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May 7, 1997

Mr. M. L. Marchi
Manager - Nuclear Business Group
Wisconsin Public Service Corporation
Post Office Box 19002
Green Bay, WI 54307-9002

SUBJECT: AMENDMENT NO. 132 TO FACILITY OPERATING LICENSE NO. DPR-43 - KEWAUNEE NUCLEAR POWER PLANT (TAC NO. M96133)

Dear Mr. Marchi:

The Commission has issued the enclosed Amendment No. 132 to Facility Operating License No. DPR-43 for the Kewaunee Nuclear Power Plant. This amendment revises the Technical Specifications (TS) in response to your application dated July 18, 1996, as supplemented on January 29, 1997.

The amendment revises TS 3.8, "Refueling," and its associated Basis, by allowing the containment personnel air lock doors to remain open during refueling operations.

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

Docket No. 50-305

Enclosures: 1. Amendment No. 132 to License No. DPR-43
2. Safety Evaluation

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

May 7, 1997

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Manager - Nuclear Business Group
Wisconsin Public Service Corporation
Post Office Box 19002
Green Bay, WI 54307-9002

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Richard J. Laufer

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

Docket No. 50-305

Enclosures: 1. Amendment No. 132 to License No. DPR-43
2. Safety Evaluation

cc w/encls: See next page

cc:

Foley & Lardner
Attention: Mr. Bradley D. Jackson
One South Pinckney Street
P. O. Box 1497
Madison, Wisconsin 53701-1497

Chairman
Town of Carlton
Route 1
Kewaunee, Wisconsin 54216

Mr. Harold Reckelberg, Chairman
Kewaunee County Board
Kewaunee County Courthouse
Kewaunee, Wisconsin 54216

Chairman
Wisconsin Public Service Commission
610 N. Whitney Way
Madison, Wisconsin 53705-2729

Attorney General
114 East, State Capitol
Madison, Wisconsin 53702

U. S. Nuclear Regulatory Commission
Resident Inspectors Office
Route #1, Box 999
Kewaunee, Wisconsin 54216

Regional Administrator - Region III
U. S. Nuclear Regulatory Commission
801 Warrenville Road
Lisle, Illinois 60532-4531

Mr. Robert S. Cullen
Chief Engineer
Wisconsin Public Service Commission
610 N. Whitney Way
Madison, Wisconsin 53705-2829

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. 132
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 July 18, 1996, as supplemented on January 29, 1997, 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:

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(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 132 , 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: May 7, 1997

ATTACHMENT TO LICENSE AMENDMENT NO. 132

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 vertical lines indicating the area of change.

REMOVE	INSERT
TS ii	TS ii
TS 3.8-1	TS 3.8-1
TS 3.8-2	TS 3.8-2
TS 3.8-2a	--------
TS 3.8-3	TS 3.8-3
TS 3.8-4	TS B3.8-1
TS 3.8-5	TS B3.8-2

3.8 REFUELING OPERATIONS

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. Containment Closure

   A. The equipment hatch shall be closed and at least one door in each personnel air lock shall be capable of being closed[1] in 30 minutes or less. In addition, at least one door in each personnel air lock shall be closed when the reactor vessel head or upper internals are lifted.

   B. 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.

---

[1] Administrative controls ensure that:
- Appropriate personnel are aware that both personnel air lock doors are open,
- A specified individual(s) is designated and available to close the air lock following a required evacuation of containment, and
- Any obstruction(s) (e.g., cables and hoses) that could prevent closure of an open air lock can be quickly removed.

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.

6. Direct communication between the control room and the operating floor of the containment shall be available whenever changes in core geometry are taking place.

7. Heavy loads, greater than the weight of a fuel assembly, will not be transported over or placed in either spent fuel pool when spent fuel is stored in that pool. Placement of additional fuel storage racks is permitted, however, these racks may not traverse directly above spent fuel stored in the pools.

8. The containment ventilation and purge system, including the capability to initiate automatic containment ventilation isolation, shall be tested and verified to be operable immediately prior to and daily during REFUELING OPERATIONS.

9. A. The spent fuel pool sweep system, including the charcoal adsorbers, shall be operating during fuel handling and when any load is carried over the pool if irradiated fuel in the pool has decayed less than 30 days. If the spent fuel pool sweep system, including the charcoal adsorber, is not operating when required, fuel movement shall not be started (any fuel assembly movement in progress may be completed).

   B. Performance Requirements

   (1) The results of the in-place cold DOP and halogenated hydrocarbon tests at design flows on HEPA filters and charcoal adsorber banks shall show $\geq$99% DOP removal and $\geq$99% halogenated hydrocarbon removal.

   (2) The results of laboratory carbon sample analysis from spent fuel pool sweep system carbon shall show $\geq$90% radioactive methyl iodide removal at conditions of 66°C and 95% RH.

   (3) Fans shall operate within $\pm$10% of design flow when tested.

10. The minimum water level above the vessel flange shall be maintained at 23 feet.

11. A dead-load test shall be successfully performed on both the fuel handling and manipulator cranes before fuel movement begins. The load assumed by the cranes for this test must be equal to or greater than the maximum load to be assumed by the cranes during the REFUELING OPERATIONS. A thorough visual inspection of the cranes shall be made after the dead-load test and prior to fuel handling.

12. A licensed senior reactor operator will be on-site and designated in charge of the REFUELING OPERATIONS.

b. If any of the specified limiting conditions for REFUELING OPERATIONS 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 procedures to be utilized during REFUELING OPERATIONS 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 (TS 3.8.a.2) 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 3.8.a.5, is sufficient to ensure an adequate margin of safety. The specification for REFUELING OPERATIONS shutdown margin is based on a dilution during refueling accident[2]. 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 OPERATIONS 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 therein through interlocks and administrative procedures. Placement of additional spent fuel racks will be controlled by detailed procedures to prevent traverse directly above spent fuel.

The one hundred hour decay time following plant shutdown is consistent with the assumption used in the dose calculation for the fuel handling accident. The requirement for the spent fuel pool sweep system, including charcoal adsorbers, to be operating when spent fuel movement is being made provides added assurance that the off-site doses will be within acceptable limits in the event of a fuel handling accident. The spent fuel pool sweep system is designed to sweep the atmosphere above the refueling pool and release to the Auxiliary Building vent during fuel handling operations. Normally, the charcoal adsorbers are bypassed but for purification operation, the bypass dampers are closed routing the air flow through the charcoal adsorbers. If the dampers do not close tightly, bypass

---

[1]USAR Section 9.5.2

[2]USAR Section 14.1

leakage could exist to negate the usefulness of the charcoal adsorber. If the spent fuel pool sweep system is found not to be operating, fuel handling within the Auxiliary Building will be terminated until the system can be restored to the operating condition.

The bypass dampers are integral to the filter housing. The test of the bypass leakage around the charcoal adsorbers will include the leakage through these dampers.

High efficiency particulate absolute (HEPA) filters are installed before the charcoal adsorbers to prevent clogging of the iodine adsorbers. The charcoal adsorbers are installed to reduce the potential radioiodine releases to the atmosphere. Bypass leakage for the charcoal adsorbers and particulate removal efficiency for HEPA filters are determined by halogenated hydrocarbon 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.

A fuel handling accident in containment does not cause containment pressurization. One containment door in each personnel air lock can be closed following containment personnel evacuation and the containment ventilation and purge system has the capability to initiate automatic containment ventilation isolation to terminate a release path to the atmosphere.

The presence of a licensed senior reactor operator at the site and designated in charge provides qualified supervision of the REFUELING OPERATIONS during changes in core geometry.[3]

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[3]USAR Section 13.2.1

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO AMENDMENT NO. 132 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 July 18, 1996, as supplemented on January 29, 1997, 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 3.8, "Refueling," and its associated Basis, to allow the containment personnel air lock (PAL) doors to remain open during refueling operations. Administrative and format changes are also proposed to update TS Section 3.8 consistent with the licensee's ongoing effort to convert the TS to WordPerfect.

The January 29, 1997, submittal supplemented the original submittal by adding a note in the TS describing the administrative controls associated with having both PAL doors open. This supplemental submittal did not change the original no significant hazards consideration determination published in the Federal Register on August 14, 1996 (61 FR 42285).

2.0 EVALUATION

The KNPP containment is provided with two PALs, a normal PAL and an emergency PAL. The airlocks are provided for the purpose of permitting personnel to enter and exit the containment without breaking the integrity of the containment pressure boundary. The two doors in series in each PAL are interlocked to prevent both doors from being opened simultaneously. Provisions are made to permit bypassing the door interlock system during conditions when containment integrity is not required.

KNPP TS Section 3.8.a.1 currently states that during refueling operations, "The equipment hatch and at least one door in each personnel air lock shall be closed." The purpose of this requirement is to prevent the release of radioactive material in the event of a fuel handling accident (FHA). The licensee's proposed TS change would revise TS 3.8.a.1 to state that, "The equipment hatch shall be closed and at least one door in each personnel air

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lock shall be capable of being closed[1] in 30 minutes or less. In addition, at least one door in each personnel air lock shall be closed when the reactor vessel head or upper internals are lifted." Footnote (1) states:

> [1] Administrative controls ensure that:
>
> - Appropriate personnel are aware that both personnel air lock doors are open;
>
> - A specified individual(s) is designated and available to close the air lock following a required evacuation of containment; and
>
> - Any obstruction(s) (e.g., cables and hoses) that could prevent closure of an open air lock can be quickly removed.

Current TS 3.8.a.3 ensures that the reactor has been subcritical for at least 100 hours prior to fuel movement, and TS 3.8.10 ensures that a minimum water level of 23 feet is maintained above the vessel flange. These TS are not affected by the proposed TS change.

The licensee recalculated the doses and revised the design basis for the fuel handling accident analysis to be consistent with Regulatory Guide 1.25, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Fuel Handling Accident (FHA) in the Fuel Handling and Storage Facility for Boiling and Pressurized Water Reactors." Neither the current nor the revised design basis FHA analysis takes credit for the containment building barriers. Credit is taken for the potential mitigating effects of the engineered safety feature (ESF) filtration system provided for the auxiliary building. The licensee's analysis calculated the doses for the 0-2 hour at the exclusion area boundary to be 4.0 rem to the thyroid and 0.35 rem to the whole body. These calculated doses are within the Standard Review Plan (SRP; NUREG-0800) criteria of 75 rem to the thyroid and 6 rem to the whole body.

The staff has completed its evaluation of the potential radiological consequences of a FHA at the KNPP based upon the conditions of the proposed TS changes. In addition to reviewing the licensee's submittal, the staff performed an independent analysis to determine conformance with the requirements of 10 CFR Part 100 and GDC-19 of Appendix A to 10 CFR Part 50. The staff analysis utilized the assumptions contained in Regulatory Guide 1.25, and the review procedures specified in SRP (NUREG-0800) Sections 15.7.4 and 6.4. The staff assumed an instantaneous puff release of noble gases and radioiodine from the gap and plenum of the broken fuel rods. These gas bubbles will pass through at least 23 feet of water covering the fuel prior to reaching the containment atmosphere. All airborne activity reaching the containment atmosphere is assumed to exhaust to the environment within 2 hours. As stipulated in the plant TS, the gap activity is assumed to have decayed for a period of 100 hours.

The staff computed the offsite doses for the KNPP using the assumptions described above and NRC's ACTICODE computer code. Control room operator doses were determined using the methodology in SRP (NUREG-0800) Section 6.4, including use of the Murphy-Campe methodology for calculations of the meteorological factors. Credit was taken for the potential mitigating effects of the engineered safety feature (ESF) filtration system provided for the auxiliary building. The computed offsite doses and control room operator doses are within the acceptance criteria given in SRP (NUREG-0800) Section 15.7.4, and GDC-19 of Appendix A to 10 CFR Part 50. The resulting calculated values and the assumptions used in calculating those doses are attached in Tables 1 and 2, respectively.

The staff's dose calculation was based on the assumption that all of the radioactive material released to the containment escapes the containment within 2 hours. However, the staff has historically required plant TS to maintain containment closure during core alterations and fuel handling as a defense-in-depth measure to further limit releases. Recently, the staff has allowed changes to plant TS to keep both doors to a containment airlock open during core alterations and fuel handling with the provisions in place to close one door quickly, thereby reestablishing containment closure. The provisions described in this safety evaluation provide reasonable assurance that containment closure as a defense-in-depth measure can be reestablished quickly to limit release much lower than assumed in the dose calculations.

In conclusion, the staff has reviewed the licensee's analysis and has performed an independent assessment of the radiological consequences resulting from a fuel handling accident during refueling operations with the containment airlocks open. The staff concludes that the radiological consequences associated with this accident are within the acceptance criteria set forth in 10 CFR Part 100, and the control room operator dose criteria specified in GDC-19 of Appendix A to 10 CFR Part 50. Therefore, the proposed changes are acceptable.

3.0 SPECIFIC TECHNICAL SPECIFICATION CHANGES

The licensee's proposal would revise TS Section 3.8 as follows:

The title of TS Section 3.8 would be changed from "Refueling" to "Refueling Operations." The TS Table of Contents page ii would also be revised to reflect this change.

TS 3.8.a.1 would be subtitled "Containment Closure," and divided into two paragraphs, TS 3.8.a.1.a and TS 3.8.a.1.b.

TS 3.8.a.1.a would contain the requirements for the equipment hatch and the personnel air locks with a footnote describing the administrative controls as described in the above evaluation.

TS 3.8.a.1.b would contain the requirements for the lines that penetrate the containment. There are no changes proposed for these requirements.

The TS Basis for TS Section 3.8 would be revised to reflect the changes described above. The TS Basis would also be revised by removing the reference to a shutdown margin of 10% delta k/k. The 10% delta k/k requirement was removed from the TS 3.8 with Amendment No. 85, dated March 19, 1990.

Format changes would be made consistent with the licensee's ongoing effort to convert the TS to a consistent format in WordPerfect. These changes include capitalizing terms and renumbering the pages of the Basis section.

The staff has reviewed the TS changes discussed above and finds that they accurately reflect the changes previously discussed in this safety evaluation. Therefore, the proposed TS changes are 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 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 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 this amendment involves no significant hazards consideration and there has been no public comment on such finding (61 FR 42285). 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.

Attachments: 1. Table 1
2. Table 2

Principal Contributors: J. Minns
R. Laufer

Date: May 7, 1997

TABLE 1

CALCULATED RADIOLOGICAL CONSEQUENCES
(rem)

Exclusion Area Boundary	Dose	SRP 15.7.4 Guidelines
Thyroid	8.6	75
Control Room Operator	**Dose**	**GDC-19 Guidelines**
Thyroid	>1	Equivalent to 5 rem whole body*

*Guideline doses provided in SRP (NUREG-0800) Section 6.4 define the dose-equivalent as 30 rem to the thyroid.

Attachment 1

TABLE 2

ASSUMPTIONS USED FOR CALCULATING RADIOLOGICAL CONSEQUENCES

Parameters	Quantity
Power Level (Mwt)	1721
Number of Fuel Rods Damaged	179
Total Number of Fuel Rods	21659
Shutdown Time, hours	100
Power Peaking Factor*	1.65
Fission Product Release Duration	2 hours
Release Fractions*	
Iodine	12%
Noble Gases	10%
Krypton Gas	30%
Iodine Forms*	
Elemental	75%
Organic	25%
Core Fission Product Inventories per TID-14844	
Receptor Point Variables	
Exclusion Area Boundary*	
Atmosphere Relative Concentration, X/Q (sec/M^3)	
0-2 hours	2.9×10^{-4}
Filter Efficiencies (%)	
Elemental	90
Organic	70
Control Room	
Atmospheric Relative Concentration, X/Q (sec/m^3)	2.2×10^{-4}
Control Room Volume, cubic feet	1.3×10^5
Recirculation Flow, ft^3/min	2500
Unfiltered Inleakage, ft^3/min	10

*Regulatory Guide 1.25

Note: The dose conversion factor from ICRP-30 was utilized for all calculations.

Attachment 2