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September 21, 2004
GO2-04-161

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: **COLUMBIA GENERATING STATION**
DOCKET NO. 50-397
LICENSE AMENDMENT REQUEST
ADOPTION OF TS TASK FORCE (TSTF) TRAVELER - 447, REVISION 1, ELIMINATION OF HYDROGEN RECOMBINERS AND CHANGE TO HYDROGEN AND OXYGEN MONITORS

Dear Sir or Madam:

Pursuant to 10 CFR 50.90, "Application for Amendment of License or Construction Permit," Energy Northwest hereby requests an amendment to the Technical Specifications (TS) for Columbia Generating Station (Columbia) Operating License (NPF-21). The purpose of this license amendment request is to eliminate the requirements for hydrogen recombiners and hydrogen/oxygen monitors from the TS. The proposed amendment supports implementation of the revisions to 10 CFR 50.44, "Standards for Combustible Gas Control System in Light-Water-Cooled Power Reactors," that became effective on October 16, 2003.

The proposed amendment is consistent with Revision 1 of NRC-approved Industry/Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler, TSTF-447, "Elimination of Hydrogen Recombiners and Change to Hydrogen and Oxygen Monitors." The availability of TSTF-447 was announced in the Federal Register on September 25, 2003 (68FR55416) as part of the Consolidated Line Item Improvement Process (CLIIP).

Attachment 1 provides a description of the proposed change, the requested confirmation of applicability, and plant-specific verifications and commitments. Attachment 2 provides the existing TS pages marked-up to show the proposed change. Attachment 3 provides the proposed TS Bases changes for information only. Attachment 4 provides a listing of Regulatory Commitments made with this submittal.

A001

Energy Northwest requests approval of the proposed license amendment by April 30, 2005. Once approved, the amendment will be implemented within 120 days.

The proposed changes have been reviewed by the Columbia Generating Station Plant Operations Committee (POC) and Corporate Nuclear Safety Review Board (CNSRB) and recommended for submission to the NRC in accordance with the requirements of the Columbia Quality Assurance Program.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), Columbia is notifying the State of Washington of this application for change to the TS by transmitting a copy of this letter and its attachments to the designated State Official.

If you have any questions or require additional information regarding this matter, please contact DW Coleman, Regulatory Programs Manager at (509) 377-4342.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on September 21, 2004.

Respectfully,

DK Atkinson
Vice President, Technical Services
Mail Drop PE08

Attachments: 1. Description and Assessment
2. Proposed Technical Specification Changes (mark-up)
3. Changes to Technical Specification Bases Pages
4. List of Regulatory Commitments

cc: BS Mallett - NRC RIV
WA Macon - NRC NRR
NRC Sr. Resident Inspector - 988C
RR Cowley - WDOH
RN Sherman - BPA/1399
TC Poindexter - Winston & Strawn
JO Luce – EFSEC

ATTACHMENT 1

Columbia Generating Station

Description and Assessment

DESCRIPTION AND ASSESSMENT

1.0 DESCRIPTION

The proposed license amendment deletes Technical Specification (TS) 3.6.3.1 "Primary Containment Hydrogen Recombiners," reference to hydrogen recombiners in Section 5.5.2, and references to the Hydrogen/Oxygen monitors in Section 3.3.3.1, "Post Accident Monitoring (PAM) Instrumentation," surveillance requirements (SR) and TS Table 3.3.3.1-1 "Post Accident Monitoring Instrumentation." The proposed TS changes support implementation of the revisions to 10 CFR 50.44, "Standards for Combustible Gas Control System in Light-Water-Cooled Power Reactors," that became effective on October 16, 2003.

The proposed changes are consistent with Revision 1 of NRC-approved Industry/Technical Specification Task Force (TSTF) Standard Technical Specification Change Traveler, TSTF-447, "Elimination of Hydrogen Recombiners and Change to Hydrogen and Oxygen Monitors" (Reference 1). The availability of this TS improvement was announced in the Federal Register on September 25, 2003 (Reference 2) as part of the Consolidated Line Item Improvement Process (CLIIP).

2.0 DESCRIPTION OF PROPOSED AMENDMENT

Consistent with the NRC-approved Revision 1, of TSTF-447, the proposed TS changes include:

TS Section 3.3.3.1 SR	SR 3.3.3.1.2, Perform CHANNEL CALIBRATION for TS Function 8, Drywell H2 Analyzer (Table 3.3.3.1-1)	Deleted
TS Section 3.3.3.1 SR	SR 3.3.3.1.3, Perform CHANNEL CALIBRATION for TS Function 9, Drywell O2 Analyzer (Table 3.3.3.1-1)	Deleted
TS Table 3.3.3.1-1	Item 8, Drywell H_2 Analyzer; Item 9, Drywell O_2 Analyzer	Deleted
TS Section 3.6.3.1	Primary Containment Hydrogen Recombiners	Deleted
TS Section 5.5.2	Primary Coolant Sources Outside Containment, reference to "hydrogen recombiner"	Deleted

3.0 BACKGROUND

The background for this application is adequately addressed by the NRC Notice of Availability published on September 25, 2003 (Reference 2), TSTF-447 (Reference 1), the documentation associated with the 10 CFR 50.44 rulemaking, and other related documents.

4.0 REGULATORY REQUIREMENTS AND GUIDANCE

The applicable regulatory requirements and guidance associated with this application are adequately addressed by the NRC Notice of Availability published on September 25, 2003 (Reference 2), TSTF-447 (Reference 1), the documentation associated with the 10 CFR 50.44 rulemaking, and other related documents.

5.0 TECHNICAL ANALYSIS

Energy Northwest has reviewed the Safety Evaluation (SE) published on September 25, 2003 (Reference 2) as part of the CLIIP. This verification included a review of the NRC staff's SE, as well as information provided to support TSTF-447. Energy Northwest has concluded that the justifications presented in the TSTF proposal and the SE prepared by the NRC staff are applicable to Columbia Generating Station (Columbia) and justify approval of this amendment request.

6.0 REGULATORY ANALYSIS

A description of this proposed amendment and its relationship to regulatory requirements and guidance was provided in the NRC Notice of Availability published on September 25, 2003 (Reference 2), TSTF-447 (Reference 1), the documentation associated with the 10 CFR 50.44 rulemaking, and other related documents.

6.1 Verification and Commitments

As discussed in the model SE published in the Federal Register on September 25, 2003, (Reference 2) for this TS improvement, Energy Northwest is making the following verifications and regulatory commitments.

Energy Northwest is not proposing any variations or deviations from the requirements of the STS changes described in TSTF-447, Revision 1 (Reference 1) or the NRC staff's model safety evaluation dated September 25, 2003 (Reference 2). Upon approval of this amendment request, the hydrogen and oxygen monitoring capability will be maintained but no longer considered safety-related as defined in 10 CFR 50.2 in accordance with the NRC staff's safety evaluation.

1. Energy Northwest has verified that a hydrogen monitoring system capable of diagnosing beyond design basis accidents is installed at Columbia and is making a regulatory commitment to maintain that capability. The hydrogen monitors are included in the plant's Emergency and Operating procedures and the Maintenance Program. This regulatory commitment is currently implemented.

2. Columbia has an inerted containment. Energy Northwest has verified that an oxygen monitoring system capable of verifying the status of the inerted containment is installed at Columbia and is making a regulatory commitment to maintain that capability. The oxygen monitors are included in the plant's Emergency and Operating procedures and the Maintenance Program. This regulatory commitment is currently implemented.

7.0 NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

Energy Northwest has reviewed the proposed No Significant Hazards Consideration Determination (NSHCD) published in the Federal Register as part of the CLIIP. Energy Northwest has concluded that the proposed NSHCD presented in the Federal Register (Reference 2) is applicable to Columbia and is hereby incorporated by reference to satisfy the requirements of 10 CFR 50.91 (a).

8.0 ENVIRONMENTAL EVALUATION

Energy Northwest has reviewed the environmental evaluation included in the model safety evaluation dated September 25, 2003 (Reference 2) as part of the CLIIP. Energy Northwest has concluded that the staff's findings presented in that evaluation are applicable to Columbia and the evaluation is hereby incorporated by reference for this application.

9.0 PRECEDENT

This application is being made in accordance with the CLIIP. Energy Northwest is not proposing variations or deviations from the TS changes described in TSTF-447, Revision 1 or the NRC staff's model SE published on September 25, 2003 (Reference 2). This amendment request is consistent with the request submitted for Limerick Generating Station, Units 1 and 2 on April 13, 2004.

10.0 REFERENCES

1. Technical Specification Task Force (TSTF) Standard Technical Specifications Change Traveler TSTF-447, Revision 1, "Elimination of Hydrogen Recombiners and Change to Hydrogen and Oxygen Monitors."

2. Federal Register, Volume 68, Number 186, Notice of Availability of Model Application Concerning Technical Specification Improvement to Eliminate Hydrogen Recombiner Requirement, and Relax the Hydrogen and Oxygen Monitor Requirements for Light Water Reactors Using the Consolidated Line Item Improvement Process, published September 25, 2003, (68FR55416).

ATTACHMENT 2

Columbia Generating Station

Proposed Technical Specification Changes (mark-up)

Pages

iii
3.3.3.1-3
3.3.3.1-4
3.6.3.1-1
3.6.3.1-2
5.5-2

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(continued)

SURVEILLANCE REQUIREMENTS

----------NOTES----------

1. These SRs apply to each Function in Table 3.3.3.1-1.

2. 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 other required channel(s) in the associated Function is OPERABLE.

SURVEILLANCE		FREQUENCY
SR 3.3.3.1.1	Perform CHANNEL CHECK.	31 days
SR 3.3.3.1.2	Deleted ~~Perform CHANNEL CALIBRATION for Function 8.~~	~~92 days~~
SR 3.3.3.1.3	Perform CHANNEL CALIBRATION for Functions 1, 2, 4, 5, ~~8,~~ and 10.	18 months
SR 3.3.3.1.4	Perform CHANNEL CALIBRATION for Functions 3, 6, and 7.	24 months

Table 3.3.3.1-1 (page 1 of 1)
Post Accident Monitoring Instrumentation

	FUNCTION	REQUIRED CHANNELS	CONDITIONS REFERENCED FROM REQUIRED ACTION D.1
1.	Reactor Vessel Pressure	2	E
2.	Reactor Vessel Water Level		
	a. -150 inches to +60 inches	2	E
	b. -310 inches to -110 inches	2	E
3.	Suppression Pool Water Level		
	a. -25 inches to +25 inches	2	E
	b. 2 ft to 52 ft	2	E
4.	Suppression Chamber Pressure	2	E
5.	Drywell Pressure		
	a. -5 psig to +3 psig	2	E
	b. 0 psig to 25 psig	2	E
	c. 0 psig to 180 psig	2	E
6.	Primary Containment Area Radiation	2	F
7.	PCIV Position	2 per penetration flow path (a)(b)	E
8.	~~Drywell H_2 Analyzer~~ Deleted	~~2~~	~~E~~
9.	~~Drywell O_2 Analyzer~~ Deleted	~~2~~	~~E~~
10.	ECCS Pump Room Flood Level	5	E

(a) Not required for isolation valves whose associated penetration flow path is isolated by at least one closed and de-activated automatic valve, closed manual valve, blind flange, or check valve with flow through the valve secured.

(b) Only one position indication channel is required for penetration flow paths with only one installed control room indication channel.

3.6 CONTAINMENT SYSTEMS

3.6.3.1 ~~Primary Containment Hydrogen Recombiners~~ Deleted

LCO 3.6.3.1 Two primary containment hydrogen recombiners shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One primary containment hydrogen recombiner inoperable.	A.1 Restore primary containment hydrogen recombiner to OPERABLE status.	30 days
B. Two primary containment hydrogen recombiners inoperable.	B.1 Verify by administrative means that the hydrogen and oxygen control function is maintained. AND B.2 Restore one primary containment hydrogen recombiner to OPERABLE status.	1 hour AND Once per 12 hours thereafter 7 days
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3.	12 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.3.1.1	Perform a system functional test for each primary containment hydrogen recombiner.	24 months
SR 3.6.3.1.2	Visually examine each primary containment hydrogen recombiner enclosure and verify there is no evidence of abnormal conditions.	24 months
SR 3.6.3.1.3	Perform a resistance to ground test for each heater phase.	24 months

5.5 Programs and Manuals

5.5.1 Offsite Dose Calculation Manual (ODCM) (continued)

3. Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of, or concurrent with, the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (i.e., month and year) the change was implemented.

5.5.2 Primary Coolant Sources Outside Containment

This program provides controls to minimize leakage from those portions of systems outside containment that could contain highly radioactive fluids during a serious transient or accident to levels as low as practicable. The systems include the Low Pressure Core Spray, High Pressure Core Spray, Residual Heat Removal, Reactor Core Isolation Cooling, ~~hydrogen recombiner,~~ process sampling, (the program requirements shall apply to the Post Accident Sampling System until such time as administrative controls provide for continuous isolation of the associated penetration(s) or a modification eliminates the potential leakage path(s)), containment monitoring, and Standby Gas Treatment. The program shall include the following:

a. Preventive maintenance and periodic visual inspection requirements; and

b. Integrated leak test requirements for each system at 24 month intervals or less.

The provisions of SR 3.0.2 are applicable to the 24 month Frequency for performing integrated system leak test activities.

5.5.3 Deleted

(continued)

ATTACHMENT 3

Columbia Generating Station

Changes to Technical Specification Bases Pages

Pages
B iii
B 3.3.3.1-6
B 3.3.3.1-11
B 3.6.3.1-1
B 3.6.3.1-2
B 3.6.3.1-3
B 3.6.3.1-4
B 3.6.3.1-5
B 3.6.3.1-6
B 3.6.3.1-7
B 3.6.3.3-1
B 3.6.3.3-2
B 3.7.1-4

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(continued)

BASES

LCO

7. Primary Containment Isolation Valve (PCIV) Position (continued)

penetration is isolated, position indication for the PCIV(s) in the associated penetration flow path is not needed to determine status. Therefore, the position indication for valves in an isolated penetration is not required to be OPERABLE.

The indication for each PCIV is provided at the valve controls in the control room. Each indication consists of green and red indicator lights that illuminate to indicate whether the PCIV is fully open, fully closed, or in a mid-position. Therefore, the PAM specification deals specifically with this portion of the instrumentation channel.

8. 9. ~~Drywell Hydrogen and Oxygen Analyzer~~ Deleted

~~Drywell hydrogen and oxygen analyzers are Category I instruments provided to detect high hydrogen or oxygen concentration conditions that represent a potential for containment breach. This variable is also important in verifying the adequacy of mitigating actions.~~

~~High hydrogen and oxygen concentrations are measured by two independent analyzers and continuously record on two recorders in the control room. The analyzers are capable of operating from 12 psia to 45 psig. The available 0% to 30% range of these analyzers satisfies the criteria of RG 1.97. These recorders are the primary indication used by the operator during an accident. Therefore, the PAM specification deals specifically with this portion of the instrument channel.~~

10. ECCS Pump Room Flood Level

ECCS pump room flood level is a Type A and Category I variable provided to indicate ECCS pump room flooding. High water level in the ECCS pump rooms is indicated on five (one for each room) separate annunciators in the control room. Each annunciator alarms at a setpoint of 6 inches above the

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.3.3.1.2 and SR 3.3.3.1.3~~, and SR 3.3.3.1.4~~

A CHANNEL CALIBRATION is performed ~~every 92 days for Function 8,~~ every 18 months for Functions 1, 2, 4, 5, ~~9,~~ and 10, and every 24 months for Functions 3, 6, and 7. CHANNEL CALIBRATION is a complete check of the instrument loop including the sensor. The test verifies that the channel responds to the measured parameter with the necessary range and accuracy. For Function 6, the CHANNEL CALIBRATION shall consist of an electronic calibration of the channel, excluding the detector, for range decades $\geq$ 10 R/hour and a one point calibration check of the detector with an installed or portable gamma source for range decades < 10 R/hour. The 92 day, 18 month, and 24 month Frequencies are based on operating experience and engineering judgment.

REFERENCES

1. Regulatory Guide 1.97, "Instrumentation for Light-Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," Revision 2, December 1980.

2. NRC Safety Evaluation Report, "Washington Public Power Supply System, Nuclear Project No. 2, Conformance to Regulatory Guide 1.97," dated March 23, 1988.

3. 10 CFR 50.36(c)(2)(ii).

B 3.6 CONTAINMENT SYSTEMS

B 3.6.3.1 ~~Primary Containment Hydrogen Recombiners~~ Deleted

BASES

BACKGROUND

The primary containment hydrogen recombiners eliminate the potential breach of primary containment due to a hydrogen oxygen reaction and are part of combustible gas control required by 10 CFR 50.44, "Standards for Combustible Gas Control in Light-Water-Cooled Reactors" (Ref. 1), and GDC 41, "Containment Atmosphere Cleanup" (Ref. 2). The primary containment hydrogen recombiners are required to reduce the hydrogen and oxygen concentrations in the primary containment following a loss of coolant accident (LOCA). The primary containment hydrogen recombiners accomplish this by recombining hydrogen and oxygen to form water vapor. The vapor remains in the primary containment, thus eliminating any discharge to the environment. The primary containment hydrogen recombiners are manually initiated, since flammability limits would not be reached until several days after a Design Basis Accident (DBA).

Two 100% capacity independent primary containment hydrogen recombiners are provided. Each consists of controls located in the control room, a power supply, and a recombiner located in the reactor building. Recombination is accomplished by heating a hydrogen and oxygen air mixture to > 500°F and passing it through a platinum on alumina catalyst. The resulting water vapor and discharge gases are cooled prior to discharge from the unit. Air flows through the unit at $\geq$ 112 scfm (which includes 60% recycle flow), with a constant speed rotary lobe blower providing the motive force. A single recombiner is capable of maintaining the hydrogen and oxygen concentrations in primary containment below the 4.0 volume percent (v/o) and 5.0 v/o, respectively, flammability limit. Two recombiners are provided to meet the requirement for redundancy and independence. Each recombiner is powered from a separate Engineered Safety Feature bus and is provided with separate power panel and control panel.

(continued)

BASES

BACKGROUND (continued)

Emergency operating procedures direct that the hydrogen and oxygen concentrations in primary containment be monitored following a DBA and that the primary containment hydrogen recombiners be manually activated to prevent the primary containment atmosphere from reaching a bulk hydrogen and oxygen concentrations of 4.0 v/o and 5.0 v/o, respectively.

APPLICABLE SAFETY ANALYSES

The primary containment hydrogen recombiners provide the capability of controlling the bulk hydrogen and oxygen concentrations in primary containment to less than the lower flammable concentrations of 4.0 v/o and 5.0 v/o, respectively, following a DBA. This control would prevent a primary containment wide hydrogen/oxygen burn, thus ensuring that pressure and temperature conditions assumed in the analysis are not exceeded. The limiting DBA relative to hydrogen and oxygen generation is a LOCA.

Oxygen may accumulate in the primary containment following a LOCA as a result of radiolytic decomposition of water in the Reactor Coolant System.

Hydrogen may accumulate in primary containment following a LOCA as a result of:

a. A metal steam reaction between the zirconium fuel rod cladding and the reactor coolant;

b. Radiolytic decomposition of water in the Reactor Coolant System; or

c. A reaction between the reactor coolant and the zinc rich paints used in the primary containment. However, since Columbia Generating Station is an oxygen control plant, this form of hydrogen generation is not assumed (minimizing hydrogen production is conservative in calculating peak oxygen concentration).

To evaluate the potential for hydrogen and oxygen accumulation in primary containment following a LOCA, the hydrogen and oxygen generation as a function of time following the initiation of the accident is calculated. Assumptions recommended by Reference 3 are used to maximize the amount of oxygen calculated.

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

The calculation confirms that when the mitigating systems are actuated in accordance with plant procedures, the peak hydrogen and oxygen concentrations in the primary containment remains < 4.0 v/o and < 5.0 v/o, respectively (Ref. 4).

The primary containment hydrogen recombiners satisfy Criterion 3 of Reference 5.

LCO

Two primary containment hydrogen recombiners must be OPERABLE. This ensures operation of at least one primary containment hydrogen recombiner in the event of a worst case single active failure.

Operation with at least one primary containment hydrogen recombiner subsystem ensures that the post LOCA hydrogen and oxygen concentrations can be prevented from exceeding their flammability limits.

APPLICABILITY

In MODES 1 and 2, the two primary containment hydrogen recombiners are required to control the hydrogen and oxygen concentrations within primary containment below their flammability limits of 4.0 v/o and 5.0 v/o, respectively following a LOCA, assuming a worst case single failure.

In MODE 3, both the hydrogen and oxygen production rates and the total hydrogen and oxygen production after a LOCA would be less than that calculated for the DBA LOCA. Also, because of the limited time in this MODE, the probability of an accident requiring the primary containment hydrogen recombiner is low. Therefore, the primary containment hydrogen recombiners are not required in MODE 3.

In MODES 4 and 5, the probability and consequences of a LOCA are low due to the pressure and temperature limitations in these MODES. Therefore, the primary containment hydrogen recombiners are not required in these MODES.

(continued)

BASES (continued)

ACTIONS

A.1

With one primary containment hydrogen recombiner inoperable, the inoperable primary containment hydrogen recombiner must be restored to OPERABLE status within 30 days. In this condition, the remaining OPERABLE primary containment recombiner is adequate to perform the hydrogen and oxygen control function. However, the overall reliability is reduced because a single failure in the OPERABLE recombiner could result in reduced hydrogen and oxygen control capability. The 30 day Completion Time is based on the low probability of the occurrence of a LOCA that would generate hydrogen and oxygen in amounts capable of exceeding the flammability limits, the amount of time available after the event for operator action to prevent hydrogen and oxygen accumulation exceeding this limit, and the low probability of failure of the OPERABLE primary containment hydrogen recombiner.

B.1 and B.2

With two primary containment hydrogen recombiners inoperable, the ability to perform the hydrogen and oxygen control function via an alternate capability must be verified by administrative means within 1 hour. The alternate hydrogen and oxygen control capability is provided by the Containment Purge System. The 1 hour Completion Time allows a reasonable period of time to verify that a loss of hydrogen and oxygen control function does not exist. In addition, the alternate hydrogen and oxygen control capability must be verified once per 12 hours thereafter to ensure its continued availability. Both the initial

(continued)

BASES

ACTIONS

B.1 and B.2 (continued)

verification and all subsequent verifications may be performed as an administrative check by examining logs or other information to determine the availability of the alternate hydrogen and oxygen control system. It does not mean to perform the Surveillances needed to demonstrate OPERABILITY of the alternate hydrogen and oxygen control system. If the ability to perform the hydrogen and oxygen control function is maintained, continued operation is permitted with two hydrogen recombiners inoperable for up to 7 days. Seven days is a reasonable time to allow two hydrogen recombiners to be inoperable because the hydrogen and oxygen control function is maintained and because of the low probability of the occurrence of a LOCA that would generate hydrogen and oxygen in the amounts capable of exceeding the flammability limits.

C.1

If any Required Action and associated Completion Time cannot be met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours. The allowed Completion Time of 12 hours is reasonable, based on operating experience, to reach MODE 3 from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.6.3.1.1

Performance of a system functional test for each primary containment hydrogen recombiner ensures that the recombiners are OPERABLE and can attain and sustain the temperature necessary for hydrogen recombination. In particular, this SR requires verification that the minimum heater outlet temperature increases to $\geq$ 500°F in $\leq$ 90 minutes and that it is maintained $\geq$ 500°F and cycles about its setpoint for $\geq$ 45 minutes to check the capability of the recombiner to properly function (and that significant heater elements are not burned out). The SR also verifies that the catalyst efficiency is confirmed. This is performed by introducing $\geq$ 1 v/o hydrogen into the catalyst bed preheated to a

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.3.1.1 (continued)

temperature ≤ 300°F, and verifying: a) the effluent stream has a hydrogen concentration ≤ 25 ppm by volume; and b) ≥ 75% of the temperature increase occurs above the fourth temperature measuring device in the catalyst bed.

Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.6.3.1.2

This SR ensures that there are no physical problems (i.e., loose wiring or structural connection, or deposits of foreign materials) that could affect primary containment hydrogen recombiner operation. Since the recombiners are mechanically passive, they are not subject to mechanical failure. The only credible failures involve loss of power, blockage of the internal flow path, missile impact, etc. A visual inspection is sufficient to determine abnormal conditions that could cause such failures.

Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

SR 3.6.3.1.3

This SR requires performance of a resistance to ground test of each heater phase to ensure that there are no detectable grounds in any heater phase. This is accomplished by verifying that the resistance to ground for any heater phase is ≥ 10,000 ohms within 30 minutes following completion of a system functional test or heatup of the system to normal operating temperature.

Operating experience has shown that these components usually pass the Surveillance when performed at the 24 month Frequency. Therefore, the Frequency was concluded to be acceptable from a reliability standpoint.

(continued)

BASES (continued)

REFERENCES

1. 10 CFR 50.44.
2. 10 CFR 50, Appendix A, GDC 41.
3. Regulatory Guide 1.7, Revision 1, September 1976.
4. FSAR, Section 6.2.5.
5. 10 CFR 50.36(c)(2)(ii).

B 3.6 CONTAINMENT SYSTEMS

B 3.6.3.3 Primary Containment Oxygen Concentration

BASES

BACKGROUND

The primary containment is designed to withstand events that generate hydrogen either due to the zirconium metal water reaction in the core or due to radiolysis. The primary method to control hydrogen is to inert the primary containment. With the primary containment inert, that is, oxygen concentration < 3.5 volume percent (v/o), a combustible mixture cannot be present in the primary containment for any hydrogen concentration. ~~The capability to inert the primary containment and maintain oxygen < 3.5 v/o works together with the Hydrogen Recombiner System (LCO 3.6.3.1, "Primary Containment Hydrogen Recombiners") to provide redundant and diverse methods to mitigate events that produce hydrogen and oxygen. For example,~~ An event that rapidly generates hydrogen from zirconium metal water reaction will result in excessive hydrogen in primary containment, but oxygen concentration will remain < 5.0 v/o and no combustion can occur. ~~Long term generation of both hydrogen and oxygen from radiolytic decomposition of water may eventually result in a combustible mixture in primary containment, except that the hydrogen recombiners remove hydrogen and oxygen gases faster than they can be produced from radiolysis and again no combustion can occur.~~ This LCO ensures that oxygen concentration does not exceed 3.5 v/o during operation in the applicable conditions.

APPLICABLE SAFETY ANALYSES

The Reference 1 calculations assume that the primary containment is inerted when a Design Basis Accident loss of coolant accident occurs. Thus, the hydrogen assumed to be released to the primary containment as a result of metal water reaction in the reactor core will not produce combustible gas mixtures in the primary containment. ~~Oxygen, which is subsequently generated by radiolytic decomposition of water, is recombined by the hydrogen recombiners (LCO 3.6.3.1) more rapidly than it is produced.~~

Primary containment oxygen concentration satisfies Criterion 2 of Reference 2.

(continued)

BASES (continued)

LCO

The primary containment oxygen concentration is maintained < 3.5 v/o to ensure that an event that produces any amount of hydrogen and oxygen does not result in a combustible mixture inside primary containment.

APPLICABILITY

The primary containment oxygen concentration must be within the specified limit when primary containment is inerted, except as allowed by the relaxations during startup and shutdown addressed below. The primary containment must be inert in MODE 1, since this is the condition with the highest probability of an event that could produce hydrogen and oxygen.

Inerting the primary containment is an operational problem because it prevents containment access without an appropriate breathing apparatus. Therefore, the primary containment is inerted as late as possible in the plant startup and de-inerted as soon as possible in the plant shutdown. As long as reactor power is < 15% RTP, the potential for an event that generates significant hydrogen and oxygen is low and the primary containment need not be inert. Furthermore, the probability of an event that generates hydrogen occurring within the first 24 hours of a startup, or within the last 24 hours before a shutdown, is low enough that these "windows," when the primary containment is not inerted, are also justified. The 24 hour time period is a reasonable amount of time to allow plant personnel to perform inerting or de-inerting.

ACTIONS

A.1

If oxygen concentration is ≥ 3.5 v/o at any time while operating in MODE 1, with the exception of the relaxations allowed during startup and shutdown, oxygen concentration must be restored to < 3.5 v/o within 24 hours. The 24 hour Completion Time is allowed when oxygen concentration is ≥ 3.5 v/o because of ~~the availability of other hydrogen and oxygen mitigating systems (e.g., hydrogen recombiners) and~~ the low probability and long duration of an event that would generate significant amounts of hydrogen and oxygen occurring during this period.

(continued)

BASES

LCO (continued)

The isolation of the SW System to components or systems may render those components or systems inoperable, but does not affect the OPERABILITY of the SW System if those component's or system's applicable LCO Conditions and Required Actions are entered. For example, if SW cooling to ~~a primary containment hydrogen recombiner~~ the LPCS pump motor was isolated, entry into LCO ~~3.6.3.1~~ Conditions and Required Actions, would be sufficient and SW OPERABILITY would not be affected. as applicable, 3.5.1 or 3.5.2

For addressing appropriate LCO conditions using LCO 3.0.6, entry into SW LCO Conditions and Required Actions would still require supported system(s) to be declared inoperable, however, it is not necessary to enter the supported systems LCO Conditions and Required Actions. For example, if DC Sources—Operating (LCO 3.8.4) is not met solely due to room cooler degradation and entry into LCO 3.7.1 Conditions and Required Actions is made, the electrical equipment in the affected equipment room(s) are required to be declared inoperable, however, the Conditions and Required Actions associated with this supported system (LCO 3.8.4) are not required to be entered.

OPERABILITY of the High Pressure Core Spray (HPCS) Service Water (SW) System is addressed by LCO 3.7.2.

APPLICABILITY

In MODES 1, 2, and 3, the SW System and UHS are required to be OPERABLE to support OPERABILITY of equipment serviced by the SW System and UHS that is required to be OPERABLE in these MODES.

In MODES 4 and 5, the OPERABILITY requirements of the SW System and UHS are determined by the systems they support, and therefore, the requirements are not the same for all facets of operation in MODES 4 and 5. Thus, the LCOs of the systems supported by the SW System and UHS will govern SW System and UHS OPERABILITY requirements in MODES 4 and 5.

(continued)

ATTACHMENT 4

Columbia Generating Station

List of Regulatory Commitments

LICENSE AMENDMENT REQUEST, ADOPTION OF TS TASK FORCE (TSTF) TRAVELER - 447, REVISION 1, ELIMINATION OF HYDROGEN RECOMBINERS AND CHANGE TO HYDROGEN AND OXYGEN MONITORS
Attachment 4

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Energy Northwest in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

REGULATORY COMMITMENT	DUE DATE
Energy Northwest will maintain the capability of monitoring containment Hydrogen for beyond design basis accidents	Currently implemented in the plant emergency and operating procedures and the maintenance program
Energy Northwest will maintain the capability of monitoring containment Oxygen to verify the status of the inerted containment	Currently implemented in the plant emergency and operating procedures and the maintenance program