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

SUBJECT: AMENDMENT NO. 130 TO FACILITY OPERATING LICENSE NO. DPR-43 - KEWAUNEE NUCLEAR POWER PLANT (TAC NO. M95303)

Dear Mr. Marchi:

The Commission has issued the enclosed Amendment No. 130 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 September 27, 1996, as supplemented on October 25, and November 18, 1996. The September 27, 1996, application superseded a previous submittal on this subject dated April 30, 1996, as supplemented on August 12, 1996.

The amendment revises TS requirements related to the low temperature overpressure protection (LTOP) system. Specifically, the LTOP curve is modified to define 10 CFR Part 50, Appendix G pressure temperature limitations for LTOP evaluation through the end of operating cycle (EOC) 33. In addition, the LTOP enabling temperature and the temperature required for starting a reactor coolant pump have been changed consistent with the design basis for the LTOP system. Finally, the TS bases were changed consistent with the changes described above.

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. 130 to License No. DPR-43
2. Safety Evaluation

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

December 13, 1996

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

SUBJECT: AMENDMENT NO. 130 TO FACILITY OPERATING LICENSE NO. DPR-43 - KEWAUNEE NUCLEAR POWER PLANT (TAC NO. M95303)

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Division of Reactor Projects III/IV
Office of Nuclear Reactor Regulation

Docket No. 50-305

Enclosures: 1. Amendment No. 130 to License No. DPR-43
2. Safety Evaluation

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Mr. M. L. Marchi
Wisconsin Public Service Corporation   Kewaunee Nuclear Power Plant

cc:

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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. 130
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 September 27, 1996, as supplemented on October 25, and November 18, 1996, 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. 130 , 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

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: December 13, 1996

ATTACHMENT TO LICENSE AMENDMENT NO.130

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 vi	TS vi
TS 3.1-1	TS 3.1-1
TS 3.1-6	TS 3.1-6
TS 3.1-7	TS 3.1-7
TS B3.1-1	TS B3.1-1
TS B3.1-6	TS B3.1-6
TS B3.1-7	TS B3.1-7
Figure TS 3.1-4	Figure TS 3.1-4

LIST OF FIGURES

FIGURE	TITLE
2.1-1 . . .	Safety Limits Reactor Core, Thermal and Hydraulic
3.1-1 . . .	Coolant Heatup Limitation Curves Applicable for Periods Up to 20 Effective Full Power Years
3.1-2 . . .	Coolant Cooldown Limitations Applicable For Periods Up to 20 Effective Full Power Years
3.1-3 . . .	Dose Equivalent I-131 Reactor Coolant Specific Activity Limit Versus Percent of Rated Thermal Power
3.1-4 . . .	Low Temperature Overpressure Protection Curve Applicable for Fluence Up to End of Operating Cycle 33
3.10-1 . .	Required Shutdown Reactivity vs. Reactor Boron Concentration
3.10-2 . .	Hot Channel Factor Normalized Operating Envelope
3.10-3 . .	Control Bank Insertion Limits
3.10-4 . .	Permissible Operating Bank on Indicated Flux Difference as a Function of Burnup (Typical)
3.10-5 . .	Target Band on Indicated Flux Difference as a Function of Operating Power Level (Typical)
3.10-6 . .	V(Z) as a Function of Core Height
4.2-1 . . .	Application of Plugging Limit for a Westinghouse Mechanical Sleeve

3.1 REACTOR COOLANT SYSTEM

APPLICABILITY

Applies to the Operating status of the Reactor Coolant System (RCS).

OBJECTIVE

To specify those LIMITING CONDITIONS FOR OPERATION of the Reactor Coolant System which must be met to ensure safe reactor operation.

SPECIFICATIONS

a. Operational Components

1. Reactor Coolant Pumps

   A. At least one reactor coolant pump or one residual heat removal pump shall be in operation when a reduction is made in the boron concentration of the reactor coolant.

   B. When the reactor is in the OPERATING mode, except for low power tests, both reactor coolant pumps shall be in operation.

   C. A reactor coolant pump shall not be started with one or more of the RCS cold leg temperatures ≤ 355°F unless the secondary water temperature of each steam generator is < 100°F above each of the RCS cold leg temperatures.

2. Decay Heat Removal Capability

   A. At least TWO of the following FOUR heat sinks shall be operable whenever the average reactor coolant temperature is ≤ 350°F but > 200°F.

      1. Steam Generator 1A
      2. Steam Generator 1B
      3. Residual Heat Removal Train A
      4. Residual Heat Removal Train B

      If less than the above number of required heat sinks are OPERABLE, corrective action shall be taken immediately to restore the minimum number to the OPERABLE status.

b. Heatup and Cooldown Limit Curves for Normal Operation

I. The reactor coolant temperature and pressure and system heatup and cooldown rates (with the exception of the pressurizer) shall be limited in accordance with Figures TS 3.1-1, TS 3.1-2, and TS 3.1-4. Figures TS 3.1-1 and TS 3.1-2 are applicable for the service period of up to 20 effective full-power years. Figure TS 3.1-4 is applicable through the end of operating cycle 33 or 33.41 effective full-power years.

A. Allowable combinations of pressure and temperature for specific temperature change rates are below and to the right of the limit lines shown. Limit lines for cooldown rates between those presented may be obtained by interpolation.

B. Figures TS 3.1-1 and TS 3.1-2 define limits to assure prevention of non-ductile failure only. For normal operation other inherent plant characteristics, e.g., pump heat addition and pressurizer heater capacity may limit the heatup and cooldown rates that can be achieved over certain pressure-temperature ranges.

C. Figure TS 3.1-4 defines limits to assure prevention of non-ductile failure applicable to low temperature overpressurization events only. Application of this curve is limited to evaluation of LTOP events whenever one or more of the RCS cold leg temperatures are less than or equal to the LTOP enabling temperature of 355°F.

2. The secondary side of the steam generator must not be pressurized > 200 psig if the temperature of the steam generator is < 70°F.

3. The pressurizer cooldown and heatup rates shall not exceed 200°F/hr and 100°F/hr, respectively. The spray shall not be used if the temperature difference between the pressurizer and the spray fluid is > 320°F.

4. The overpressure protection system for low temperature operation shall be operable whenever one or more of the RCS cold leg temperatures are ≤ 355°F, and the reactor vessel head is installed. The system shall be considered operable when at least one of the following conditions is satisfied:

   A. The overpressure relief valve on the Residual Heat Removal System (RHR 33-1) shall have a set pressure of ≤ 500 psig and shall be aligned to the RCS by maintaining valves RHR 1A, 1B, 2A, and 2B open.

      1. With one flow path inoperable, the valves in the parallel flow path shall be verified open with the associated motor breakers for the valves locked in the off position. Restore the inoperable flow path within 5 days or complete depressurization and venting of the RCS through a ≥ 6.4 square inch vent within an additional 8 hours.

      2. With both flow paths or RHR 33-1 inoperable, complete depressurization and venting of the RCS through at least a 6.4 square inch vent pathway within 8 hours.

   B. A vent pathway shall be provided with an effective flow cross section ≥ 6.4 square inches.

      1. When low temperature overpressure protection is provided via a vent pathway, verify the vent pathway at least once per 31 days when the pathway is provided by a valve(s) that is locked, sealed, or otherwise secured in the open position. If the vent path is provided by any other means, verify the vent pathway every 12 hours.

BASES - Operational Components (TS 3.1.a)

Reactor Coolant Pumps (TS 3.1.a.1)

When the boron concentration of the Reactor Coolant System is to be reduced, the process must be uniform to prevent sudden reactivity changes in the reactor. Mixing of the reactor coolant will be sufficient to maintain a uniform boron concentration if at least one reactor coolant pump or one residual heat removal pump is running while the change is taking place. The residual heat removal pump will circulate the equivalent of the primary system volume in approximately one-half hour.

Part I of the specification requires that both reactor coolant pumps be operating when the reactor is in power operation to provide core cooling. Planned power operation with one loop out of service is not allowed in the present design because the system does not meet the single failure (locked rotor) criteria requirement for this mode of operation. The flow provided in each case in Part 1 will keep DNBR well above 1.30. Therefore, cladding damage and release of fission products to the reactor coolant will not occur. One pump operation is not permitted except for tests. Upon loss of one pump below 10% full power, the core power shall be reduced to a level below the maximum power determined for zero power testing. Natural circulation can remove decay heat up to 10% power. Above 10% power, an automatic reactor trip will occur if flow from either pump is lost.[1]

The RCS will be protected against exceeding the design basis of the LTOP system by restricting the starting of a RXCP to when the secondary water temperature of each SG is < 100°F above each RCS cold leg temperature. The restriction on starting a reactor coolant pump (RXCP) when one or more RCS cold leg temperatures is ≤ 355°F is provided to prevent a RCS pressure transient, caused by an energy addition from the secondary system, which could exceed the design basis of the low temperature overpressure protection (LTOP) system. The LTOP enable temperature of 355°F is based on a fluence corresponding to 33.41 effective full-power years.

Decay Heat Removal Capabilities (TS 3.1.a.2)

When the average reactor coolant temperature is ≤ 350°F a combination of the available heat sinks is sufficient to remove the decay heat and provide the necessary redundancy to meet the single failure criterion.

When the average reactor coolant temperature is ≤ 200°F, the plant is in a COLD SHUTDOWN condition and there is a negligible amount of sensible heat energy stored in the Reactor Coolant System. Should one residual heat removal train become inoperable under these conditions, the remaining train is capable of removing all of the decay heat being generated.

---

[1] USAR Section 7.2.2

Limit curves for normal heatup and cooldown of the primary Reactor Coolant System have been calculated using the methods discussed above. The derivation of the limit curves is consistent with the NRC Regulatory Standard Review Plan[8][9]. Limit curves for normal heatup and cooldown of the primary Reactor Coolant System have been calculated using the methods discussed above. The derivation of the limit curves is consistent with Footnotes[10][11].

Transition temperature shifts occurring in the pressure vessel materials due to radiation exposure have been obtained directly from the reactor pressure vessel surveillance program. As presented in WCAP 9878[12], weld metal Charpy test specimens from Capsule R indicate that the core region weld metal exhibits the largest shift in RT_{NDT} (235°F).

The results of Irradiation Capsules V, R, P, and S analyses are presented in WCAP 8908[13], WCAP 9878, WCAP-12020[14], and WCAP-14279[15], respectively. Heatup and cooldown limit curves for normal operation of the reactor vessel are presented in Figures TS 3.1-1 and TS 3.1-2 and represent an operational time period of 20 effective full-power years.

---

[8]"Fracture Toughness Requirements," Branch Technical Position MTEB 5-2, Chapter 5.3.2 in Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants, LWR Edition, NUREG-0800, 1981.

[9]ASME Boiler and Pressure Vessel Code, "Nuclear Power Plant Components" Section III, 1986 Edition, Non-Mandatory Appendix G - "Protection Against Non-ductile Failure."

[10]NRC Regulatory Standard Review Plan Directorate of Licensing, Section 5.3.2, "Pressure-Temperature Limits" 1974

[11]ASME Boiler and Pressure Vessel Code, "Nuclear Power Plant Components" Section III, Summer 1984 Addenda, Non-Mandatory Appendix G - "Protection Against Non-ductile Failure."

[12]S.E. Yanichko, et al., "Analysis of Capsule R from the Wisconsin Public Service Corporation Kewaunee Nuclear Plant Reactor Vessel Radiation Surveillance Program," WCAP 9878, March 1981.

[13]S.E. Yanichko, S. L. Anderson, and K. V. Scott, "Analysis of Capsule V from the Wisconsin Public Service Corporation Kewaunee Nuclear Plant Reactor Vessel Radiation Surveillance Program," WCAP 8908, January 1977.

[14]S.E. Yanichko, et al., "Analysis of Capsule P from the Wisconsin Public Service Corporation Kewaunee Nuclear Power Plant Reactor Vessel Radiation Surveillance Program," WCAP-12020, November 1988.

[15]E. Terek, et al., "Analysis of Capsule S from the Wisconsin Public Service Corporation Kewaunee Nuclear Power Plant Reactor Vessel Radiation Surveillance Program," WCAP-14279, March 1995.

A limit curve (Figure TS 3.1-4) for evaluation of low temperature overpressure protection (LTOP) events has been calculated using the methodology of 10 CFR 50.61(c)(2). The derivation of the LTOP evaluation curve is consistent with Footnotes[16][17]. This curve is applicable for 33.41 effective full-power years of fluence (through the end of operating cycle 33). If a low temperature overpressure event occurred, the RCS pressure transient would be evaluated to the limits of this figure to verify the integrity of the reactor vessel. If these limits are not exceeded, vessel integrity is assured and a TS violation has not occurred.

Pressurizer Limits - (TS 3.1.b.3)

Although the pressurizer operates at temperature ranges above those for which there is reason for concern about brittle fracture, operating limits are provided to assure compatibility of operation with the fatigue analysis performed in accordance with Code requirements. In-plant testing and calculations have shown that a pressurizer heatup rate of 100°F/hr cannot be achieved with the installed equipment.

Low Temperature Overpressure Protection - (TS 3.1.b.4)

The low temperature overpressure protection system must be OPERABLE during startup and shutdown conditions below the enable temperature (i.e., low temperature) as defined in Branch Technical Position RSB 5-2. Based on the Kewaunee Appendix G LTOP protection pressure-temperature limits calculated through 33.41 effective full-power years, the LTOP System must be OPERABLE whenever one or more of the RCS cold leg temperatures are ≤ 355°F and the head is on the reactor vessel. The LTOP system is considered operable when all 4 valves on the RHR suction piping (valves RHR-1A, 1B, 2A, 2B) are open and valve RHR-33-1, the LTOP valve, is able to relieve RCS overpressure events without violating Figure TS 3.1-4.

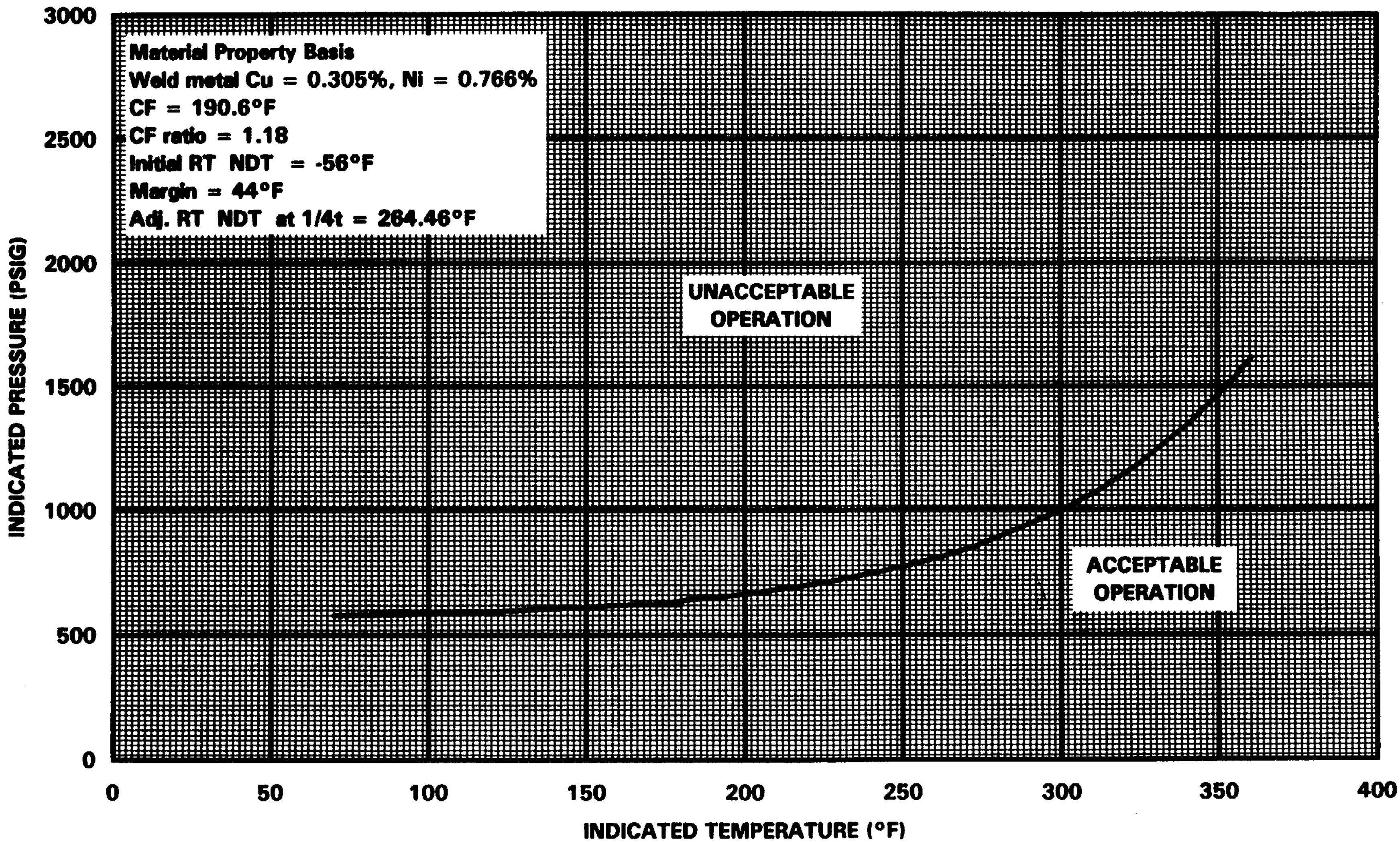
The set pressure specified in TS 3.1.b.4 includes consideration for the opening pressure tolerance of ± 3% (± 15 psig) as defined in ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NC: Class 2 Components for Safety Relief Valves. The analysis of pressure transient conditions has demonstrated acceptable relieving capability at the upper tolerance limit of 515 psig.

---

[16]NRC Regulatory Standard Review Plan Directorate of Licensing, Section 5.3.2, "Pressure-Temperature Limits," 1974

[17]ASME Boiler and Pressure Vessel Code, "Nuclear Power Plant Components" Section III/XI, 1989 Edition, Non-Mandatory Appendix G - "Fracture Toughness Criteria for Protection Against Failure."

FIGURE TS 3.1-4
LOW TEMPERATURE OVERPRESSURE PROTECTION CURVE
APPLICABLE FOR FLUENCE UP TO END OF OPERATING CYCLE 33



Amendment No. ~~108, 120,~~ 130

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO AMENDMENT NO. 130 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 September 27, 1996, as supplemented on October 25, and November 18, 1996, 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 TS requirements related to the low temperature overpressure protection (LTOP) system. Specifically, the LTOP curve would be modified to define 10 CFR Part 50, Appendix G pressure temperature limitations for LTOP evaluation through the end of operating cycle (EOC) 33. In addition, the LTOP enabling temperature and the temperature required for starting a reactor coolant pump would be changed consistent with the design basis for the LTOP system. Finally, the TS bases would be changed consistent with the changes described above.

The September 27, 1996, submittal superseded a previous submittal on this subject dated April 30, 1996, as supplemented on August 12, 1996. The October 25, and November 18, 1996, submittals provided clarifying information that did not change the initial proposed no significant hazards consideration determination published in the October 7, 1996, Federal Register.

Material test data used in determining the LTOP Pressure-Temperature (P-T) limits and the enabling temperature were reported in letters from C. R. Steinhardt dated April 28, 1995, and January 25, 1996.

2.0 BACKGROUND

The staff evaluates the LTOP P-T Limits and LTOP enabling temperature of pressurized water reactors (PWRs) based on the following NRC regulations and guidance: 10 CFR Part 50, Appendix G; Generic Letter (GL) 88-11; GL 92-01, Revision 1; GL 92-01, Revision 1, Supplement 1; Regulatory Guide (RG) 1.99, Revision 2; Standard Review Plan (SRP) Section 5.3.2 and Branch Technical Position RSB 5-2 in SRP 5.2.2. GL 88-11 advised licensees that the staff would use RG 1.99, Revision 2 to review P-T Limit Curves. RG 1.99, Revision 2 contains methodologies for determining the increase in transition temperature and the decrease in upper-shelf energy resulting from neutron radiation. GL 92-01, Revision 1 requested that licensees submit the reactor pressure vessel (RPV) data for their plants to the staff for review. GL 92-01, Revision 1, Supplement 1 requested that licensees provide and assess data from other licensees that could affect their RPV integrity evaluations. These data are used by the staff as the basis for the staff's review of P-T Limit submittals, and as the basis for the staff's review of pressurized thermal shock (PTS) assessments (10 CFR 50.61 assessments). Appendix G to 10 CFR Part 50 requires that P-T Limits for the RPV be at least as conservative as those obtained by applying the methodology of Appendix G to Section III of the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME) Code.

SRP 5.3.2 provides an acceptable method of calculating the P-T Limits for ferritic materials in the beltline of the RPV based on the linear elastic fracture mechanics (LEFM) methodology of Appendix G to Section III of the ASME Code. The basic parameter of this methodology is the stress intensity factor K_I, which is a function of the stress state and flaw configuration. The methods of Appendix G postulate the existence of a sharp surface flaw in the RPV that is normal to the direction of the maximum stress. The flaw in the RPV is postulated to have a depth that is equal to one-fourth of the RPV beltline thickness and a length equal to 1.5 times the RPV beltline thickness. The critical locations in the RPV beltline region for calculating heatup and cooldown P-T Limit Curves are the 1/4 thickness (1/4t) and 3/4 thickness (3/4t) locations, which correspond to the depth of the maximum postulated flaw, if initiated and grown from the inside and outside surfaces of the RPV, respectively. However, when calculating the LTOP P-T Limits the critical location is the 1/4T location since the limits are calculated for isothermal conditions.

The Appendix G, ASME Code methodology requires that licensees determine the adjusted reference temperature (ART or RT_{NDT}) at the maximum postulated flaw depth. The ART is defined as the sum of the initial (unirradiated) reference temperature [$RT_{NDT(U)}$], the mean value of the adjustment in reference temperature (ΔRT_{NDT}) caused by irradiation, and a margin (M) term. The ΔRT_{NDT} is a product of a chemistry factor and a fluence factor. The chemistry factor is dependent upon the amount of copper and nickel in the material and may be determined from tables in the RG or from surveillance data. The fluence factor is dependent upon the neutron fluence at the maximum postulated flaw depth. The margin term is dependent upon whether the $RT_{NDT(U)}$ is a plant-specific or a generic value and whether the chemistry factor was determined using the tables in RG 1.99, Revision 2 or surveillance data. The margin term is used to account for uncertainties in the values of $RT_{NDT(U)}$, copper and nickel contents, fluence and calculational procedures. RG 1.99, Revision 2 describes the methodology to be used in calculating the margin term.

Branch Technical Position RSB 5-2 in SRP 5.2.2 indicates that the LTOP system should be operable during startup and shutdown conditions below the enabling temperature, defined as the water temperature corresponding to a metal temperature of at least RT_{NDT} + 90°F at the beltline location that is controlling in the Appendix G limit calculation.

3.0 Evaluation

3.1 Material Properties

3.1.1 Evaluation of $RT_{NDT(U)}$

The limiting material in the Kewaunee beltline is a circumferentially-oriented weld that was fabricated by Combustion Engineering using a submerged arc process with Linde 1092 flux and weld wire heat number IP 3571. In their August 12, 1996, letter, the licensee provided $RT_{NDT(U)}$ data from surveillance welds in Kewaunee and Maine Yankee that were fabricated by Combustion Engineering using Linde 1092 flux and weld wire IP 3571. The Kewaunee surveillance weld data resulted in an $RT_{NDT(U)}$ of -50°F. The Maine Yankee surveillance weld data resulted in an $RT_{NDT(U)}$ of -30°F. Since both of these welds were fabricated using the same type of flux and the same heat of weld wire that was used to fabricate the limiting weld in the Kewaunee reactor vessel beltline, they are representative of the $RT_{NDT(U)}$ of the beltline weld. The generic mean value of all submerged arc welds fabricated by Combustion Engineering is -56°F with a standard deviation of 17°F. The Kewaunee and Maine Yankee $RT_{NDT(U)}$ data are within the 95% tolerance limits of the generic data. Hence, the generic mean value and standard deviation for the $RT_{NDT(U)}$ may be used to represent the limiting weld in the Kewaunee reactor vessel beltline. The licensee used the generic mean value and standard deviation for the $RT_{NDT(U)}$ in determining the ART for the limiting beltline material.

All three PWR Owners Groups have funded programs to perform fracture toughness tests of reactor vessel materials. The Westinghouse Owners Group (WOG) program will include testing of the licensee's surveillance weld. The WOG program is scheduled to be completed December 30, 1996. The licensee is participating in this program. The $RT_{NDT(U)}$ for the Kewaunee limiting beltline weld will be independently verified by the fracture toughness results from the WOG program. However, until the results from that program are evaluated, the generic mean value and standard deviation for the $RT_{NDT(U)}$ are acceptable for use in determining LTOP P-T Limits and enable temperature for the Kewaunee reactor vessel.

3.1.2 Evaluation of ΔRT_{NDT}

The licensee used data from its surveillance program to determine the chemistry factor in its calculation of the ΔRT_{NDT}. The surveillance data was reported in the April 28, 1995, letter.

Regulatory Position C.2.1 of RG 1.99, Revision 2 provides a calculational procedure for determining the chemistry factor from two or more credible surveillance data. This procedure defines the relationship of ΔRT_{NDT} to neutron fluence that fits the surveillance data in such a way as to minimize the sum of the squares of the errors. Section B of RG 1.99, Revision 2 describes criteria to be used in determining whether surveillance data is credible. The licensee evaluated the credibility of its surveillance data in its surveillance capsule report enclosed in their April 28, 1995, letter. The licensee's evaluation indicates that the surveillance data is credible.

Credibility criteria 3 in RG 1.99, Revision 2 indicates that the scatter of the measured ΔRT_{NDT} values about a best fit line normally should be less than 28°F for welds and 17°F for base metal. If the fluence is large (two or more orders of magnitude), the scatter should not exceed twice those values. The scatter of the measured ΔRT_{NDT} values about a best fit line can be determined from the difference between the measured ΔRT_{NDT} and the predicted ΔRT_{NDT} values (Where the predicted ΔRT_{NDT} values are calculated using the chemistry factor described in Regulatory Position C.2.1). If the difference between the measured ΔRT_{NDT} and the predicted ΔRT_{NDT} values are less than 28°F for each surveillance weld data, the weld data would meet credibility criteria 3. Table 1 (attached) indicates that the difference between the measured ΔRT_{NDT} and the predicted ΔRT_{NDT} values for each surveillance capsule. Since the difference between the measured ΔRT_{NDT} and the predicted ΔRT_{NDT} values are less than 28°F for the surveillance weld data, the scatter of the surveillance data about the best fit line meets credibility criteria 3.

Regulatory Position C.2.1 also indicates that if there is clear evidence that the copper and nickel content of the surveillance weld differs from that of the vessel weld, (i.e., differs from the average for the weld wire heat number associated with the vessel weld and the surveillance weld), the measured values of the ΔRT_{NDT} should be adjusted by multiplying them by the ratio of the chemistry factor for the vessel weld to the surveillance weld. The licensee provided weld chemical composition data in their January 25, 1996, letter. The data was from two Combustion Engineering weld qualifications and from four surveillance welds that were fabricated using the same heat (IP 3571) of weld wire as the limiting Kewaunee beltline weld. The welds were fabricated using copper coated primary electrodes. Since the coating on the electrodes varies from coil to coil, the licensee evaluated the data using several weighting methods to determine the best-estimate for this heat of weld material. Averaging the simple average of each weld results in a best-estimate average copper of 0.305 percent. Double counting the copper in the tandem electrodes results in a best-estimate weighted copper of 0.30 percent. And estimating the number of coils used to fabricate each of the welds results in a best-estimate weighted average copper of 0.297 percent. The licensee used a best-estimate copper for their beltline weld of 0.305 percent. The licensee used a best-estimate nickel of 0.766 percent, which is the average of simple averages from each weld. Interpolation of Table 1 in RG 1.99, Revision 2 indicates that a weld with 0.305 percent copper and 0.766 percent nickel will have a chemistry factor of 221.3.

The best-estimate copper and nickel from the Kewaunee surveillance weld is 0.22 percent and 0.76 percent, respectively. Using the tables in RG 1.99, Revision 2 results in a chemistry factor of 187.5 for the surveillance weld.

The ratio of the chemistry factor for the beltline weld to that of the surveillance weld is 1.18 (221.3/187.5). The licensee used this ratio to adjust the surveillance data. This procedure satisfies the methodology in Regulatory Position C.2.1 and results in an adjusted chemistry factor of 224.9.

The Combustion Engineering Owners Group Reactor Vessel Working Group (CEOG-RVWG) has undertaken a task to further research data files and log books compiled by CE. The CEOG-RVWG will compile and evaluate all available data to determine best-estimate chemistry for each CE fabricated weld heat. This program is scheduled to be completed in December 1996. The licensee is participating in this task. The best-estimate chemistry for the Kewaunee limiting beltline weld will be independently verified by the CEOG-RVWG. However, until the result from that program is evaluated the licensee's best-estimate chemistry is acceptable for determining its LTOP P-T Limits and enabling temperature.

3.1.3 <u>Evaluation of Margin Term</u>

The licensee calculated the margin term to be 44°F. The licensee used a standard deviation for the $RT_{NDT(U)}$ of 17°F and a standard deviation for the ΔRT_{NDT} of 14°F. RG 1.99, Revision 2 indicates that the standard deviation for ΔRT_{NDT} for a weld is 28°F. However, the RG also indicates that the standard deviation for ΔRT_{NDT} may be reduced in half when credible surveillance data is used to determine the chemistry factor. Using the methodology in RG 1.99, Revision 2 results in a margin value of 44°F.

3.1.4 <u>Evaluation of LTOP P-T Limits and Enable Temperature</u>

The licensee calculated its LTOP Limits and enabling temperature using a generic $RT_{NDT(U)}$ of -56°F, a margin term of 44°F and a ΔRT_{NDT} that was determined from its surveillance weld data. Using these material properties, the licensee's projected value of neutron fluence (E>1Mev) through end of operating cycle 33 and the methodology in SRP 5.3.2, the staff confirmed that the LTOP P-T Limits meet the safety factors in Appendix G to Section III of the ASME Code.

Since the LTOP Limits were determined for isothermal conditions, the critical beltline location with respect to determining the enabling temperature is the 1/4t location. The RT_{NDT} for the limiting beltline weld at the 1/4t location through end of operating cycle 33 is projected to be 265°F. The licensee has designated 355°F as the enabling temperature. Since Branch Technical Position RSB 5-2 indicates that the enabling temperature should be RT_{NDT} + 90°F, the proposed enabling temperature meets the limit in the Branch Technical Position.

3.1.5 <u>Summary</u>

Based on the information provided by the licensee and confirmed by the staff's analysis, the LTOP Limits meet the safety factors in Appendix G to Section III of the ASME Code and 10 CFR Part 50, Appendix G, through the end of operating cycle 33; and the licensee's proposed enabling temperature meets the limit specified in Branch Technical Position 5-2 in SRP 5.2.2. Therefore, the staff finds the proposed change acceptable.

3.2 Neutron Fluence

The neutron fluence for energy (E) > 1.0 MeV was calculated in connection with the analysis of the surveillance capsule S and is documented in WCAP-14279, "Analysis of Capsule S from the Wisconsin Public Service Corporation Kewaunee Nuclear Plant Reactor Vessel Radiation Surveillance Program," dated March 1995. WCAP-14279 was included as an attachment to the licensee's April 28, 1995, letter. The licensee included an estimate of the effective full power years (EFPY) of operation expected at the end of the operating license. WCAP-14279 includes the results of a calculation performed with a benchmarked code, recommended approximations and latest cross sections. The results of the calculation were subsequently biased upward by 11 percent to account for the average value of the measured data in the four (V, R, P, and S) surveillance capsules removed up to this point.

The staff has reviewed the licensee's estimated fluence value of 3.4×10^{19} n/cm^2 at 34 EFPY and, since it was calculated in accordance with standard industry methodology, and is conservative, finds it acceptable.

3.3 Thermal Hydraulics

The LTOP system is provided to assure that under low temperature operating conditions the integrity of the reactor vessel is not compromised by violating 10 CFR Part 50, Appendix G guidelines. The residual heat removal (RHR) system suction relief valve with a setpoint of 500 psig is currently used to accomplish this function at Kewaunee. The enabling temperature of the LTOP system specified in the current TS is 338°F. These LTOP setpoints were developed to protect the (P-T) limits established in the current TS Figure 3.1-4 which are applicable through 18.40 EFPY.

In the current TS, when the temperature of the reactor coolant system (RCS) cold leg is less than or equal to 338°F, LTOP is provided by the RHR suction relief valve with a lift setting of 500 psig. These setpoints were developed to avoid transient RCS pressures from exceeding the reactor vessel Appendix G limits during any design transient. The design transients considered in the LTOP design include (1) the start of an idle reactor coolant pump (RCP) with secondary water temperature in the steam generator less than or equal to 100°F above the RCS cold leg temperature, (2) the mass addition transient involving all three charging pumps injecting water to the RCS with the letdown line isolated and (3) one safety injection (SI) pump operating and injecting water to the RCS. In addition, the LTOP analysis assumes a water solid RCS.

The licensee's proposal would revise TS Figure 3.1-4 to make it applicable up to 33.41 EFPY and change the LTOP enabling temperature to 355°F. No change is proposed for the setpoint of the RHR suction relief valve. The licensee has provided the results of its analysis to confirm that the new LTOP enabling temperature and the current lifting setpoint of the RHR suction relief valve will provide adequate protection to the Appendix G P-T limits established in the proposed TS Figure 3.1-4. The methodology used to evaluate these new setpoints is essentially the same as that previously used for LTOP design at Kewaunee. Proper combined instrument/valve setpoint correction has been factored in the setpoints study. To support the assumption made in the heat addition transient analysis, restriction is provided in TS 3.1 to prevent the starting of any RCP when the secondary water temperature in any steam generator (SG) is greater than 100°F above RCS temperature during low temperature operating conditions.

Plant administrative controls require that both SI pumps be placed in the pull-to-lock position and that the SI to RCS flowpath be isolated at RCS pressures less than 1000 psig. However, the licensee has conservatively assumed an inadvertent starting of one SI pump as one of the mass addition scenarios in the LTOP design transient. Plant administrative controls will also preclude the operation of more than one RCP when RCS temperature is less than 140°F to assure that Appendix G P-T limits are not violated. The analysis also does not take credit for the relief capacity of another RHR suction relief valve in the system which provides extra design margin in the LTOP system.

The staff has reviewed the licensee's submittal and finds that the changes are based on the applicable regulatory guidance in SRP 5.2.2 (Revision 2), are reasonably conservative, and are, therefore, acceptable.

4.0 Technical Specification Changes

The licensee proposed the following changes in the TS to implement the LTOP changes previously discussed:

1. TS 3.1.a.C would be revised to increase the required RCS temperature for starting a RCP consistent with the design basis for the LTOP system.

2. TS 3.1.b.1.C and TS 3.1.b.4 would be modified to incorporate a LTOP enabling temperature of 355°F.

3. Figure TS 3.1-4 would be modified to define 10 CFR 50, Appendix G P-T limitations for LTOP evaluation through the end of operating cycle (EOC) 33 which is equivalent to 33.41 EFPY.

4. TS 3.1.b.1 would be modified to reflect the applicability of Figure TS 3.1-4 through EOC 33 or 33.41 EFPY.

5. The Basis for TS 3.1 would be revised to reflect the changes described above.

6. The List of Figures in the Table of Contents would be changed to reflect the revised title of Figure TS 3.1-4 indicating the new expiration date of EOC 33.

The staff has reviewed the TS changes discussed above and finds that they consistently incorporate the LTOP changes previously discussed in this safety evaluation and will provide adequate assurance of reactor vessel integrity during low temperature operating conditions. Therefore, the proposed changes are acceptable.

5.0 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.

6.0 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. 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 52472). 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.

7.0 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.

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Attachment: Table 1

Table 1
Comparison of Measured ΔRT_{NDT} to Predicted ΔRT_{NDT} for the Kewaunee Surveillance Weld (Weld Wire Heat Number IP 3571)

Capsule	Neutron Fluence of Capsule ($E19n/cm^2$) (E>1Mev)	Measured ΔRT_{NDT} (°F)	Predicted ΔRT_{NDT} Using Position C.2.1 of RG 1.99 (°F)	Measured-Predicted ΔRT_{NDT} (°F)
V	0.629	175	166	+9
R	1.94	235	225	+10
P	2.89	230	244	-14
S	3.45	250	252	-2