May 15, 2007

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

SUBJECT: COLUMBIA GENERATING STATION - REQUEST FOR RELIEF NOS. RP01, RP03, RP06, RV01 AND RV02 FOR THE THIRD 10-YEAR INSERVICE TESTING PROGRAM INTERVAL (TAC NOS. MD3536, MD3540, MD3548, MD3549, AND MD3553)

Dear Mr. Parrish:

By letter dated October 10, 2005, as supplemented by letters dated February 22 and March 22, 2007, Energy Northwest (the licensee) submitted requests for relief, RP01 through RP08 and RV01 through RV05, from certain requirements of the American Society of Mechanical Engineers (ASME) "Code for Operation and Maintenance of Nuclear Power Plants" (OM Code), for the third 10-year inservice testing (IST) program interval at Columbia Generating Station (CGS). The Nuclear Regulatory Commission (NRC)-approved ASME OM Code for the third 10-year IST program interval is the 2001 Edition with the 2002 and 2003 Addenda. The third 10-year IST program interval at CGS began on December 13, 2005, and ends on December 12, 2014.

Based on the information provided in the relief request, the NRC staff concluded that the following requests for relief were acceptable: RP01, RP03, RP06, RV01 and RV02. The remaining relief requests were addressed by separate NRC correspondence.

For relief requests RP03, RV01, and RV02, relief is granted based on the determination that it is impractical for the licensee to comply with the specified requirement. Granting relief pursuant to paragraph 50.55a(f)(6)(i) of Title 10 of the *Code of Federal Regulations* (10 CFR) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the components.

For relief request RP01, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the determination that the proposed alternative provides an acceptable level of quality and safety.

For relief request RP06, the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that complying with the specified requirement would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the components.

The above relief requests are applicable to the third 10-year IST program interval for CGS.

The detailed results of the NRC staff's review are provided in the enclosed safety evaluation. If you have any questions concerning this matter, please call Mr. F. Lyon of my staff at (301) 415-2296.

Sincerely,

/RA/

Thomas G. Hiltz, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-397

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

THIRD 10-YEAR INSERVICE TESTING PROGRAM INTERVAL

REQUEST FOR RELIEF NOS. NOS. RP01, RP03, RP06, RV01 AND RV02

ENERGY NORTHWEST

COLUMBIA GENERATING STATION

DOCKET NO. 50-397

1.0 INTRODUCTION

By letter dated October 10, 2005, as supplemented by letters dated February 22 and March 22, 2007, Energy Northwest (the licensee) submitted relief requests RP01, RP02, RP03, RP04, RP05, RP06, RP07, RP08, RV01, RV02, RV03, RV04, and RV05 for the third 10-year inservice testing (IST) program interval at the Columbia Generating Station (CGS). The licensee requested relief from certain IST requirements of the 2001 Edition through 2003 Addenda of the American Society of Mechanical Engineers (ASME) "Code for Operation and Maintenance of Nuclear Power Plants" (OM Code), which is the ASME OM Code of record for the third IST interval at CGS. The Nuclear Regulatory Commission (NRC) evaluation of relief requests RP01, RP03, RP06, RV01 and RV02 is contained herein. The CGS third 10-year IST program interval commenced on December 13, 2005, and ends on December 12, 2014.

2.0 REGULATORY EVALUATION

Section 50.55a of Title 10 of the *Code of Federal Regulations* (10 CFR) requires that IST of certain ASME Code Class 1, 2, and 3 pumps and valves be performed at 120-month (10-year) IST program intervals in accordance with the specified ASME Code incorporated by reference in the regulations, except where alternatives have been authorized or relief has been requested by the licensee and granted by the Commission pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a. In accordance with 10 CFR 50.55a(f)(4)(ii), licensees are required to comply with the requirements of the latest edition and addenda of the ASME Code incorporated by reference in the regulations 12 months prior to the start of each 120-month IST program interval. In accordance with 10 CFR 50.55a(f)(4)(iv), IST of pumps and valves may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in 10 CFR 50.55a(b), subject to NRC approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions and addenda are met. In proposing alternatives from IST requirements, the licensee must demonstrate in accordance with 10 CFR 50.55a(a)(3) "that: (i) The proposed alternatives would provide an acceptable level of quality and safety; or (ii) Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety." In requesting relief from IST requirements, the licensee must demonstrate in accordance with 10 CFR 50.55a(f)(5)(iii) “that conformance with certain code requirements is impractical for its facility....” Section 50.55a authorizes the Commission to approve alternatives and to grant relief from ASME Code requirements upon making necessary findings. NRC guidance contained in Generic Letter (GL) 89-04, “Guidance on Developing Acceptable Inservice Testing Programs,” provides alternatives to ASME Code requirements which are acceptable. Further guidance is given in GL 89-04, Supplement 1, and NUREG-1482, Revision 1, “Guidance for Inservice Testing at Nuclear Power Plants.”

The CGS third 10-year IST program interval commenced on December 13, 2005. The program was developed in accordance with the 2001 Edition through the 2003 Addenda of the ASME OM Code. By letter dated October 10, 2005, Energy Northwest requested relief from certain requirements of the OM Code for the CGS third 10-year IST program interval.

The NRC staff previously approved similar relief requests to RP01, RP03, RP06, RV01 and RV02 for CGS for the second 10-year IST interval (NRC letter to licensee dated November 27, 1995, as supplemented by letter dated March 25, 1999).

The NRC’s findings with respect to granting or denying the IST program relief requests are given below.

3.0 TECHNICAL EVALUATION

3.1 Pump Relief Request RP01

The licensee requested relief from the ASME OM Code requirements of Table ISTB-3000-1 and Subsections ISTB-5210 and ISTB-5220 for measuring pump differential pressure during the Group A, Group B, preservice and comprehensive tests for Standby Service Water pumps SW-P-1A and SW-P-1B, and Standby Service Water, High Pressure Core Spray (HPCS) pump HPCS-P-2. These are ASME Section III Class 3 pumps and are currently classified as Group A pumps. These pumps are vertical line shaft centrifugal pumps that are immersed in their water source. Since they have no suction line that can be instrumented, there are no inlet pressure gauges installed on these pumps, making it impractical to directly measure inlet pressure for use in determining differential pressure for the pumps. The licensee requested relief pursuant to 10 CFR 50.55a(a)(3)(i), as the proposed alternative would provide an acceptable level of quality and safety.

3.1.1 Applicable Code Requirement (as stated by licensee)

Measure pump differential pressure, ΔP. Vertical line shaft centrifugal pumps preservice and inservice testing (ISTB-5210, ISTB-5220, Table ISTB-3000-1). Relief is required for Group A, Group B and comprehensive and preservice tests.

3.1.2 Proposed Alternative and Basis for Use (as stated by licensee)

Pump discharge pressure will be recorded during the testing of these pumps. Code Acceptance Criteria will be based on discharge pressure instead of differential pressure as specified in the Code Table ISTB-5200-1. The effect of setting the Code Acceptance

Criteria on discharge pressure instead of differential pressure as specified in the Code will have no negative impact on detecting pump degradation.

1. SW-P-1A, SW-P-1B, and HPCS-P-2 are vertical line shaft centrifugal pumps which are immersed in their water source. They have no suction line which can be instrumented.

2. Technical Specification SR [Surveillance Requirement] 3.7.1.1 states minimum allowable spray pond level to assure adequate NPSH [net positive suction head] and ultimate heat sink capability.

3. The difference between allowable minimum and overflow pond level is only 21 inches of water or 0.8 psi [pounds per square inch]. This small difference will not be significant to the [licensee's inservice] Test Program and suction pressure will be considered constant. Administratively, the pond level is controlled within a nine (9) inch band.

4. Acceptable flow rate and discharge pressure [per the licensee's IST Program] will suffice as proof of adequate suction pressure.

5. These pumps operate with a suction lift. Maximum elevation of spray pond level is 434 feet 6 inches and minimum elevation of discharge piping for these pumps is 442 feet 5/8 inches. Thus discharge pressure for these pumps will always be lower than the calculated differential pressure for the entire range of suction pressures. Thus acceptance criteria based on discharge pressure is conservative. This is further illustrated below:

   Differential pressure is defined as discharge pressure [P_d] minus suction pressure [P_s]. In the case of a pump with suction lift the suction pressure is negative, thus:

   $\triangle P = P_d - (-P_s)$
   $\triangle P = P_d + P_s$

   This concept is more easily understood when head is used instead of pressure.

   The ASME Code uses the term differential pressure instead of total head since differential pressure is required to be measured. However, most literature on pumps deals with hydraulic parameters in terms of head and flow. In case 1:

   Total Head = Discharge Head - Suction Head

   But in Case 2 (Service Water Pumps)

   Total Head = Discharge Head + Suction Lift

   When one converts head to pressure, the equivalent formula for differential pressure would be:

$$\triangle P = P_d + 0.431(EL_{pump} - EL_{water\ level})$$

Since pump discharge pipe elevation [EL] for these pumps is always more than spray pond water level, discharge pressure is always less than the calculated differential pressure.

Quality/Safety Impact

The effect of setting the Code Acceptance Criteria on discharge pressure instead of differential pressure as specified in the Code provides a more conservative test methodology.

3.1.3 Licensee's Proposed Alternative Testing

The licensee proposes to measure and evaluate the discharge pressure during the Group A, Group B, preservice and comprehensive testing of these pumps, in lieu of differential pressure.

3.1.4 Evaluation

The licensee has requested relief from the ASME OM Code requirements of Table ISTB-3000-1 and Subsections ISTB-5210 and ISTB-5220 for measuring pump differential pressure during the Group A, Group B, preservice and comprehensive tests for Standby Service Water pumps SW-P-1A and SW-P-1B, and Standby Service Water, HPCS pump HPCS-P-2. The licensee proposes instead to measure and evaluate the pumps' operational readiness based on the discharge pressure of these pumps, because inlet suction pressure instrumentation is not available.

In NUREG-1482, Revision 1, Paragraph 5.5.3, the NRC staff provided guidance for the use of fluid level for calculating suction pressure and determining differential pressure when direct measurement of inlet pressure or differential pressure is not available. Subsection ISTB-3520(b) of the Code allows the licensee to determine differential pressure by determining the difference between the pressure at a point in the inlet pipe and the pressure at a point in the discharge pipe. The licensee may implement this calculational method without obtaining relief from the NRC. However, the licensee has rather proposed that determining the pumps' operational readiness based on discharge pressure provides an equivalent level of quality and safety.

The licensee has stated that the difference between minimum and overflow pond level is only 21 inches of water, or 0.8 psi (pounds per square inch), which is further administratively controlled to a 9-inch band, which equates to 0.33 psi. This small variation makes the suction pressure essentially constant. Based on the information provided by the licensee in relief request RP03, the standby service water pumps' discharge pressure could range from 185 psig (pounds per square inch gauge) to 240 psig, making the 0.33 psig subtraction less than 0.2 percent of discharge pressure. In addition, the licensee states that measuring discharge pressure is more conservative for these pumps because the measurement is uncorrected for elevation. Since it is assumed for the calculation that the spray pond level is at a lower elevation than the discharge piping, the discharge pressure is less than the pump differential pressure simply because of the difference in the static head. Since the discharge pressure for each pump is less than the calculated differential pressure considering the entire range of suction pressures, the NRC staff finds that the testing proposed by the licensee provides an acceptable level of safety and quality. Therefore, the staff finds that the licensee's proposed alternative to the requirements of Table ISTB-3000-1 and Subsections ISTB-5210 and ISTB-5220 of the ASME OM Code is acceptable.

3.1.5 Conclusion

Based on the information provided by the licensee, the licensee has demonstrated that the proposed alternative would provide an acceptable level of quality and safety. Therefore, the NRC staff concludes that, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's relief request RP01 is authorized for the third 10-year interval.

3.2 <u>Pump Relief Request RP03</u>

The licensee requested relief from the Code requirements of Subsections ISTB-5221(b) and ISTB-5223(b) for measuring pump differential pressure during the Group A, Group B, preservice and comprehensive tests for Standby Service Water pumps SW-P-1A and SW-P-1B, and Standby Service Water, HPCS pump HPCS-P-2. These are ASME Section III Class 3 vertical line shaft centrifugal pumps and are currently classified as Group A pumps. The licensee requested relief pursuant to 10 CFR 50.55a(f)(5)(iii) because the establishment of specific reference values is impractical for these pumps. The licensee proposed to use pump curves developed and implemented following the guidance of Code Case OMN-9 instead of reference values. The licensee requested relief because Code Case OMN-9 applies only to ASME OM Code-1990 through ASME OMb Code-1992, and the Code Case expired on November 25, 2006.

3.2.1 Applicable Code Requirement (as stated by licensee)

Subsection ISTB-5221(b) and ISTB-5223(b). The resistance of the system shall be varied until the flow rate equals the reference point. The differential pressure shall then be determined and compared to the reference value. Alternatively, the flow rate shall be varied until the differential pressure equals the reference point and the flow rate determined and compared to the reference flow rate value.

3.2.2 Burden Caused by Compliance (as stated by licensee)

1. Service Water systems are designed such that the total pump flow cannot be adjusted to one finite value for the purpose of testing without adversely affecting the system flow balance and Technical Specification operability requirements. Thus, these pumps must be tested in a manner that the Service Water loop remains properly flow balanced during and after the testing and each supplied load remains fully operable to maintain the required level of Plant safety.

2. The Service Water system loops are not designed with a full flow test line with a single throttle valve. Thus, the flow cannot be throttled to a fixed reference value. Total pump flow rate can only be measured using the total system flow indication installed on the common return header. There are no valves in any of

the loops, either on the common supply or return lines, available for the purpose of throttling the total system flow. Only the flows of the served components can be individually throttled. Each main loop of service water supplies 17-18 safety related loads, all piped in parallel with each other. The HPCS-P-2 pump loop supplies four loads, each in parallel. Each pump is independent from the others (i.e., no loads are common between the pumps). Each load is throttled to a FSAR [Final Safety Analysis Report]-required flow range which must be satisfied for the loads to be operable. All loads are aligned in parallel, and all receive service water flow when the associated service water pump is running, regardless of whether the served component itself is in service. During power operation, all loops of service water are required to be operable per Technical Specifications. A loop of service water cannot be taken out of service for testing without entering an Action Statement for a Limiting Condition of Operation (LCO). Individual component flows outside of the FSAR-mandated flow ranges also induce their own Technical Specification action statements that in turn can induce Plant shutdown in as little as [2] hours, depending on the load in question.

3. Each loop of Service Water is flow balanced before exiting each refueling outage to ensure that all loads are adequately supplied. A flow range is specified for each load. Once properly flow balanced, very little flow adjustment can be made for any one particular load without adversely impacting the operability of the remaining loads (increasing flow for one load reduces flow for all the others). Each time the system is flow balanced, proper individual component flows are produced, but this in turn does not necessarily result in one specific value for total flow. Because each load has an acceptable flow range, overall system full flow (the sum of the individual loads) also has a range. Total system flow can conceivably be in the ranges of approximately 9,200 - 10,100 gpm [gallons per minute] for the SW-P-1A and SW-P-1B pumps and approximately 1,050 - 1,160 gpm for the HPCS-P-2 pump. Consequently, the requirement to quarterly adjust the service water loop flow to one specific flow value for the performance of inservice testing conflicts with the system design and component operability requirements (i.e., flow balance) as required by Technical Specification.

3.2.3 Proposed Alternative and Basis for Use (as stated by licensee)

As discussed above, it is impractical to return to a specific value of flow rate or discharge pressure for testing of these pumps. As stated in NUREG-1482 Rev 1 Section 5.2, some system designs do not allow for testing at a single reference point or a set of reference points. Code Case OMN-9, “Use of Pump Curves for Testing,” is included in RG [Regulatory Guide] 1.192, “Operations and Maintenance Code Case Acceptability, ASME OM Code.” In such cases, it may be necessary to plot pump curves to use as the basis for variable reference points. Flow rate and discharge pressure are measured during inservice testing and compared to an established reference curve. Discharge pressure instead of differential pressure is used to determine pump operational readiness as described in Relief Request RP01.

The following elements are used in developing and implementing the reference pump curves. These elements follow the guidance of Code Case OMN-9. This Code Case has been accepted by the NRC staff with the condition that (1) when the repair, replacement, or routine servicing of a pump may have affected a reference curve, the licensee must determine a new reference curve, or reconfirm an existing reference curve, in accordance with Section 3 of Code Case OMN-9; and (2) if it is necessary or desirable, for some reason other than that stated in Section 4 of Code Case OMN-9, to establish an additional reference curve or set of curves, the licensee must determine the new curves in accordance with Section 3 of Code Case OMN-9.

1. A reference pump curve (flow rate vs discharge pressure) has been established for pumps SW-P-1A and SW-P-1B from data taken on these pumps when they were known to be operating acceptably. These pump curves represent pump performance almost identical to preoperational test data.

2. Pump curves are based on seven or more test points beyond the flat portion of the curve (at flow rate greater than 4,800 gpm). Rated capacity of these pumps is 12,000 gpm. Three or more test data points were at flow rate greater than 9,000 gpm. The pumps are being tested at or near full design flow rate.

3. To reduce the uncertainty associated with the pump curves and the adequacy of the acceptance criteria, special test gauges (±0.5 % full scale accuracy) were installed to take test data in addition to Plant installed gauges and Transient Data Acquisition System (TDAS). All instruments used either met or exceeded the Code required accuracy.

4. For the HPCS-P-2 pump, the reference pump curve is based on the manufacturer's pump curve as modified by preoperational test data.

5. Review of the pump hydraulic data trend plots indicates close correlation with the established pump reference curves, thus further validating the accuracy and adequacy of the pump curves to assess pump operational readiness.

6. The reference pump curves are based on flow rate vs discharge pressure. Acceptance criteria curves are based on differential pressure limits given in Table ISTB-5200-1 for the applicable test type. Setting the Code Acceptance Criteria on discharge pressure using differential limits is slightly more conservative for these pump installations with suction lift (Relief Request RP01). [See the sample SW-P-1A pump Acceptance Criteria sheet for Group A test provided in the licensee's October 10, 2005 application.] These acceptance criteria limits do not conflict with Technical Specifications or FSAR criteria.

7. Similar reference curves will be used for comprehensive pump tests using the applicable acceptance criteria and instrument accuracy range requirements.

8. Only a small portion of the established reference curve is being used to accommodate flow rate variance due to flow balancing of various system loads.

9. Review of vibration data trend plots indicates that the change in vibration readings over the narrow range of pump curves being used is insignificant and

thus only one fixed reference value has been assigned for each vibration measurement location.

10. When the repair, replacement, or routine servicing of a pump may have affected a reference curve, a new reference curve shall be determined, or the existing reference curve reconfirmed, in accordance with Section 3 of Code Case OMN-9.

11. If it is necessary or desirable for some reason other than that stated in Section 4 of Code Case OMN-9 to establish an additional reference curve or set of curves, the new curve(s) in accordance with Section 3 of Code Case OMN-9 must be determined.

Quality/Safety Impact

Design of the Columbia Generating Station Service Water System and the Technical Specification requirements make it impractical to adjust system flow to a fixed reference value for inservice testing without adversely affecting the system flow balance and Technical Specification operability requirements. Proposed alternate Testing using a reference pump curve for each pump provides adequate assurance and accuracy in monitoring pump condition to assess pump operational readiness and shall adequately detect pump degradation. Alternate testing will have no adverse impact on Plant and public safety.

3.2.4 Evaluation

The licensee has requested relief from Subsections ISTB-5221(b) and ISTB-5223(b), which require establishing a fixed set of reference values for either flow or differential pressure. It is impractical to alter pump flow rates to obtain repeatable reference values for the Standby Service Water pumps (SW-P-1A and SW-P-1B) and the Standby Service Water, HPCS pump (HPCS-P-2), because these pumps supply cooling water to multiple safety-related loads which are located in several flow-balanced loops without throttle valves. Varying the flow rate of one of the safety loads affects the system flow balance and compliance with the Technical Specification operability requirements. Installing valves that can throttle system flow would be a burden because of the numerous design, fabrication, and installation changes that would have to be made to the piping systems. The licensee proposes to use pump curves developed and implemented following the guidance of Code Case OMN-9, instead of reference values.

In NUREG-1482, Revision 1, Paragraph 5.2, the NRC staff provided guidance for utilizing pump curves when it is impractical to establish a fixed set of reference values. Based on the information provided in its application, the licensee has proposed a methodology consistent with the guidance of Paragraph 5.2. The NRC staff finds that the testing proposed by the licensee provides reasonable assurance of the operational readiness of the pumps. The licensee requested relief because Code Case OMN-9 applies only to ASME OM Code-1990 through ASME OMb Code-1992, and the Code Case expired on November 25, 2006. Based on the foregoing, the staff finds that the licensee's proposed alternative to the requirements of ISTB-5221(b) and ISTB-5223(b) of the ASME OM Code is acceptable.

3.2.5 Conclusion

Pursuant to 10 CFR 50.55a(f)(6)(i), the NRC staff grants relief and imposes alternative requirements, as described above, on the basis that the Code requirement is impractical for the facility. Granting relief pursuant to 10 CFR 50.55a(f)(6)(i) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. The proposed alternative to the ASME OM Code requirements in ISTB-5221(b) and ISTB-5223(b) provides reasonable assurance of the operational readiness of the Standby Service Water pumps and the Standby Service Water, HPCS pump. This relief is granted for the third 10-year IST interval.

3.3 Pump Relief Request RP06

The licensee requested relief from ISTB-3550 and ISTB-5200(a) of the ASME OM Code for Group A, Group B, comprehensive, and preservice tests for standby liquid control (SLC) pumps SLC-P-1A and SLC-P-1B. The licensee requested relief pursuant to 10 CFR 50.55a(a)3)(ii) because a rate or quantity meter is not installed in the test circuit for the pumps, and to install one would be costly and time consuming with few compensating benefits. Without a rate or flow meter, the flow rate of the pumps cannot be directly measured as required by the Code. Since the flow rate cannot be directly measured, it is an unnecessary burden, which provides no additional assurance of pump operational readiness, to require a 2 minute run time for pump tests.

3.3.1 Code Requirements

ASME OM Code Subsection ISTB-3550 states that, when measuring flow rate, a rate or quantity meter shall be installed in the pump test circuit.

Subsection ISTB-5200(a) states that, for the Group A test and the comprehensive test, after pump conditions are as stable as the system permits, each pump shall be run at least 2 minutes. At the end of this time, at least one measurement or determination of each of the quantities required by Table ISTB-3000-1 shall be made and recorded. For the Group B test, after pump conditions are stable, at least one measurement or determination of the quantity required by Table ISTB-3000-1 shall be made and recorded.

3.3.2 Licensee's Basis for Relief Request

The licensee requests relief from ISTB-3550 and ISTB-5200(a) of the ASME OM Code for Group A, Group B, comprehensive, and preservice tests for the following pumps:

Pump	Code Class	Pump Group	System
SLC-P-1A	2	B	Standby Liquid Control
SLC-P-1B	2	B	

The licensee states that a rate or quantity meter is not installed in the test circuit for pumps SLC-P-1A and SLC-P-1B. To have one installed would be costly and time consuming with few compensating benefits. As a result of a rate or quantity meter not being installed in the test circuit, it is impractical to directly measure the flow rate for the SLC pumps. Therefore, the requirement for allowing a 2-minute "hold" time for pump tests is an unnecessary burden which would provide no additional assurance of determining pump operational readiness.

3.3.3 Proposed Alternative and Basis for Use (as stated by licensee)

Pump flow rate will be determined by measuring the volume of fluid pumped and dividing corresponding pump run time. The volume of fluid pumped will be determined by the difference in fluid level in the test tank at the beginning and end of the pump run (test tank fluid level corresponds to volume of fluid in the tank). The pump flow rate calculation methodology meets the accuracy requirements of OM Code, Table ISTB-3500-1. The pump flow rate calculation is identified on the record of test and ensures that the method for the flow rate calculation yields an acceptable means for the detection and monitoring of potential degradation of the Standby Liquid Control Pumps and therefore, satisfies the intent of the OM Code Subsection ISTB.

In this type of testing, the requirement to maintain a 2-minute hold time after stabilization of the system is unnecessary and provides no additional increase of the ability to determine pump condition.

<u>Quality/Safety Impact</u>

The test tank is a horizontal flat-bottomed rectangular tank. The tank fluid volume is approximately 216 gallons. The average calculated flow rate is 42.2 gpm. The accuracy of the level reading is ±1/8 inch. The accuracy of volume change is ±1/4 inch (1/8 inch at initial level and 1/8 inch at final level). 1/4 inch corresponds to 1.23 gallons in the range of the test tank level used during the performance of the pump surveillance test. The pump is required [by the applicable surveillance procedure] to be run for a minimum time to ensure that an 18-inch change of test tank level has occurred. This is to ensure that the Code required accuracy for flow rate measurement of ±2 percent is satisfied. The test methodology used to calculate pump flow rate will provide results consistent with Code requirements. This will provide adequate assurance of acceptable pump performance.

Calculation methods are specified in the surveillance procedures [of the IST Program] for the Standby Liquid Control Pumps, and meet the quality assurance requirements for the Columbia Generating Station.

3.3.4 Evaluation

The applicable edition of the OM Code, ISTB-3550, requires that when measuring flow rate, a rate or quantity meter shall be installed in the test circuit. Additionally, ISTB-5200(a) requires that for the Group A test and comprehensive test, after pump conditions are as stable as the system permits, each pump shall be run at least 2 minutes.

The licensee stated that to install a flow meter to measure the flow rate and to guarantee the test tank size, such that the pump flow rate will stabilize in 2 minutes before recording the data, would be a burden because of the design and installation changes to be made to the existing system. In the NRC staff guidance in NUREG-1482, Revision 1, Section 5.5.2, the staff agreed, and noted that requiring licensees to install a flow meter to measure the flow rate and to guarantee the test tank size, such that the pump flow rate will stabilize in 2 minutes before recording the data, would be a burden because of the design and installation changes to be made to the existing system, and that compliance with the Code requirements would be a hardship.

The licensee's proposed alternative for measuring the flow rate for these pumps is to use a test tank and determine the pump flow rate by measuring the volume of fluid pumped and dividing the volume by the corresponding pump run time. The volume of fluid pumped will be determined by the difference in fluid level in the test tank at the beginning and end of the pump run. The test methodology used to calculate pump flow rate will provide results consistent with Code requirements and will provide adequate assurance of acceptable pump performance.

The pump flow rate calculation methodology meets the accuracy requirements of Table ISTB 3500-1 of the ASME OM Code. The pump flow rate calculation from the surveillance test performed as part of the IST Program is identified on the record of the surveillance test and ensures that the method for the flow rate calculation yields an acceptable means for the detection and monitoring of potential degradation of the pumps. In this type of testing, the requirement to maintain a 2-minute hold time after stabilization of the system is unnecessary and provides no additional increase of the ability to determine pump condition. The NRC staff finds that the complying with ISTB-3550 and ISTB-5200(a) would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The testing proposed by the licensee provides reasonable assurance that the pumps are operationally ready. Therefore, the staff authorizes that the licensee's proposed alternative to the requirements of ISTB-3550 and ISTB-5200(a) of the ASME OM Code is acceptable.

3.3.5 Conclusion

As described above, the staff has determined that the licensee has demonstrated that the proposed alternative provides reasonable assurance that the SLC pumps are operationally ready. Compliance with the specified Code requirements would be a hardship without a compensating increase in the level of quality and safety. The staff concludes that, pursuant to 10 CFR 50.55a(a)(3)(ii), the licensee's relief request RP06 is authorized for the third 10-year interval.

3.4 Valve Relief Request RV01

The licensee requested relief from ISTC-3630 for certain Primary Containment Cooling and Purge system relief valves. Since the valves cannot be tested individually, the licensee requested relief pursuant to 10 CFR 50.55a(f)(6)(i) because the code requirement is impractical. The licensee proposed that the leakage criteria and corrective actions already existing in Technical Specifications SR 3.6.1.1.2, SR 3.6.1.1.3 and SR 3.6.1.1.4, combined with valve closure verification, exercise and visual examination, provide an acceptable alternative.

3.4.1 Code Requirements

ASME OM Code Subsection ISTC-3630 requires that Category A valves, other than containment isolation valves, be individually tested.

3.4.2 Licensee's Basis for Requesting Relief

The licensee requests relief from ISTC-3630 of the ASME OM Code for the following Primary Containment Cooling and Purge system relief valves:

CVB-V-1AB, CD, EF, GH, JK, LM, NP, QR, and ST

The licensee states that these check valves cannot be tested individually; therefore, assigning a limiting leakage rate for each valve is not practical. Each vacuum relief valve assembly consists of two independent testable check valves in series with no instrument connection located between them to allow testing of each. Therefore, leak testing in accordance with the Code is impractical. Modifications to allow individual testing of these valves would require a major system redesign and be burdensome.

3.4.3 Proposed Alternative and Basis for Use (as stated by licensee)

Subsection ISTC-3630 requires Category A valves, other than containment isolation valves, to be individually leak tested at least once every two years. The leak test described in Subsection ISTC-3630 is bounded by leak testing performed to meet Technical Specifications Surveillance Requirement (SR) 3.6.1.1.3 and SR 3.6.1.1.4 and both the Code requirement and the SRs are met by performance of the same procedure. Each of the SRs in Technical Specifications contain a note which states "Performance of SR 3.6.1.1.2 satisfies this surveillance." Relief is requested to allow SR 3.6.1.1.2 bypass leakage test to also satisfy ISTC-3630 requirements.

These valves will be leak tested according to Columbia Generating Station Technical Specifications SR 3.6.1.1.2, SR 3.6.1.1.3, and SR 3.6.1.1.4 during refueling outages.

Technical Specifications SR 3.6.1.1.2 drywell-to-suppression chamber bypass leakage test monitors the combined leakage of three types of pathways: (1) the drywell floor and downcomers, (2) piping externally connected to both the drywell and suppression chamber air space, and (3) the suppression chamber-to-drywell vacuum breakers. The test frequency is 120 months and 48 months following one test failure and 24 months if two consecutive tests fail until two consecutive tests are less than or equal to the bypass leakage limit.

Technical Specifications SR 3.6.1.1.3 establishes a leak rate test frequency of 24 months for each suppression chamber-to-drywell vacuum breaker pathway except when the leakage test of SR 3.6.1.1.2 has been performed (Note to SR 3.6.1.1.3). Thus, each suppression chamber-to-drywell vacuum breaker pathway will have a leak test frequency of 24 months by either SR 3.6.1.1.2 or SR 3.6.1.1.3.

Technical Specifications SR 3.6.1.1.4 establishes a leakage test frequency of 24 months to determine the suppression chamber-to-drywell vacuum breaker total bypass leakage, except when the bypass leakage test of SR 3.6.1.1.2 has been performed (Note to SR 3.6.1.1.4). Thus, the determination of suppression chamber-to-drywell vacuum breaker total leakage will have a leak test frequency of 24 months by either SR 3.6.1.1.2 or SR 3.6.1.1.4.

These valves are verified-closed by position indicators, exercised, and tested in the open direction using a torque wrench per Technical Specifications SR 3.6.1.7.1, SR 3.6.1.7.2, and SR 3.6.1.7.3. In accordance with [the licensee-controlled IST Program], the valves are visually inspected each refueling outage.

Quality/Safety Impact

The leakage criteria and corrective actions specified in Technical Specifications SR 3.6.1.1.2, SR 3.6.1.1.3, and SR 3.6.1.1.4 combined with visual examination of valve seats every refueling outage provides adequate assurance of the relief valve assembly’s ability to remain leak tight and to prevent a suppression pool bypass. Thus, the proposed alternative provides adequate assurance of material quality and public safety.

3.4.4 Evaluation

ISTC-3630 of the ASME OM Code requires Category A valves, other than containment isolation valves, be individually leak tested. There are nine suppression chamber-to-drywell vacuum breakers which are located in the suppression chamber airspace of the primary containment. These vacuum breakers are required by the licensee’s design basis accident analyses, as described in the FSAR: (1) to be leak tight to prevent suppression pool bypass during a loss of coolant accident (LOCA) and (2) to open to allow non-condensible gases from the wetwell to be returned to the drywell to prevent an upward pressure differential across the drywell floor and backflooding of the suppression chamber pool water into the drywell after a LOCA. Each vacuum breaker consists of two independent testable check valves in series with no instrumentation located between them to allow individual leak testing of each of the two check valves. The NRC staff finds that leak testing in accordance with the Code is impractical, per the reasoning set out by the licensee. Modifications to allow individual testing of these valves would require a major system redesign and would be considered burdensome for the licensee.

The licensee proposed to leak test the suppression chamber-to-drywell vacuum breakers with the vacuum relief valves in series per TS SR 3.6.1.1.3 and SR 3.6.1.1.4. SR 3.6.1.1.3 requires verification that individual drywell-to-suppression chamber vacuum relief valve bypass pathway leakage is $\leq$1.2 percent of the acceptable $A/\sqrt{K}$ design value of 0.050 ft^2 (square feet) at an initial differential pressure of $\geq$1.5 psid (pounds per square inch differential) every 24 months. SR 3.6.1.1.4 requires verification that total drywell-to-suppression chamber vacuum relief valve bypass leakage is $\leq$3.0 percent of the acceptable $A/\sqrt{K}$ design valve of 0.050 ft^2 at an initial differential pressure of $\geq$1.5 psid every 24 months. A note preceding each SR indicates that the performance of SR 3.6.1.1.2 satisfies SR 3.6.1.1.3 and SR 3.6.1.1.4.

SR 3.6.1.1.2 requires verification that drywell-to-suppression chamber bypass leakage is $\leq$ 10 percent of the acceptable $A/\sqrt{K}$ design value of 0.050 ft^2 at an initial differential pressure of $\geq$1.5 psid every 120 months, and 48 months following a test with bypass leakage greater than the bypass leakage limit, and 24 months following two consecutive tests with bypass leakage greater than the bypass leakage limit until two consecutive tests are less than or equal to the bypass leakage limit. SR 3.6.1.1.2 monitors the combined leakage of three types of pathways: (1) the drywell floor and downcomers, (2) piping externally connected between the drywell and suppression chamber airspace, and (3) the suppression chamber-to-drywell vacuum breakers.

SR 3.6.1.1.3 and SR 3.6.1.1.4 will be performed every 24 months. As indicated above, performance of SR 3.6.1.1.2 will satisfy SR 3.6.1.1.3 and SR 3.6.1.1.4. Therefore, per the implementation of these three SRs, the testing frequency of the suppression chamber-to-drywell vacuum breakers is maintained at every 24 months. SR 3.6.1.1.3 establishes the bypass leakage limit for each of the nine suppression chamber-to-drywell vacuum breakers, while SR 3.6.1.1.4 specifies the bypass leakage limit for all nine vacuum breakers. (In both SRs, individual valve leakage limits are not specified.) SR 3.6.1.1.2, however, establishes the leakage limit for the total drywell-to-suppression chamber bypass, but not the specific leakage limit for the suppression chamber-to-drywell vacuum breakers. The CGS FSAR does not prescribe a specific design limit for the bypass leakage through the suppression chamber-to-drywell vacuum breakers, but rather a single limit through all leakage pathways. These valves are also verified closed by position indicators, exercised and tested in the open direction using a torque wrench per SR 3.6.1.7.1, SR 3.6.1.7.2, and SR 3.6.1.7.3. Additionally, these valves are visually inspected each refueling outage. Although the two check valves are tested in series, the leakage criteria and corrective actions specified in SR 3.6.1.1.2, SR 3.6.1.1.3 and SR 3.6.1.1.4, combined with valve closure verification, exercise and visual examination, provide reasonable assurance of the relief valve's ability to remain leak tight to prevent a suppression pool bypass and open to allow non-condensible gases from the wetwell to be returned to the drywell.

3.4.5 Conclusion

Pursuant to 10 CFR 50.55a(f)(6)(i), the NRC staff grants relief and imposes alternative requirements on the basis that Code requirement is impractical for the facility. Granting relief pursuant to 10 CFR 50.55a(f)(6)(i) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. Although the two check valves are tested in series, the leakage criteria and corrective actions specified in Technical Specifications SR 3.6.1.1.2, SR 3.6.1.1.3 and SR 3.6.1.1.4, combined with valve closure verification, exercise and visual examination, provide reasonable assurance of the relief valve's ability to remain leak tight to prevent a suppression pool bypass and open to allow non-condensible gases from the wetwell to be returned to the drywell. Therefore, the proposed alternative to the ASME OM Code requirements in ISTC-3630 provides reasonable assurance of the operational readiness of the Primary Containment Cooling and Purge system relief valves. Relief is granted for the third 10-year IST interval.

3.5 Valve Relief Request RV02

The licensee requested relief from ISTC-5141, ISTC-5142, and ISTC-5143 for certain Standby Service Water system valves. It is impractical to measure the stroke time of these valves conventionally, since they have no position indication nor means to allow them to be manually cycled. As an alternative, the licensee proposed to exercise the valves quarterly in accordance with ISTC requirements and to verify the failsafe position of the valves on loss-of-power.

3.5.1 Code Requirements

ASME OM Code Paragraphs ISTC-5141, ISTC-5142, and ISTC-5143 require that the stroke time of a hydraulically operated valve be measured.

3.5.2 Licensee's Basis for Requesting Relief

The licensee requested relief from ISTC-5141, ISTC-5142, and ISTC-5143 of the ASME OM Code for the following Standby Service Water system valves:

SW-TCV-11A
SW-TCV-11B

The licensee stated that it is difficult to accurately measure the stroke time of these hydraulically actuated control valves. These valves are not provided with any form of override that would allow them to be manually cycled. Additionally, they are not provided with position indication. Partial stroking of these valves can be verified by observing system operational parameter changes, but accurate timing of full stroke for trending purposes is impractical.

The licensee stated:

1. These hydraulically actuated valves serve as regulating thermostatic control valves. The valves do not function to rapidly isolate or de-isolate the piping into which they are installed. Rather, their function is to slowly regulate throughout their entire stroke range to control the outlet temperatures of the components they serve. SW-TCV-11A & 11B are controlled by thermostats which regulate main control room air temperature.

2. Manual control of these valves can only be obtained by lifting the 4-20 mA [milli-amp] control leads to inject a test signal to the hydraulic actuator. This in turn requires that the Technical Specification 3.7.4 and Licensee Controlled Specification 1.7.2 required systems be taken out of service.

3. Modification of the existing valves or installation of new valves to provide manual control and position indication would be burdensome and costly.

3.5.3 Proposed Alternative (as stated by licensee)

> These valves shall be exercised quarterly in accordance with the Subsection ISTC requirements and the fail-safe position on a loss of power (OPEN) shall be verified. Any abnormality or erratic action experienced during valve exercising shall be evaluated per the Corrective Action Program.

3.5.4 Evaluation

The Standby Service Water system valves are emergency chilled water hydraulically operated control valves that regulate the control room air handling cooling coil outlet temperature. The OM Code requires that these fail-open control valves be stroke-time tested quarterly, if practical, to monitor the valves for degrading conditions. It is impractical to measure the stroke times since these valves are not provided with position indication or a means to allow them to be manually cycled. Manual control of these valves is only possible by lifting control leads, which requires the associated train of the Standby Service Water system to be taken out of service per TS 3.7.4. Redesigning the system to allow stroke timing of these valves would be a burden on the licensee because of the design changes that would have to be made to the control valves.

Code Case OMN-8 states that stroke-time testing need not be performed for control valves that have only a fail-safe safety function. However, Code Case OMN-8 expired on November 20, 2006, and is only applicable through the 1995 Edition of the OM Code. The Code of record at CGS is the 2001 Edition through 2003 Addenda of the OM Code. Since Code Case OMN-8 is not approved for the licensee's Code of record, an alternative to use Code Case OMN-8 beyond its stated applicability and expiration date requires NRC authorization.

In this relief request, the licensee states that it will exercise these valves quarterly in accordance with the applicable Subsection ISTC requirements as stated in Code Case OMN-8 and will verify the failsafe position of the valves on loss-of-power. The licensee's proposed alternative provides reasonable assurance that the hydraulically controlled valves will perform their system function of throttling flow to control room temperature.

3.5.5 Conclusion

Pursuant to 10 CFR 50.55a(f)(6)(i), the NRC staff grants relief and imposes alternative requirements on the basis that the Code requirement is impractical for the facility. Granting relief pursuant to 10 CFR 50.55a(f)(6)(i) is authorized by law and will not endanger life or property or the common defense and security, and is otherwise in the public interest giving due consideration to the burden upon the licensee that could result if the requirements were imposed on the facility. The proposed alternative to the ASME OM Code requirements in ISTC-5141, ISTC 5142, and ISTC-5143, provides reasonable assurance of the operational readiness of the Standby Service Water control valves. Relief is granted for the third 10-year IST interval.

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