



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

May 2, 2018

Mr. Bradley J. Sawatzke  
Acting Chief Executive Officer  
Energy Northwest  
76 North Power Plant Loop  
P.O. Box 968 (Mail Drop 1023)  
Richland, WA 99352-0968

SUBJECT: COLUMBIA GENERATING STATION - ISSUANCE OF AMENDMENT RE:  
CHANGE TO TECHNICAL SPECIFICATION 3.5.1, "ECCS – OPERATING"  
(CAC NO. MG0015: EPID L-2017-LLA-0277)

Dear Mr. Sawatzke:

The U.S. Nuclear Regulatory Commission (the Commission) has issued the enclosed Amendment No. 249 to Renewed 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 July 25, 2017.

The amendment revises TS 3.5.1, "ECCS [Emergency Core Cooling System] – Operating," and deletes the Note associated with Surveillance Requirement (SR) 3.5.1.2 to reflect the residual heat removal (RHR) system design and ensure the RHR system's operation is consistent with the TS 3.5.1 limiting condition for operation requirements. Additionally, the current TSs reflects the TS NOTE associated with the approval of Amendment No. 246, dated February 16, 2018.

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

Sincerely,

A handwritten signature in black ink, appearing to read "L. John Klos".

L. John Klos, Project Manager  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosures:

1. Amendment No. 249 to NPF-21
2. Safety Evaluation

cc: Listserv



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

ENERGY NORTHWEST

DOCKET NO. 50-397

COLUMBIA GENERATING STATION

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 249  
License No. NPF-21

1. The Nuclear Regulatory Commission (the Commission) has found that:
  - A. The application for amendment by Energy Northwest (licensee), dated July 25 2017, 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 Renewed 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. 249 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed 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 within 60 days from the date of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION



Robert J. Pascarelli, Chief  
Plant Licensing Branch IV  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Attachment:  
Changes to the Renewed Facility  
Operating License No. NPF-21  
and Technical Specifications

Date of Issuance: May 2, 2018

ATTACHMENT TO LICENSE AMENDMENT NO. 249

COLUMBIA GENERATING STATION

RENEWED FACILITY OPERATING LICENSE NO. NPF-21

DOCKET NO. 50-397

Replace the following pages of the Renewed Facility Operating License No. NPF-21 and 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.

Renewed Facility Operating License

REMOVE

-4-

INSERT

-4-

Technical Specification

REMOVE

3.5.1-4

3.5.1-5

3.5.1-6

INSERT

3.5.1-4

3.5.1-5

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(2) Technical Specifications and Environmental Protection Plan

The Technical Specifications contained in Appendix A, as revised through Amendment No. 249 and the Environmental Protection Plan contained in Appendix B, are hereby incorporated in the renewed license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

- a. For Surveillance Requirements (SRs) not previously performed by existing SRs or other plant tests, the requirement will be considered met on the implementation date and the next required test will be at the interval specified in the Technical Specifications as revised in Amendment No. 149.

(3) Deleted.

(4) Deleted.

(5) Deleted.

(6) Deleted.

(7) Deleted.

(8) Deleted.

(9) Deleted.

(10) Deleted.

(11) Shield Wall Deferral (Section 12.3.2, SSER #4, License Amendment #7)

The licensee shall complete construction of the deferred shield walls and window as identified in Attachment 3, as amended by this license amendment.

(12) Deleted.

(13) Deleted.

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\*The parenthetical notation following the title of many license conditions denotes the section of the Safety Evaluation Report and/or its supplements wherein the license condition is discussed.

**SURVEILLANCE REQUIREMENTS**

SURVEILLANCE		FREQUENCY												
SR 3.5.1.1	Verify, for each ECCS injection/spray subsystem, locations susceptible to gas accumulation are sufficiently filled with water.	In accordance with the Surveillance Frequency Control Program												
SR 3.5.1.2	<p>-----NOTE-----                      Not required to be met for system vent flow paths opened under administrative controls.</p> <p>-----</p> <p>Verify each ECCS injection/spray subsystem manual, power operated, and automatic valve in the flow path, that is not locked, sealed, or otherwise secured in position, is in the correct position.</p>	In accordance with the Surveillance Frequency Control Program												
SR 3.5.1.3	Verify ADS accumulator backup compressed gas system average pressure in the required bottles is $\geq 2200$ psig.	In accordance with the Surveillance Frequency Control Program												
SR 3.5.1.4	<p>Verify each ECCS pump develops the specified flow rate with the specified differential pressure between reactor and suction source.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th><u>SYSTEM</u></th> <th><u>FLOW RATE</u></th> <th><u>DIFFERENTIAL PRESSURE BETWEEN REACTOR AND SUCTION SOURCE</u></th> </tr> </thead> <tbody> <tr> <td>LPCS</td> <td><math>\geq 6200</math> gpm</td> <td><math>\geq 128</math> psid</td> </tr> <tr> <td>LPCI</td> <td><math>\geq 7200</math> gpm</td> <td><math>\geq 26</math> psid</td> </tr> <tr> <td>HPCS</td> <td><math>\geq 6350</math> gpm</td> <td><math>\geq 200</math> psid</td> </tr> </tbody> </table>	<u>SYSTEM</u>	<u>FLOW RATE</u>	<u>DIFFERENTIAL PRESSURE BETWEEN REACTOR AND SUCTION SOURCE</u>	LPCS	$\geq 6200$ gpm	$\geq 128$ psid	LPCI	$\geq 7200$ gpm	$\geq 26$ psid	HPCS	$\geq 6350$ gpm	$\geq 200$ psid	In accordance with the INSERVICE TESTING PROGRAM
<u>SYSTEM</u>	<u>FLOW RATE</u>	<u>DIFFERENTIAL PRESSURE BETWEEN REACTOR AND SUCTION SOURCE</u>												
LPCS	$\geq 6200$ gpm	$\geq 128$ psid												
LPCI	$\geq 7200$ gpm	$\geq 26$ psid												
HPCS	$\geq 6350$ gpm	$\geq 200$ psid												

**SURVEILLANCE REQUIREMENTS**

SURVEILLANCE		FREQUENCY
SR 3.5.1.5	<p>-----NOTE----- Vessel injection/spray may be excluded. -----</p> <p>Verify each ECCS injection/spray subsystem actuates on an actual or simulated automatic initiation signal.</p>	In accordance with the Surveillance Frequency Control Program
SR 3.5.1.6	<p>-----NOTE----- Valve actuation may be excluded. -----</p> <p>Verify the ADS actuates on an actual or simulated automatic initiation signal.</p>	In accordance with the Surveillance Frequency Control Program
SR 3.5.1.7	<p>-----NOTE----- Not required to be performed until 12 hours after reactor steam pressure and flow are adequate to perform the test. -----</p> <p>Verify each required ADS valve opens when manually actuated.</p>	In accordance with the Surveillance Frequency Control Program
SR 3.5.1.8	<p>-----NOTE----- ECCS actuation instrumentation is excluded. -----</p> <p>Verify the ECCS RESPONSE TIME for each ECCS injection/spray subsystem is within limits.</p>	In accordance with the Surveillance Frequency Control Program



UNITED STATES  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 249 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-21

ENERGY NORTHWEST

COLUMBIA GENERATING STATION

DOCKET NO. 50-397

1.0 INTRODUCTION

By application dated July 25, 2017 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17206A543), Energy Northwest (the licensee) requested changes to the Technical Specifications (TSs) for the Columbia Generating Station (Columbia). The requested change revised TS 3.5.1, "ECCS [Emergency Core Cooling System] - Operating." This amendment would delete the Note associated with Surveillance Requirement (SR) 3.5.1.2 to reflect the residual heat removal (RHR) system design and ensure the RHR system operation is consistent with the TS 3.5.1 limiting condition for operation (LCO) requirements. However, the current TSs would continue to reflect prior amendments completed for Columbia; therefore, the TS NOTE associated with Amendment No. 246, dated February 16, 2018 (ADAMS Accession No. 18025A213) is retained in the current TS pages.

The implementation of this license amendment request (LAR) will result in no physical modification to the plant and would allow Columbia to remove a TS SR Note that is not conservative.

2.0 REGULATORY EVALUATION

The U.S. Nuclear Regulatory Commission (NRC) staff considered the following regulatory requirements during its review of the LAR:

The regulations in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36, "Technical specifications," details the content and information that must be included in TSs. Paragraph 50.36(c) of 10 CFR requires TSs to include the following categories: (1) safety limits, limiting safety system settings, and limiting control settings; (2) LCOs; (3) SRs; (4) design features; and (5) administrative controls. As described in 10 CFR 50.36(c)(2), LCOs are the lowest functional capability or performance levels of equipment required for safe operation of the facility. When an LCO is not met, the licensee shall shut down the reactor or follow any other actions permitted by TS.



Additionally as described in 10 CFR 50.36(c)(3), "Surveillance Requirements," are requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the limiting conditions for operation will be met.

Paragraph 50.46(a)(1)(i) of 10 CFR requires that each boiling or pressurized light-water nuclear power reactor fueled with uranium oxide pellets within cylindrical zircaloy or ZIRLO cladding be provided with an ECCS, designed with a calculated cooling performance in accordance with an acceptable evaluation model following a postulated loss-of-coolant accident (LOCA.)

Appendix A to 10 CFR Part 50, General Design Criterion (GDC) 34, "Residual heat removal," requires that a system to remove residual heat be provided with a safety function to transfer fission product decay heat and other residual heat from the reactor core at a rate such that specified acceptable fuel design limits and the design conditions of the reactor coolant pressure boundary are not exceeded.

Appendix A to 10 CFR Part 50, GDC 35, "Emergency core cooling," requires that a system to provide abundant emergency core cooling be provided with a safety function to transfer heat from the reactor core following any loss of reactor coolant at a rate such that (1) fuel and clad damage that could interfere with continued effective core cooling is prevented and (2) clad metal-water reaction is limited to negligible amounts.

Appendix A to 10 CFR Part 50, GDC 37, "Testing of emergency core cooling system," requires that the ECCS design provide the capability for periodic pressure and functional testing. This testing shall assure (1) structural and leak-tight integrity of components, (2) operability and performance of active components, (3) operability of the whole system under conditions as close to design as possible.

## 2.1 Proposed Technical Specification Change

The proposed change would delete the following Note associated with TS SR 3.5.1.2:

Low pressure coolant injection (LPCI) subsystems may be considered OPERABLE during alignment and operation for decay heat removal with reactor steam dome pressure less than 48 psig [pounds per square inch gauge] in MODE 3 [Hot Shutdown], if capable of being manually realigned and not otherwise inoperable.

However, the current TSs will continue to reflect prior amendments completed for Columbia; therefore, the TS NOTE associated with Amendment No. 246, dated February 16, 2018, is retained in the current TS pages.

## 2.2 System Design and Operation

The safety function of the ECCS is to provide core cooling following a LOCA. The ECCS consists of two high-pressure and two low-pressure systems. The high-pressure systems are the high-pressure core spray (HPCS) system and the automatic depressurization system (ADS). The low-pressure systems are the LPCI mode of RHR and the low-pressure core spray (LPCS) system.

The manner in which the ECCS operates to protect the core is a function of the rate at which reactor coolant inventory is lost from the break. The HPCS is designed to operate while the reactor coolant system is at high pressure. The LPCS and LPCI are designed for operation at low pressures. If the break in the nuclear system process barrier is of such a size that the loss-of-coolant exceeds the capability of the HPCS, reactor pressure decreases at a rate fast enough for the low-pressure ECCS to commence coolant injection into the reactor vessel in time to cool the core. Automatic depressurization is provided to reduce reactor pressure if a break has occurred and the high-pressure coolant injection system is inoperable.

The RHR system is a low-pressure system that can be used for cooling and/or inventory control. The primary purposes of the RHR system modes are 1) the LPCI mode to automatically initiate and maintain reactor water level following a LOCA and 2) the containment spray mode is employed following a LOCA to condense steam for primary containment pressure reduction and to reduce airborne activity in the primary containment following a LOCA. The RHR system consists of three independent closed loops, each containing a motor-driven pump powered by an engineered safety feature system.

The shutdown cooling (SDC) mode of the RHR system is operated during normal unit cooldown and shutdown to remove decay heat. The RHR system is placed in the SDC mode of operation when nuclear system temperature has decreased to where the steam supply pressure is not sufficient to maintain the turbine shaft gland seals nor the vacuum in the main condenser.

### 3.0 TECHNICAL EVALUATION

The RHR system is used in the SDC mode to remove residual heat from the nuclear system to maintain reactor water inventory below 200 degrees Fahrenheit so that refueling and nuclear system servicing can be performed.

Currently, Columbia TS 3.5.1.2 contains a Note that requires the RHR system be capable of manual realignment to the LPCI mode and not be otherwise inoperable. This Note was added as a part of the Columbia improved technical specification campaign intended to provide clarity that LPCI may be considered operable during alignment and operation in the SDC mode.

Industry Operating Experience (OE) has determined that manually realigning a RHR shutdown cooling subsystem from SDC to LPCI could result in water flashing to steam in the RHR piping, water hammer, pressure locking, or thermal binding of valves unless the RHR SDC piping is first allowed to cool. In the LAR, the licensee identified that this OE is applicable to Columbia in that the design of the RHR system could be susceptible to this same phenomenon and that removal of the TS 3.5.1.2 Note is conservative and would prevent water flashing and water hammer in the RHR piping. In addition, the licensee stated in the LAR that, there are barriers in place that currently direct the operation crews to declare the LPCI mode inoperable when susceptible.

The NRC Information Notice (IN) 2010-11, "Potential for Steam Voiding Causing Residual Heat Removal System Inoperability," dated June 16, 2010 (ADAMS Accession No. ML100640465), determined that during operation in MODE 3, the potential exists for the water in the RHR pump suction piping aligned for SDC to flash/boil when realigned to the LPCI mode. This phenomenon is due to the physical arrangement (i.e., common interface) of the SDC and LPCI suction lines for the RHR pumps. The realignment from SDC mode to LPCI mode, transfers the suction source for the RHR pump; thereby, exposing the high temperature SDC water to the low-pressure section of the LPCI suction piping from the suppression pool. The resultant flashing/boiling of the high-pressure, high-temperature water when introduced to the

low-pressure piping could result in voiding in the suction piping, RHR pump cavitation, water hammer, and associated RHR system damage. This threat is greatest during the early stages of MODE 3 operation when the SDC water temperature is highest.

The licensee stated in the LAR, that “[a] Boiling Water Reactor Owners’ Group (BWROG) Ad Hoc committee” recommended that the provision allowing LPCI to be considered operable when aligned for decay heat removal [(i.e., SDC)] be removed and, if necessary, plants should enter the Action for an inoperable LPCI subsystem when it is aligned to RHR SDC in MODE 3 with reactor steam dome pressure less than 48 psig. This Action has a 7-day completion time, which is much longer than the time typically required to transition to Mode 4 [(Cold Shutdown)] from MODE 3 at less than 48 psig steam dome pressure.”

The NRC staff review confirmed that the flashing/boiling in the RHR suction piping and the suppression pool suction valve thermal binding are the result of the RHR system design that supports several different operating modes using common equipment. This design feature and the associated temperature phenomenon prevents timely realignment of the RHR subsystem from SDC mode to LPCI mode.

Based on the above, the NRC staff finds that the current Note in LCO 3.5.1.2 could potentially allow operating conditions to exist that would adversely impact the function of the RHR system because high-pressure, high-temperature water, when introduced to the low-pressure piping, could result in voiding in the suction piping, RHR pump cavitation, water hammer and associated RHR system damage. Therefore, the NRC staff finds that removal of the Note associated with this particular amendment is acceptable, and the applicable regulatory requirements will continue to be met. Changes to the TS Bases should be made in accordance with the licensee’s TS Bases Control Program.

The proposed LAR was evaluated by the NRC staff and it was determined that the applicable regulatory requirements will continue to be met, and adequate defense-in-depth and sufficient safety margins will be maintained in accordance with 10 CFR 50.36 and 10 CFR Part 50, Appendix A, GDCs 34, 35 and 37. The staff determined that removal of the TS 3.5.1.2 Note would prevent water flashing, water hammer pressure locking, or thermal binding in the RHR piping and addresses NRC IN 2010-11. However, the current TS will continue to reflect prior amendments completed for Columbia; therefore, the TS NOTE associated with Amendment No. 246, dated February 16, 2018, is retained in the current TS pages.

The NRC staff, therefore, concludes that with the removal of the TS SR 3.5.1.2 Note, the necessary quality of the system and components will be maintained and that this will assure that limiting condition for operation with 3.5.1 will be met. Removal of the TS SR 3.5.1.2 Note and operation with one RHR subsystem inoperable for LPCI mode while being aligned or operated is acceptable and SR 3.5.1.2 will comply with 10 CFR 50.36(c)(3).

#### 4.0 STATE CONSULTATION

In accordance with the Commission’s regulations, the Washington State official was notified of the proposed issuance of the amendment on April 5, 2018. 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 published in the *Federal Register* November 7, 2017 (82 FR 51649). Accordingly, the 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 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) there is reasonable assurance that 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: Fred Forsaty, NRR

Date: May 2, 2018

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CHANGE TO TECHNICAL SPECIFICATION 3.5.1, "ECCS – OPERATING"  
(CAC NO. MG0015: EPID L-2017-LLA-0277) DATED MAY 2, 2018

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ADAMS Accession No.: ML 18100A199

\* by memo

\*\* by email

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