technical specifications for Westinghouse plants which both require a minimum shutdown margin of approximately 5% delta K/K. The licensee stated that the current specification requiring a SDM of greater than or equal to 10% delta K/K will limit core design flexibility for future reloads and may be difficult to maintain for all intermediate core load conditions as discussed in the bulletin.

## 3.0 EVALUATION

The Westinghouse Standard Technical Specifications require that during refueling operations the boron concentration of all filled portions of the reactor coolant system and refueling canal be maintained uniform and sufficient to meet the more restrictive of the 2000 PPM boron concentration or a shutdown margin of 5% delta K/K.

These limitations on reactivity conditions during refueling ensure that the reactor will remain subcritical during core alterations and that a uniform boron concentration is maintained for reactivity control. These limitations are consistent with the initial conditions assumed for the boron dilution

incident in the accident analyses. The value of 0.95 or less for Keff includes a 1 percent delta K/K conservative allowance for uncertainties. Similarly, the boron concentration value of 2000 ppm or greater includes a conservative uncertainty allowance of 50 ppm boron.

NRC Bulletin 89-03, "Potential Loss of Required Shutdown Margin During Refueling Operations," requests all PWR licensees to assure that adequate SDM is maintained during all refueling operations by assuring that any intermediate fuel assembly configuration intended to be used during refueling is identified and evaluated to maintain sufficient refueling boron concentration to result in a minimum shutdown margin of approximately 5%.

Kewaunee Technical Specification 3.8.a.5 requires that a minimum boron concentration of 2100 ppm be maintained in the reactor coolant system during reactor vessel head removal or while loading and unloading fuel. This boron concentration corresponds to a SDM of approximately 10% delta K/K.

Reanalysis of the Kewaunee refueling dilution event using the maximum flow rate of 3 charging pumps (180 gpm) shows that it will take approximately 67 minutes to reduce boron concentration from the initial value of 2100 ppm to 1600 ppm, where the core would be 5% shut down. It would take 128 minutes to reduce the boron concentration from 2100 ppm to 1253 ppm, where SDM is conservatively assumed to be zero. This is considered ample time for the operators to recognize the increasing source range instrumentation audible high count rate signal and take manual action to isolate dilution flow. This also meets the Standard Review Plan 15.4.6 objective of dilution transient termination prior to elimination of SDM.

Based on its review which is described above, the staff concludes that the proposed change meets the intent of the Standard Technical Specification requirements and that adequate protection is provided against inadvertent criticality during refueling operations. On this basis, the staff finds the proposed change will not reduce the level of plant safety and thus is acceptable.

## 4.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change to 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 or changes a surveillance requirement. 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. 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.

## 5.0 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; and (2) such activities will be conducted in compliance with the Commission's regulations and 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: Michael Davis

Dated: March 19, 1990