



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

November 6, 2008

Mr. David A. Christian
President and Chief Nuclear Officer
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: KEWAUNEE POWER STATION - ISSUANCE OF AMENDMENT RE: SAFETY
INJECTION ACCUMULATOR MINIMUM BORON CONCENTRATION
(TAC NO. MD9243)

Dear Mr. Christian:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 199 to Facility Operating License No. DPR-43 for the Kewaunee Power Station. This amendment revises the Technical Specifications (TS) in response to your application dated July 16, 2008.

The amendment revises Sections 3.3.a.1.A and 3.3.a.2.A of the Kewaunee Technical Specifications to increase the minimum required safety injection accumulator boron concentration from 1900 parts-per-million (ppm) to 2400 ppm.

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

Sincerely,

A handwritten signature in black ink, appearing to read "Peter S. Tam".

Peter S. Tam, Senior Project Manager
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-305

Enclosures:

1. Amendment No. 199 to
License No. DPR-43
2. Safety Evaluation

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

DOMINION ENERGY KEWAUNEE, INC.

DOCKET NO. 50-305

KEWAUNEE POWER STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 199
License No. DPR-43

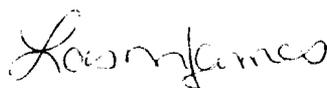
1. The U.S. Nuclear Regulatory Commission (the Commission) has found that:
 - A. The application for amendment by Dominion Energy Kewaunee, Inc., dated July 16, 2008, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations 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. 199, 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 its date of issuance and shall be implemented within 60 days of the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Lois M. James, Chief
Plant Licensing Branch III-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment: Changes to the Facility Operating License
and Technical Specifications

Date of Issuance: November 6, 2008

ATTACHMENT TO LICENSE AMENDMENT NO. 199

FACILITY OPERATING LICENSE NO. DPR-43

DOCKET NO. 50-305

Replace the following page of the Facility Operating License No. DPR-43 with the attached revised page. The changed area is identified by a marginal line.

REMOVE

INSERT

Page 3

Page 3

Replace the following page of Appendix A, Technical Specifications, with the attached revised page. The revised page is identified by amendment number and contains marginal lines indicating the areas of change.

REMOVE

INSERT

TS 3.3-1

TS 3.3-1

C. This license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR, Chapter 1: (1) Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Section 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70, (2) is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect, and (3) is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The licensee is authorized to operate the facility at steady-state reactor core power levels not in excess of 1772 megawatts (thermal).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 199, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

(3) Fire Protection

The licensee shall implement and maintain in effect all provisions of the approved Fire Protection Program as described in the licensee's Fire Plan, and as referenced in the Updated Safety Analysis Report, and as approved in the Safety Evaluation Reports, dated November 25, 1977, and December 12, 1978 (and supplement dated February 13, 1981) subject to the following provision:

The licensee may make changes to the approved Fire Protection Program without prior approval of the Commission, only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

(4) Physical Protection

The licensee shall fully implement and maintain in effect all provisions of the Commission-approved physical security, training and qualification, and safeguards contingency plans including amendments made pursuant to provisions of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The combined set of plans, which contain Safeguards Information protected under 10 CFR 73.21, is entitled: "Nuclear Management Company Kewaunee Nuclear Power Plant Physical Security Plan (Revision 0)" submitted by letter dated October 18, as supplemented by letter dated October 21, 2004, July 26, 2005, and May 15, 2006.

(5) Deleted

3.3 ENGINEERED SAFETY FEATURES AND AUXILIARY SYSTEMS

APPLICABILITY

Applies to the OPERATING status of Engineered Safety Features and Auxiliary Systems.

OBJECTIVE

To define those LIMITING CONDITIONS FOR OPERATION that are necessary: (1) to remove decay heat from the core in emergency or normal shutdown situations, and (2) to remove heat from containment in normal OPERATING and emergency situations.

SPECIFICATIONS

a. Accumulators

1. The reactor shall not be made critical unless the following conditions are satisfied, except for LOW POWER PHYSICS TESTING and except as provided by TS 3.3.a.2.
 - A. Each accumulator is pressurized to at least 700 psig and contains $1250 \text{ ft}^3 \pm 25 \text{ ft}^3$ of water with a boron concentration of at least 2400 ppm, and is not isolated.
 - B. Accumulator isolation valves SI-20A and SI-20B shall be opened with their power breakers locked out at or before the Reactor Coolant System pressure exceeds 1000 psig.
2. During power operation or recovery from an inadvertent trip, the following conditions of inoperability may exist during the time interval specified:
 - A. One accumulator may have a boron concentration < 2400 ppm for 72 hours.
 - B. One accumulator may be inoperable for a reason other than TS 3.3.a.2.A for 24 hours.

If OPERABILITY is not restored within the time specified, then within 1 hour action shall be initiated to:

- Achieve HOT STANDBY within the next 6 hours.
- Achieve HOT SHUTDOWN within the following 6 hours.
- Achieve COLD SHUTDOWN within an additional 36 hours.



UNITED STATES
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WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATING TO AMENDMENT NO. 199 TO FACILITY OPERATING LICENSE NO. DPR-43

DOMINION ENERGY KEWAUNEE, INC.

KEWAUNEE POWER STATION

DOCKET NO. 50-305

1.0 INTRODUCTION

By letter dated July 16, 2008 (Agencywide Document Access and Management System (ADAMS) Accession No. ML081990266), Dominion Energy Kewaunee (DEK), the licensee for the Kewaunee Power Station (Kewaunee), requested to amend the Kewaunee Technical Specifications (TS) to increase the minimum required safety injection (SI) accumulator boron concentration. The request is submitted to address concerns identified by the licensee's contractor, Westinghouse, regarding subcriticality requirements immediately following a postulated loss-of-coolant accident (LOCA).

Specifically, the current minimum accumulator boron concentration required by Kewaunee TS 3.3.a.1.A and 3.3.a.2.A is 1900 parts-per-million (ppm), and the licensee proposes to increase this value to 2400 ppm. The licensee stated that the increase in boron concentration does not pose a current safety concern; a plant practice of maintaining a safety injection boron concentration at or above 2500 ppm is already in place.

2.0 REGULATORY EVALUATION

The requirements for nuclear production facility TS are contained in Part 50, Section 36 of Title 10 of the *US Code of Federal Regulations* (10 CFR 50.36). Specifically, 10 CFR 50.36(c)(2)(i) defines limiting conditions for operation as the lowest functional capability or performance levels of equipment required for safe operation of the facility.

The safety injection accumulator boron concentration is a limiting condition for operation because the boron in the safety injection accumulator is intended, following a large-break LOCA, to hold the core in a subcritical condition during the reflood stage after the large-break LOCA. This subcriticality is a key assumption in the licensee's LOCA analyses to demonstrate adequate core cooling. The accumulators satisfy Criterion 3 of 10 CFR 50.36(c)(2)(ii).

The requirement for a licensee to demonstrate adequate core cooling under LOCA conditions is promulgated by 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems [ECCS] for Light Water Nuclear Power Reactors."

In light of the requirements of 10 CFR 50.36, regarding TS requirements for limiting conditions for operation, and 10 CFR 50.46, regarding adequate ECCS evaluation models for postulated

LOCAs, this safety evaluation establishes that the licensee's proposed TS modification to increase safety injection accumulator minimum boron concentration will provide for adequate post-LOCA ECCS performance based on the predicted results of the licensee's ECCS evaluation model.

3.0 TECHNICAL EVALUATION

The licensee proposed to increase the minimum required SI accumulator boron concentration from 1900 ppm to 2400 ppm. The current range of licensing basis boron concentrations depicted by the Kewaunee TS and Updated Safety Analysis Report (USAR) is 1900 ppm - 2625 ppm.

For some safety analyses, it is conservative to assume a minimum boron concentration. These analyses pertain to those accidents or phases of accidents where the effects of increased boron are beneficial. For instance, a reactor subcriticality evaluation is conservative if a lower boric acid concentration is assumed than what exists at the plant. For these types of analyses, the licensee assumes a boron concentration of 1850 ppm or 1900 ppm, as noted below.

For other safety analyses, it is conservative to assume a maximum boron concentration. These analyses pertain to those accidents or phases of accidents where the effects of increased boron concentration are harmful. For instance, a post-LOCA boron precipitation evaluation or a containment sump pH evaluation is conservative if a high boron concentration is assumed. For these types of analyses, the licensee assumes a boron concentration of 2625 ppm.

The licensee stated that, as a result of selecting the revised required minimum SI accumulator boron concentration within the current minimum and maximum limits, the safety analyses that use minimum or maximum SI accumulator boron concentration as a design input will be unaffected and will remain bounding and valid. For the reasons identified above, the U.S. Nuclear Regulatory Commission (NRC) staff accepts the licensee's position regarding the bounding nature of the analyzed safety injection accumulator boron concentrations.

The licensee stated that the proposed amendment is required to align the Kewaunee TS with the results of an evaluation performed in Westinghouse Nuclear Safety Advisory Letter (NSAL-07-7), "Short-Term Recriticality During a PWR [Pressurized-Water Reactor] Large-Break LOCA." NSAL-07-7 determined that the potential exists for recriticality to occur during a large-break LOCA in the short-term (reflood stage). Westinghouse determined that Kewaunee is not susceptible to the issue based on the current plant practice of maintaining SI accumulator boron concentration at or above 2500 ppm. However, to ensure that the Kewaunee TS are conservative with respect to the results of NSAL-07-7, the licensee proposed to raise the minimum required boron concentration for the SI accumulators in the TS from 1900 ppm to 2400 ppm.

3.1 Evaluation of LOCA Events Against the New Minimum Concentration

As a result of the analytic issue, the licensee has determined that Kewaunee is not currently susceptible to a safety issue based on the current plant practice of maintaining SI accumulator boric acid concentration at or above 2500 ppm. The licensee supported this claim by re-evaluating subcriticality for both small- and large-break LOCAs and demonstrating that

subcriticality can be maintained at SI accumulator boron concentrations below 2400 ppm, which, given the proposed TS limit of 2400 ppm, is conservative and acceptable.

The licensee stated that the post-LOCA boron precipitation analysis assumes the maximum SI accumulator boron concentration of 2625 ppm, which is less conservative compared to the proposed new minimum boron concentration of 2400 ppm, but acceptably so, because the assumed concentration represents the upper limit on available boron, which is not proposed to change by this amendment.

With regard to post-LOCA sump boron concentration, the licensee's analysis, which affirms subcriticality, assumes a minimum SI accumulator boron concentration of 1900 ppm. The proposed new minimum concentration (i.e., 2400 ppm) of boron in the SI accumulator will, thus, result in an increased margin. The NRC staff finds this position acceptable because the post-LOCA boron sump concentration affects post-LOCA subcriticality, and assuming a lower-than-actual boron concentration in the analysis is conservative in this respect.

The NRC staff also evaluated the licensee's post-LOCA containment sump pH analysis, which found that the pH will remain in the 7.0 – 9.5 range with the raised minimum boron concentration. This range is acceptable to the NRC staff since the proposed change in minimum SI accumulator boron concentration from 1900 ppm to 2400 ppm is still bounded by the previous calculation of the containment sump pH where the maximum analyzed boron concentration of the SI accumulator was 2625 ppm.

3.2 Evaluation of Non-LOCA Events Against the New Minimum Concentration

The licensee reviewed the proposed change for its impact on the non-LOCA safety analyses and concluded that only one accident scenario – the main steamline break – would be affected by a change in SI accumulator boron concentration. This is because the main steam line break is the only non-LOCA transient that credits ECCS actuation and relies on SI accumulator borated water for reactor shutdown.

To evaluate this claim by the licensee, the NRC staff reviewed Chapter 14 of the Kewaunee USAR for accident descriptions. The NRC staff did not explicitly evaluate each postulated accident or transient, but considered instead, events by condition using the American Nuclear Society scale of event severity and frequency, Conditions I-IV. Section 14.0.1 describes the Conditions and groups the transients by Condition. By definition, there are no evaluated Condition I occurrences because Condition I represents normal operation. The NRC staff did not consider any Condition II events because, by definition, Condition II events shall be accommodated with, at most, a shutdown of the reactor with the plant capable of returning to operation after corrective action. Therefore, ECCS actuation is not required for Condition II events.

The NRC staff reviewed the Condition III events, and evaluated a small-break LOCA. The small-break LOCA analysis falls into the category of design-basis accidents that cause ECCS actuation. The SBLOCA analysis assumes the insertion of control rods via the Reactor Protection System. Consequently, the SI accumulator boron concentration required to achieve the level of subcriticality for the small-break LOCA is significantly lower than the concentration required for a large-break LOCA.

A small steamline break is described as a Condition III event; however, the Kewaunee steamline break analysis considers only a main steam line break. The NRC staff confirmed that the remaining Condition III events do not require ECCS actuation.

The NRC staff accepts the main steamline break analysis for the subject license amendment request because a smaller steamline break analysis would predict reactor coolant system performance similar to that for an excessive load increase, or for a main steamline break. If the small break were significant enough to result in SI accumulator deployment, the reactivity compensation required for a small break would be expected to be bounded by that for a large break, since the larger break would result in more primary-side cooling, and hence, add more positive reactivity to the core. Therefore, the boron required for the main steamline break would be greater than that for a smaller steamline break.

The NRC staff reviewed steam generator tube rupture accident. This accident relies on ECCS actuation, although the accident sequence analytically credits a reactor trip such that SI accumulator boration is not required for core shutdown. The NRC staff observed, as noted above, that the licensee evaluated the main steamline break. The NRC staff confirmed that the remaining Condition IV events do not require ECCS operation.

Regarding the main steamline break analysis, the licensee stated that the current licensing basis analysis is acceptable because it assumes a SI accumulator boron concentration of 1850 ppm. The NRC staff finds this acceptable, because the proposed new minimum concentration of 2400 ppm is greater than and conservatively bounds the 1850 ppm assumed in the analysis.

3.3 Summary of NRC Staff Evaluation

The NRC staff reviewed the subject license amendment request, and made the following findings:

- The licensee has acceptably accounted for the impact the requested increase in SI accumulator minimum boron concentration would have on non-LOCA transient analyses.
- The licensee has demonstrated that the requested minimum SI accumulator boron concentration will provide acceptable subcriticality in post-LOCA scenarios.
- For post-LOCA calculations, the licensee has assumed either a minimum or maximum SI accumulator boron concentration that remains conservatively bounded by existing licensing basis analyses.

The NRC staff concludes that the proposed license amendment to increase the minimum safety injection accumulator boron concentration from 1900 ppm to 2400 ppm is acceptable.

The NRC staff's finding is based on the fact that most of the existing analysis of record remains conservative or bounding of the requested change. The only exception is the licensee's post-LOCA subcriticality assessment, which has been re-evaluated. The licensee's post-LOCA

subcriticality assessments set forth in the subject license amendment request demonstrates that a minimum SI accumulator boron concentration of 2400 ppm will preserve post-LOCA subcriticality.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC 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 (73 FR 50359). 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 Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Benjamin Parks
Emma Wong

Date: November 6, 2008

November 6, 2008

RF

Mr. David A. Christian
President and Chief Nuclear Officer
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, VA 23060-6711

SUBJECT: KEWAUNEE POWER STATION - ISSUANCE OF AMENDMENT RE: SAFETY
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Sincerely, /RA/

Peter S. Tam, Senior Project Manager
Plant Licensing Branch III-1
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Docket No. 50-305

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OFFICE	NRR/LPL3-1/PM	NRR/LPL3-1/LA	SRXB/BC	CSGB/BC	OGC NLO w/ comment	NRR/LPL3-1/BC
NAME	PTam	BTully	G Cranston*	A Hiser**		L James
DATE	10/24/08	10/22/08	9/18/08*	9/2/08	10/30/08	11/16/08

*SE transmitted by memo of 9/18/08. **Last paragraph of Section 3.1 in SE transmitted by e-mail of 9/2/08.

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