April 5, 2001

Mr. J. V. Parrish
Chief Executive Officer
Energy Northwest
P.O. Box 968 (Mail Drop 1023)
Richland, WA 99352-0968

SUBJECT: COLUMBIA GENERATING STATION - ISSUANCE OF AMENDMENT RE: OSCILLATION POWER RANGE MONITORING TECHNICAL SPECIFICATIONS (TAC NO. MB0483)

Dear Mr. Parrish:

The Commission has issued the enclosed Amendment No. 171 to Facility Operating License No. NPF-21 for the Columbia Generating Station. The amendment consists of changes to the Technical Specifications (TSs) in response to your application dated November 2, 2000.

The amendment replaces interim corrective actions that placed restrictions on plant operations and defined operator response to reactor power instability events with oscillation power range monitoring instrumentation. Specifically, the amendment: (1) added a new TS 3.3.1.3, "Oscillation Power Range Monitoring (OPRM) Instrumentation," (2) revised TS 3.4.1, "Recirculation Loops Operating," to remove monitoring specifications that are no longer needed upon activation of the automatic OPRM instrumentation, and (3) revised TS 5.6.5 to include in the Core Operating Limits Report the applicable operating limits for the OPRM, and also reference the topical report that describes the analytical methods used to determine the setpoint values for the OPRM.

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

Sincerely,

/RA/

Jack Cushing, Project Manager, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosures: 1. Amendment No. 171 to NPF-21
2. Safety Evaluation

cc w/encls: See next page

*For previous concurrences
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 5, 2001

Mr. J. V. Parrish
Chief Executive Officer
Energy Northwest
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Richland, WA 99352-0968

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Jack Cushing, Project Manager, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-397

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cc w/encls: See next page

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

ENERGY NORTHWEST

DOCKET NO. 50-397

COLUMBIA GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 171
License No. NPF-21

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Energy Northwest dated November 2, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's 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. NPF-21 is hereby amended to read as follows:

(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 171 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. The license amendment is effective as of its date of issuance and shall be implemented prior to restart from Refuel Outage 15.

FOR THE NUCLEAR REGULATORY COMMISSION

L RAGHAVAN

Stephen Dembek, Chief, Section 2
Project Directorate IV & Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment: Changes to the Technical Specifications

Date of Issuance: April 5, 2001

ATTACHMENT TO LICENSE AMENDMENT NO. 171

FACILITY OPERATING LICENSE NO. NPF-21

DOCKET NO. 50-397

Replace the following pages of the Appendix A Technical Specifications with the attached revised pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change. The overleaf pages are provided to maintain document completeness.

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---	3.3.1.3-2
---	3.3.1.3-3
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(continued)

3.3 INSTRUMENTATION

3.3.1.3 Oscillation Power Range Monitor (OPRM) Instrumentation

LCO 3.3.1.3 Four channels of the OPRM instrumentation shall be OPERABLE within the limits as specified in the COLR.

APPLICABILITY: THERMAL POWER $\geq$ 25% RTP.

ACTIONS

----------NOTE----------
Separate Condition entry is allowed for each channel.

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. One or more required channels inoperable.	A.1	Place channel in trip.	30 days
	OR		
	A.2	Place associated RPS trip system in trip.	30 days
	OR		
	A.3	Initiate alternate method to detect and suppress thermal hydraulic instability oscillations.	30 days

(continued)

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. OPRM trip capability not maintained.	B.1 Initiate alternate method to detect and suppress thermal hydraulic instability oscillations.	12 hours
C. Required Action and associated Completion Time not met.	C.1 Reduce THERMAL POWER < 25% RTP.	4 hours

SURVEILLANCE REQUIREMENTS

----------NOTE----------
When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours, provided the OPRM System maintains trip capability.

SURVEILLANCE	FREQUENCY
SR 3.3.1.3.1 Perform CHANNEL FUNCTIONAL TEST.	184 days

(continued)

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.3.1.3.2	Calibrate the local power range monitors.	1000 MWD/T average core exposure
SR 3.3.1.3.3	----------NOTE---------- Neutron detectors are excluded. ---------- Perform CHANNEL CALIBRATION.	24 months
SR 3.3.1.3.4	Perform LOGIC SYSTEM FUNCTIONAL TEST.	24 months
SR 3.3.1.3.5	Verify OPRM is not bypassed when THERMAL POWER is $\geq$ 30% RTP and core flow $\leq$ 60% rated core flow.	24 months
SR 3.3.1.3.6	----------NOTE---------- Neutron detectors are excluded. ---------- Verify the RPS RESPONSE TIME is within limits.	24 months on a STAGGERED TEST BASIS

3.4 REACTOR COOLANT SYSTEM (RCS)

3.4.1 Recirculation Loops Operating

LCO 3.4.1 Two recirculation loops with matched flows shall be in operation.

OR

One recirculation loop shall be in operation provided that the following limits are applied when the associated LCO is applicable:

a. LCO 3.2.1, "AVERAGE PLANAR LINEAR HEAT GENERATION RATE (APLHGR)," single loop operation limits specified in the COLR; and

b. LCO 3.2.2, "MINIMUM CRITICAL POWER RATIO (MCPR)," single loop operation limits specified in the COLR.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Recirculation loop flow mismatch not within limits.	A.1 Declare the recirculation loop with lower flow to be "not in operation."	2 hours
B. Requirements of the LCO not met for reasons other than Condition A.	B.1 Satisfy the requirements of the LCO.	4 hours

(continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Required Action and associated Completion Time of Condition B not met. OR No recirculation loops in operation.	C.1 Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.4.1.1	----------NOTE---------- Not required to be performed until 24 hours after both recirculation loops are in operation. ---------- Verify recirculation loop drive flow mismatch with both recirculation loops in operation is: a. $\leq$ 10% of rated recirculation loop drive flow when operating at < 70% of rated core flow; and b. $\leq$ 5% of rated recirculation loop drive flow when operating at $\geq$ 70% of rated core flow.	24 hours

5.6 Reporting Requirements

5.6.2 Annual Radiological Environmental Operating Report (continued)

report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted in a supplementary report as soon as possible.

5.6.3 Radioactive Effluent Release Report

The Radioactive Effluent Release Report covering the operation of the unit shall be submitted in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and the Process Control Program and in conformance with 10 CFR 50.36a and 10 CFR 50, Appendix I, Section IV.B.1.

5.6.4 Monthly Operating Reports

Routine reports of operating statistics and shutdown experience, including documentation of all challenges to the safety/relief valves, shall be submitted on a monthly basis no later than the 15th of each month following the calendar month covered by the report.

5.6.5 CORE OPERATING LIMITS REPORT (COLR)

a. Core operating limits shall be established prior to each reload cycle, or prior to any remaining portion of a reload cycle, and shall be documented in the COLR for the following:

1. The APLHGR for Specification 3.2.1;

2. The MCPR for Specification 3.2.2;

3. The LHGR for Specification 3.2.3; and

4. LCO 3.3.1.3, "Oscillation Power Range Monitor (OPRM) Instrumentation."

(continued)

5.0 ADMINISTRATIVE CONTROLS

5.6 Reporting Requirements

The following reports shall be submitted in accordance with 10 CFR 50.4.

5.6.1 Occupational Radiation Exposure Report

A tabulation on an annual basis of the number of station, utility, and other personnel (including contractors) for whom monitoring was performed, receiving an annual deep dose equivalent of > 100 mrems and the associated collective deep dose equivalent (reported in man-rem) according to work and job functions (e.g., reactor operations and surveillance, inservice inspection, routine maintenance, special maintenance (describe maintenance), waste processing, and refueling). This tabulation supplements the requirements of 10 CFR 20.2206. The dose assignments to various duty functions may be estimated based on electronic or pocket dosimeter, thermoluminescent dosimeter (TLD), or film badge measurements. Small exposures totalling < 20% of the individual total dose need not be accounted for. In the aggregate, at least 80% of the total whole body dose received from external sources should be assigned to specific major work functions. The report shall be submitted by April 30 of each year.

5.6.2 Annual Radiological Environmental Operating Report

The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted by May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the Radiological Environmental Monitoring Program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM), and in 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

The Annual Radiological Environmental Operating Report shall include the results of analyses of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. In the event that some individual results are not available for inclusion with the report, the

(continued)

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

b. The analytical methods used to determine the core operating limits shall be those previously reviewed and approved by the NRC, specifically those described in the following documents:

1. ANF-1125(P)(A), and Supplements 1 and 2, "ANFB Critical Power Correlation," April 1990;

2. ANF-NF-524(P)(A), Revision 2 and Supplements 1 and 2, "Advanced Nuclear Fuels Corporation Critical Power Methodology for Boiling Water Reactors," November 1990;

3. ANF-89-014(P)(A), Revision 1 and Supplements 1 and 2, "Advanced Nuclear Fuels Corporation Generic Mechanical Design for Advanced Nuclear Fuels Corporation 9x9-IX and 9x9-9X BWR Reload Fuel," October 1991;

4. XN-NF-81-22(P)(A), "Generic Statistical Uncertainty Analysis Methodology," November 1983;

5. NEDE-23785-1-PA, Revision 1, "The GESTR-LOCA and SAFER Models for the Evaluation of the Loss-of-Coolant Accident, Volume III, SAFER/GESTR Application Methodology," October 1984;

6. NEDO-20566A, "General Electric Company Analytical Model for Loss-of-Coolant Analysis in Accordance with 10 CFR 50, Appendix K," September 1986;

7. CENPD-300-P-A, "Reference Safety Report for Boiling Water Reactor Reload Fuel," July 1996;

8. WPPSS-FTS-131(A), Revision 1, "Applications Topical Report for BWR Design and Analysis," March 1996;

9. ANFB Critical Power Correlation Uncertainty for Limited Data Sets, ANF-1125(P)(A), Supplement 1, Appendix D, Siemens Power Corporation - Nuclear Division, July 1998; and

10. NEDO-32465-A, "BWR Owners' Group Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology and Reload Applications," August 1996.

(continued)

5.6 Reporting Requirements

5.6.5 CORE OPERATING LIMITS REPORT (COLR) (continued)

c. The core operating limits shall be determined such that all applicable limits (e.g., fuel thermal mechanical limits, core thermal hydraulic limits, Emergency Core Cooling Systems (ECCS) limits, nuclear limits such as SDM, transient analysis limits, and accident analysis limits) of the safety analysis are met.

d. The COLR, including any midcycle revisions or supplements, shall be provided upon issuance for each reload cycle to the NRC.

5.6.6 Post Accident Monitoring (PAM) Instrumentation Report

When a report is required by Condition B or F of LCO 3.3.3.1, "Post Accident Monitoring (PAM) Instrumentation," a report shall be submitted within the following 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 171 TO FACILITY OPERATING LICENSE NO. NPF-21

ENERGY NORTHWEST

COLUMBIA GENERATING STATION

DOCKET NO. 50-397

1.0 INTRODUCTION

By letter dated November 2, 2000, Energy Northwest (the licensee), proposed a license amendment to change the Technical Specifications (TSs) for the Columbia Generating Station (CGS), formerly known as WNP-2. The proposed amendment incorporates long-term power stability solution instrumentation functions into the CGS TS. The changes reflect the addition of a new TS Section 3.3.1.3, "Oscillation Power Range Monitoring (OPRM) Instrumentation;" revision to TS Section 3.4.1, "Recirculation Loops Operating," to remove monitoring specifications that will no longer be necessary upon activation of the automatic OPRM instrumentation; revision of TS 5.6.5 to include in the Core Operating Limits Report (COLR) the applicable operating limits for the OPRMs; and the addition of a reference to the topical report that describes the analytical methods used to determine the setpoint values for the OPRM.

2.0 BACKGROUND

General Design Criterion (GDC) 10 in Appendix A to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50) requires that the reactor core be designed with appropriate margin to assure that specified acceptable fuel design limits will not be exceeded during any condition of normal operation, including the effects of anticipated operational occurrences. GDC 12 requires assurance that power oscillations that can result in conditions exceeding specified acceptable fuel design limits are either not possible or can be reliably and readily detected and suppressed. The OPRM instrumentation automatically detects and suppresses power oscillations and thereby ensures compliance with GDC 10 and 12.

The digital-based OPRM described in ABB-CE Topical Report CENPD-400-P, "Generic Topical Report for the ABB Option III Oscillation Power Range Monitor (OPRM)," detects and suppresses reactor core power instabilities using the Option III approach described in NEDO-31960, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," dated June 1991, and NEDO-31960, Supplement 1, dated March 1992, which were approved by the staff. Using existing local power range monitors (LPRMs) and reactor core recirculation flow instrumentation, the OPRM provides independent oscillation detection algorithm (ODA) trip function outputs to the original reactor protection system (RPS) interface relays.

The OPRM consists of four independent channels, one per RPS channel. Each OPRM channel consists of two modules, either of which can generate a channel trip signal. This configuration provides redundancy between OPRM channels and within each OPRM channel. Each OPRM module receives signals from dedicated LPRMs, and provides LPRM signals to the other module in its channel through a fiber optic data link. The OPRM module combines the locally wired LPRM signals with the shared LPRM signals to create LPRM cells that represent the neutron flux distribution in the reactor core. A microprocessor in each module uses these cells of LPRM signals to calculate the trip function values with the ODAs described in NEDO-31960 and NEDO-31960, Supplement 1.

One OPRM module is installed in each LPRM page in the existing space in the LPRM amplifier card frame. An LPRM page is a collection of components in the power range monitoring cabinets. Except for unassigned LPRM pages, there is one LPRM page per average power range monitor (APRM) set. Each LPRM page contains LPRM amplifier cards, wiring, and supporting electronics on a hinged assembly that allows access to the wiring and components behind the assembly. The OPRM module is connected to the APRM power and flow signals and the LPRM flux amplifier card outputs in its page.

In the operate mode, the OPRM module performs three diverse ODA calculations, runs self-tests, services the interpage data link, broadcasts channel information on the maintenance and plant computer data links, and provides annunciator indications to the main control room panel. The trip output is automatically armed (trip enable) when programmed high APRM power and low-core flow setpoints are reached.

The OPRM monitors the number of available and on-scale LPRMs and flags an LPRM cell as not valid if a sufficient number of LPRMs are not available or are not on-scale. When trip enabled is armed, an alert to the operator of a trouble condition results. If no LPRM cells are valid, an INOP alarm is generated. Trouble and INOP conditions caused by an insufficient number of LPRMs will not cause a reactor trip when at power. The staff found this design feature to be acceptable because TS APRM limiting conditions for operation are intended to ensure that an APRM trip will occur if a sufficient number of LPRMs are not available. Additionally, regional core oscillations do not occur during low-power operation when LPRMs are frequently out-of-range (and the corresponding LPRM cells are not valid). The OPRM trip module relays and INOP module relays will change state upon loss-of-power or when an OPRM module is physically removed from the chassis.

The OPRM protection system (through the plant process computer via a one-way data link) provides the following control board annunciator outputs to the control room operator:

- Trip enable (the OPRM is armed),
- Alarm (one or more cells calculating the period based algorithm have reached the pre-trip setpoint),
- Trip (one or more cells have tripped),
- INOP (the OPRM module may not be performing the ODA function), and

- TROUBLE (the OPRM module is performing the ODA function but requires operator attention).

The above indications are also available at the OPRM module, where they remain latched until manually reset.

A keyswitch on each OPRM module panel provides the operator with administrative control of the OPRM operating modes. The position of the keyswitch determines whether the OPRM module is in the test or operate mode. The keyswitch in the test position and entry of an OPRM access password are required to make configuration changes or perform surveillance tests.

While in the operate mode, the OPRM module undirectionally transmits LPRM and ODA status information to the maintenance terminal and plant computer fiber-optic data links. This transmission occurs even when the maintenance terminal and plant computer are not connected or installed to the OPRM module panel. A 20-minute event recall buffer in each OPRM module saves trip-related data for further analysis. The event recall buffer data may be downloaded to the maintenance terminal or plant computer when the OPRM module is in the test mode.

The OPRM module consists of a metal enclosure (which provides shielding against electromagnetic interference) with a removable circuit card assembly. The metal enclosure is permanently mounted in the card file of the APRM or LPRM page. Digital isolators and relays mounted remote from the OPRM provide isolation and fault protection for the OPRM digital inputs and outputs. OPRM module repair is limited to module replacement.

The OPRM chassis connects to the LPRMs, the APRM power signal, the total flow signal, digital input signals, relays, power, and ground through a prefabricated pigtail connector. OPRM modules are connected in pairs via fiber-optic data links to ensure isolation between APRM/LPRM groups.

During the initial surveillance phase following installation of the OPRM system in CGS, the OPRM trip capabilities were deactivated but the OPRM alarms and indications were placed in operation to enhance operator ability to recognize and respond to an instability event. As part of this initial surveillance phase, the OPRM functions have been monitored to ensure that the OPRM algorithms performed according to plant-specific design specifications under a variety of operating conditions.

3.0 EVALUATION

The regulatory requirements that govern the proposed changes are GDC 10 and 12. The staff evaluated the proposed changes against the guidelines in Chapter 7 of the Standard Review Plan, and the appropriate guidance for design of digital instrumentation and control system modifications, and with the specific staff guidance provided in the safety evaluation (SE) approving CENDP-400-P, "Generic Topical Report for the ABB Option III Oscillation Power Range Monitor (OPRM)."

As stated in the staff's SE that approved ABB-CE Topical Report CENPD-400-P, licensees referencing the topical report for implementation of the OPRM should provide the following information in their license amendment submittals:

1. Confirm the applicability of CENPD-400-P, including clarifications and reconciled differences between the specific plant design and the topical report design descriptions;

2. Confirm the applicability of BWROG topical reports that address the OPRM and associated instability functions, setpoints and margins;

3. Provide a plant-specific technical specification (TS) for the OPRM functions consistent with CENPD-400-P, Appendix A;

4. Confirm that the plant-specific environmental (temperature, humidity, radiation, electromagnetic and seismic) conditions are enveloped by the OPRM equipment environmental qualification values;

5. Confirm that administrative controls are provided for manually bypassing OPRM channels or protective functions, and for controlling access to the OPRM functions; and

6. Confirm that any changes to the plant operator's main control room panel have received human factors reviews per plant-specific procedures.

3.1 Applicability of the ABB Option III OPRM Design to the CGS Plant Design

The staff compared the applicable CGS design features with the corresponding design features in CENPD-400-P-A. The CGS unit is a GE BWR/5 in which the OPRM module was appropriately installed in place of an existing LPRM voltage regulator card; however, the voltage regulator card in the adjacent card frame was not replaced with a dual voltage regulator. Instead, the existing voltage regulator was rewired to provide power to both card frames. The licensee determined that the existing voltage regulator power is sufficient for both card frames, as confirmed by plant tests. Therefore, a dual voltage regulator was not necessary. The staff finds this configuration acceptable.

The staff reviewed the applicability of Boiling Water Reactor Owners Group' (BWROG) topical reports that address the OPRM and associated instability detection functions, setpoints and margins with respect to the CGS design. The staff found in its review of CENPD-400-P that all three algorithms described in NEDO-31960-A, "BWR Owners' Group Long-Term Stability Solutions Licensing Methodology," are included in the ABB-CE Option III design. Consequently, the implementation of this OPRM design in CGS is acceptable.

In the NRC's approval of NEDO-31960-A and Supplement 1, the staff required that a licensee in implementing Option III or IIIA include in TS the selected bypass region outside of which the detect and suppress action is deactivated. The licensee included this region in the CGS TS as Surveillance Requirement (SR) 3.3.1.3.5. The exclusion region methodology in NEDO-31960 defines a curved region on the power-to-flow operating map that intersects the natural circulation line on the map near the highest flow control line. To simplify implementation of the solution in the CGS design, the licensee proposed squared off boundaries at 30 percent rated

power and 60 percent rated core flow. The licensee proposed using the nominal drive flow that produces 60 percent core flow on the 100 percent rod line as the OPRM 60 percent core flow setpoint. This setpoint is consistent with the boundaries described in NEDO-32465, "BWR Owner's Reactor Stability Detect and Suppress Solutions Licensing Basis Methodology for Reload Applications," dated August 1996, which states, "The trip function will be enabled when both the power level is greater than 30% of rated power and the core flow is less than 60%." The staff, therefore, finds the setpoint proposed by the licensee to be acceptable.

In the NRC's approval of NEDO-31960-A and Supplement 1, the staff required that an automatic protective action be initiated if an instability detection algorithm is used to detect oscillations. The protective actions may be either a select rod insertion or a full scram. The licensee has chosen the full scram option, which is an acceptable approach for responding to detected oscillations.

Additionally, in the NRC's approval of NEDO-31960-A and Supplement 1, the staff required that the licensee use one of the LPRM groupings defined in NEDO-31960. The licensee selected the "Four LPRMs per OPRM cell - 4BL" configuration, which is currently in use at CGS. The staff finds this configuration acceptable.

The staff, therefore, finds that the OPRM design is applicable to CGS.

3.2 Power Instability Functions, Setpoints, and Margins

The licensee tested the OPRM, including the adequacy of the setpoint values and margins, during the first fuel cycle of OPRM operation. At the end of the testing period, the licensee developed setpoints and margins that will be incorporated into the limiting conditions for operation portion of the CGS TS. These setpoints were demonstrated to be consistent with the guidelines in NEDO-31960 and NEDO-31960, Supplement 1 using the methodology described in NEDO-32465-A. The staff, therefore, finds the setpoints and margins were developed in accordance with an acceptable methodology and, therefore, are acceptable.

3.3 Plant-Specific Revised Technical Specifications

The following section describes the licensee's proposed TS amendments and the NRC staff's evaluation of each proposed change.

3.3.1 Addition of TS 3.3.1.3, Oscillation Power Range Monitor (OPRM) Instrumentation, Limiting Condition for Operation (LCO) 3.3.1.3, Conditions, Required Actions, and Completion Times

TS 3.3.1.3 is a new specification that incorporates LCO 3.3.1.3 Conditions, Required Actions, Completion Times, and Surveillance Requirements associated with the OPRM instrumentation. The licensee added the period based algorithm (PBA) setpoint and confirmation count permissive values to the plant Core Operating Limits Report (COLR). The Conditions, Required Actions, Completion Times, and Surveillance Requirements of LCO 3.3.1.3 are consistent with the guidance provided in CENPD-400-A, except for the following:

- The proposed LCO 3.3.1.3 requirement for operability of the OPRM instrumentation is enhanced by adding the statement, "within the limits as specified in the Core Operating Limits Report (COLR)." This is consistent with LCOs in the licensee's current TS 3.2.1, "Average Planar Linear Heat Generation Rate (APLHGR)," 3.2.2, "Minimum Critical Power Ratio (MCPR)," and 3.2.3, "Linear Heat Generation Rate (LHGR)." Changes to the COLR are controlled pursuant to the provisions of TS 5.6.5, "Core Operating Limits Report (COLR)." The proposed addition of the PBA setpoint and confirmation count permissive values to the plant COLR is an acceptable approach for tracking cycle-specific set points and, therefore, this proposed change is acceptable.

- Required Action B.2 and its associated 120-day Completion Time are deleted. Condition B addresses situations in which the OPRM trip capability is not maintained. At the time the NRC staff reviewed CENPD-400-P, the staff estimated that the 120-day completion time would be necessary for correcting common-cause software errors in a disciplined manner to ensure new software faults would not be incorporated into the software and to ensure that existing software errors would be appropriately corrected. In subsequent in-plant testing of the OPRM, an actual case occurred involving a 10 CFR Part 21 notice of equipment malfunction that required several months to resolve. The staff reviewed its previous 120-day completion time position and determined that public health and safety would be protected by requiring the licensee to continue operating using the interim corrective actions (ICAs) currently in place at each plant. The staff concurs with the licensee's conclusion that operation under the ICAs beyond 120 days does not create a safety concern because plants have operated under this ICA for the last 10 years without risk to the public. Further, with the OPRM out-of-service, the problem leading into Condition B will be required to be corrected in an acceptable manner by the requirements of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action." This criterion requires that problems "are promptly identified and corrected." Additionally, licensee management attention will continue to be focused on restoring OPRM operability, since the plant will be operating in an "Active LCO" (Condition B). The staff, therefore, finds these justifications for removing the 120-day completion time to be acceptable.

- The licensee proposed changing the description of the enabled region in SR 3.3.1.3.5 from "$\geq$30% RTP and core flow <60% rated recirculation drive flow" to "$\geq$30% RTP and core flow <60% rated core flow." This setpoint is consistent with the boundaries discussed in NEDO-32465, Section 2.2, "Licensing Compliance," which states, "The trip function will be enabled when both the power level is greater than 30% of rated power and the core flow is less than 60%." The rated power setpoint is as conservative as the recommended rated power (30 percent) and slightly more conservative (60 percent rated core flow) than the recommended rated core flow setpoint (less than 60 percent rated core flow). The staff, therefore, finds this difference between the recommended setpoint and the proposed setpoint to be acceptable.

3.3.2 Technical Specification 3.4.1, "Recirculation Loops Operating"

The proposed changes to Section 3.4.1 of the TS remove monitoring specifications that will not be necessary upon activation of the OPRM instrumentation. Specifically, references to regions defined on the power-to-flow map, and actions and surveillance requirements associated with entry into these regions are deleted. The following sections address the changes proposed in this amendment request.

- Reference to the power-flow map have been removed in two places from the LCO statement for TS 3.4.1. This change is consistent with the guidance provided in ABB-CE CENPD-400-P-A because the use of a power-flow map to prevent unstable power oscillations has been replaced by the OPRM system. This proposed change, therefore, is acceptable.

- Condition A of TS 3.4.1 will be deleted. Action A is used to ensure that an oscillation can be properly detected and appropriate actions can be taken. These functions will be performed by the OPRM automatically. Therefore, this action is no longer needed. This proposed change, therefore, is acceptable.

- Condition B of TS 3.4.1 will be deleted. Action B is used to ensure that an oscillation can be properly detected and appropriate actions can be taken. These functions will be performed by the OPRM automatically. Therefore, this action is no longer needed. This proposed change, therefore, is acceptable.

- Condition C of TS 3.4.1 will be deleted. Action C is used to ensure that an oscillation can be properly detected and appropriate actions can be taken. These functions will be performed by the OPRM automatically. Therefore, this action is no longer needed. This proposed change, therefore, is acceptable.

- Condition D of TS 3.4.1 will be deleted. Action D is used to ensure that an oscillation can be properly detected and appropriate actions can be taken. These functions will be performed by the OPRM automatically. Therefore, this action is no longer needed. This proposed change, therefore, is acceptable.

- Condition E and associated Required Action E.1 of TS 3.4.1 will be renamed as Condition A and Required Action A.1, respectively. This change will reflect the deletion of TS 3.4.1 Conditions A through D. This proposed change, therefore, is acceptable.

- Condition F and associated Required Action F.1 of TS 3.4.1 will be renamed as Condition B and Required Action B.1, respectively. Additionally, references to Conditions B, C, D, and E will be deleted. This change will reflect the deletion of TS 3.4.1 Conditions A through D. This proposed change, therefore, is acceptable.

- Condition G and associated Required Action G.1 of TS 3.4.1 will be renamed as Condition C and Required Action C.1, respectively. This change will reflect the deletion of TS 3.4.1 Conditions A through D. Additionally, reference to the

power-to-flow map will be removed because the reference is no longer applicable. This proposed change, therefore, is acceptable.

- Surveillance Requirement 3.4.1.2 will be deleted. This surveillance requirement ensures that the plant is operated in the unrestricted region of the power-to-flow map. With implementation of the OPRM, this surveillance requirement is no longer needed and, therefore, is acceptable.

The remainder of TS 3.4.1 will remain unchanged, including requirements associated with recirculation loop flow mismatches and no recirculation loops in operation.

3.3.3 Proposed Changes to TS Bases Section B.3.3.1.3, Oscillation Power Range Monitor (OPRM)

The staff finds that the TS 3.3.1.3 Bases are consistent with CENPD-400-P-A and with the proposed TS changes.

3.3.4 Technical Specification 5.6.5, "Core Operating Limits Report (COLR)"

The licensee proposed revising the Administrative Control Specification 5.6.5 to require that the COLR include the applicable operating limits for the OPRM, and to specify the topical report that describes the analytical methods used to determine the setpoint value for the OPRM. Setpoints may be moved into the COLR to eliminate unnecessary license amendments when the setpoints may change as a result of cycle-specific core configurations. The OPRM setpoints may change with each fuel cycle as new fuel designs replace existing designs. This proposed change, therefore, is acceptable.

3.4 Plant-Specific Environmental Conditions

The licensee states that the OPRM components, including modules, digital isolator blocks, external relay boards, analog signal isolators, replacement power supplies and voltage regulators, and additional mounting hardware and separation barriers are accounted for in approved seismic qualification data file records. The licensee reviewed the effect of the additional OPRM equipment on the seismic qualification of the power range neutron monitoring system panel and approved the qualification in accordance with the requirements of the licensee's design control program. These actions for seismic qualification are acceptable to the staff.

In Table 1 below, the CGS plant-specific environmental conditions at the OPRM installation location for temperature, humidity, pressure, and radiation are compared to the OPRM environmental qualification values. As shown in Table 1, the generic OPRM qualification values envelop the CGS temperature and radiation environmental conditions and, therefore, are acceptable.

The generic OPRM qualification values for humidity do not envelop the CGS environmental conditions (low humidity limit). The licensee states that operation at humidity levels lower than 40 percent are justified because all OPRM circuit cards are coated with CONAP or an acrylic urethane, which isolates the electronic equipment from direct contact with a low-humidity

environment and thereby addresses the primary concern of damage from electrostatic discharges, which can occur in low humidity conditions. The staff finds that this justification for the lower humidity limit is consistent with guidance for protection against electrostatic discharge, and is, therefore, acceptable.

TABLE 1. COMPARISON OF CGS ENVIRONMENTAL CONDITIONS WITH OPRM ENVIRONMENTAL QUALIFICATION VALUES

	CGS	OPRM
Temperature	4.9°C to 40.4°C (40.8°F to 104.8°F)	4.4°C to 48.9°C (40°F to 120°F)
Humidity	10% to 60% RH	40% to 95% RH
Radiation	2 Gy TID	100 Gy (Co-60 γ) TID

CENPD-400-P-A states that addition of the new OPRM equipment and plant modifications for its installation should not produce unacceptable levels of noise emissions (electromagnetic interference) that could adversely affect adjacent equipment, or the licensee is to take action to prevent these emissions from reaching potentially sensitive equipment in the area of the OPRM installation. These measures apply for both noise susceptibility and emissions.

The licensee stated that new equipment qualified for use at CGS must be capable of withstanding the EMI levels for which it is designed. The CGS design evaluation verified that the plant environment would not be adversely affected by the addition of the OPRM equipment. External power inputs and outputs pass through filters that, together with the metal enclosure, provide an EMI boundary. These features, when combined with grounding and cable separation in accordance with CGS standards, and restrictions on welding and portable transceiver use in the main control room area, ensure that the OPRM is protected from adverse effects of EMI. The CGS main control room has been tested for EMI environmental parameters. The staff finds the licensee's evaluation of the EMI environment and the measures taken to shield surrounding equipment in order to reduce adverse EMI effects in the OPRM installation meet the staff guidance in Chapter 7 of the Standard Review Plan on EMI qualification, and therefore, are acceptable.

3.5 Administrative Controls

In the SE for CENPD-400-P-A, the staff found the OPRM design features that control access to setpoint adjustments, calibrations, and test points to be acceptable. The licensee states that administrative procedures at CGS provide controls for manually bypassing OPRM channels or protective functions when making setpoint adjustments and calibrations and will control access to the bypass controls. Additionally, the licensee states that the keys for the local key lock switch for accessing the OPRM module bypass function will be under the administrative control of the control room supervisor/shift manager and will be stored in a key locker. These activities are acceptable.

3.6 Confirmation of Human Factors Review

The licensee stated that the addition of the OPRM system was in compliance with existing CGS human factors design specifications for control room/panel hardware (e.g., annunciators and controls). The staff finds these actions acceptable.

3.7 Summary

Based on the above review and the licensee's justifications for TS changes, the staff concludes that the CGS OPRM implementation and associated proposed TS changes are consistent with the staff SE approving CENDP-400-P, appropriate guidance for design of digital instrumentation and control system modifications, GDC 10 and 12, and guidelines in Chapter 7 of the Standard Review Plan; and, therefore, are acceptable.

4.0 STATE CONSULTATION

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

5.0 ENVIRONMENTAL CONSIDERATION

The amendment changes 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 and changes surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (65 FR 77916). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). This amendment also involves changes in recordkeeping, reporting or administrative procedures or requirements. Accordingly, with respect to these items, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(10). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the 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 the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: M. Waterman

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