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April 2, 2014
GO2-14-049

10 CFR 50.55a

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

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397 RELIEF REQUESTS FOR THE COLUMBIA GENERATING STATION FOURTH TEN-YEAR INTERVAL INSERVICE TESTING PROGRAM**

Dear Sir or Madam,

Pursuant to 10 CFR 50.55a(a)(3) and 10 CFR 50.55a(f)(5)(iii), Energy Northwest hereby requests NRC approval of the attached relief requests for the upcoming Fourth Ten-Year Interval Pump and Valve Inservice Testing (IST) Program at Columbia Generating Station. As required by 10 CFR 50.55a(f)(4), the Fourth Ten-Year Interval IST Program will comply with the requirements of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code (2004 Edition through 2006 Addenda).

Previous IST relief requests for Columbia have been submitted with the overall program plan for the associated ten-year interval. However, for the upcoming fourth ten-year IST interval, Energy Northwest is submitting the associated relief requests separately and in advance of the overall program plan. The IST overall program plan for the fourth ten-year interval will be submitted by separate correspondence.

Attachment 1 to this letter provides a comparison between the relief requests for the third ten-year interval and the relief requests for the fourth ten-year interval. Attachment 2 provides the relief requests for the fourth ten-year interval IST program.

The Fourth Ten-Year Interval Program will be in effect from December 13, 2014 to December 12, 2024. Energy Northwest requests approval of the relief requests by November 1, 2014, to allow time for implementation before the start of the interval.

There are no new or revised regulatory commitments contained in this submittal. If you have any questions or require additional information, please contact Ms. L. L. Williams at (509) 377-8148.

A047
NRR

Executed this 1st day of April, 2014.

Respectfully,

A. L. Javorik
Vice President, Engineering

Attachments: 1. Comparison Between Relief Requests for the Third Ten-Year Interval and Relief Requests for the Fourth Ten-Year Interval

2. Relief Requests for the Columbia Generating Station Fourth Ten-Year Interval Inservice Testing Program

cc: NRC Region IV Administrator
NRC NRR Project Manager
NRC Senior Resident Inspector/988C
M. A. Jones – BPA/1399

Comparison Between Relief Requests for the Third Ten-Year Interval and Relief Requests for the Fourth Ten-Year Interval

A comparison between the relief requests for the third ten-year interval and the relief requests for the fourth ten-year interval is shown in the following table.

Relief Request Number in 3rd Ten Year Interval Plan	Equivalent or New Relief Request Number in 4th Ten Year Interval Plan	Comments
	RG01	New Relief Request to use Code Case OMN-20 for Frequency Grace
RP01	RP01	
RP03	RP02	
RP04	RP03	
RP05	RP04	
RP06	RP05	
RP07		Deleted – ISTB-3510(b)(2) revised to incorporate Code Case OMN-6 in OMb 2006 addenda
	RP06	New Relief Request to use Code Case OMN-19 Alternate Upper Limit for the Comprehensive Pump Test
RV01	RV01	
RV02		Deleted – ISTC-5100 revised to incorporate Code Case OMN-8 in OMb 2006 addenda.
RV03	RV02	
RV04	RV03	
RV05	RV04	

Details are provided in the individual relief requests provided in Attachment 2 to this letter.

Relief Requests for the Columbia Generating Station
Fourth Ten-Year Interval
Inservice Testing Program

Relief Request – **RG01**

Proposed Alternative
In Accordance with 10 CFR 50.55a(a)(3)(ii)

– Hardship or Unusual Difficulty Without Compensating increase in Level of Quality and Safety –

ASME Code Components Affected

All Pumps and Valves contained within the Inservice Testing Program scope.

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code.

Applicable Code Requirement

This request applies to the frequency specifications of the ASME OM Code. The frequencies for tests given in the ASME OM Code do not include a tolerance band.

ISTA-3120(a)	Inservice Testing Interval. The frequency for the inservice testing shall be in accordance with the requirements of Section IST.
ISTB-3400	Frequency of Inservice Tests. An inservice test shall be run on each pump as specified in Table ISTB-3400-1.
ISTC-3510	Exercising Test Frequency. Active Category A, Category B, and Category C check valves shall be exercised nominally every 3 months, except as provided by ISTC-3520, ISTC-3540, ISTC-3550, ISTC-3570, ISTC-5221, and ISTC-5222. Power-operated relief valves shall be exercise tested once per fuel cycle.
ISTC-3540	Manual Valves. Manual valves shall be full-stroke exercised at least once every 2 years, except where adverse conditions may require the valve to be tested more frequently to ensure operational readiness. Any increased testing frequency shall be specified by the Owner. The valve shall exhibit the required change of obturator position.
ISTC-3630 (a)	Leakage Rate for Other Than Containment Isolation Valves. Frequency. Tests shall be conducted at least once every 2 years.
ISTC-3700	Position Verification Testing. Valves with remote position indicators shall be observed locally at least once every 2 years to verify that valve operation is accurately indicated.

Relief Request – **RG01** (Contd.)

ISTC-5221(c)(3)	Valve Obturator Movement. At least one valve from each group shall be disassembled and examined at each refueling outage; all valves in a group shall be disassembled and examined at least once every 8 years.
ISTC-5260	Explosively Actuated Valves. (b) Concurrent with the first test and at least once every 2 years, the service life records of each valve shall be reviewed to verify that the service life of the charges have not been exceeded and will not be exceeded before the next refueling. (c) At least 20% of the charges in explosively actuated valves shall be fired and replaced at least once every 2 years.
Appendix I, I-1320(a)	Test Frequencies, Class 1 Pressure Relief Valves, 5-Year Test Interval. Class 1 pressure relief valves shall be tested at least once every 5 years, starting with initial electric power generation. No maximum limit is specified for the number of valves to be tested within each interval; however, a minimum of 20% of the valves from each valve group shall be tested within any 24 month interval.
Appendix I, I-1330	Test Frequency, Class 1 Nonreclosing Pressure Relief Devices. Class 1 nonreclosing pressure relief devices shall be replaced every 5 years unless historical data indicates a requirement for more frequent replacement.
Appendix I, I-1340	Test Frequency, Class 1 Pressure Relief Valves that are used for Thermal Relief Application. Tests shall be performed in accordance with I-1320, Test Frequencies, Class 1 Pressure Relief Valves.
Appendix I, I-1350(a)	Test Frequency, Class 2 and 3 Pressure Relief Valves. 10-Year Test Interval, Classes 2 and 3 pressure relief valves, with the exception of PWR main steam safety valves, shall be tested every 10 years, starting with initial electric power generation. No maximum limit is specified for the number of valves to be tested during any single plant operating cycle; however, a minimum of 20% of the valves from each valve group shall be tested within any 48 month interval.
Appendix I, I-1360	Test Frequency, Class 2 and 3 Nonreclosing Pressure Relief Devices. Classes 2 and 3 nonreclosing pressure relief devices shall be replaced every 5 years, unless historical data indicates a requirement for more frequent replacement.

Relief Request – **RG01** (Contd.)

Appendix I, I-1370	Test Frequency, Class 2 and 3 Primary Containment Vacuum Relief Valves. (a) Tests shall be performed on all Classes 2 and 3 containment vacuum relief valves at each refueling outage or every 2 years, whichever is sooner, unless historical data requires more frequent testing. (b) Leak tests shall be performed on all Classes 2 and 3 containment vacuum relief valves at a frequency designated by the Owner in accordance with Table ISTC-3500-1.
Appendix I, I-1380	Test Frequency, Classes 2 and 3 Vacuum Relief Valves, Except for Primary Containment Vacuum Relief Valves. All Classes 2 and 3 vacuum relief valves shall be tested every 2 yr, unless performance data suggest the need for a more appropriate test interval.
Appendix I, I-1390	Test Frequency, Classes 2 and 3 Pressure Relief Devices That Are Used for Thermal Relief Application. Tests shall be performed on all Classes 2 and 3 relief devices used in thermal relief application every 10 yr, unless performance data indicate more frequent testing is necessary. In lieu of tests the Owner may replace the relief devices at a frequency of every 10 yr, unless performance data indicate more frequent replacements are necessary.
Appendix II, II-4000	Performance Improvement Activities. (a)(1) If sufficient information is not currently available to complete the analysis required in II-3000, or if this analysis is inconclusive, then the following activities shall be performed at sufficient intervals over an interim period of the next 5 years or two refueling outages, whichever is less, to determine the cause of the failure or the maintenance patterns. (e) Identify the interval of each activity.
Appendix II, II-4000	Optimization of Condition Monitoring Activities. (b)(1)(e) Identify the interval of each activity. Interval extensions shall be limited to one fuel cycle per extension. Intervals shall not exceed the maximum intervals shown in table II-4000-1. All valves in a group sampling plan must be tested or examined again, before the interval can be extended again, or until the maximum interval would be exceeded. The requirements of ISTA-3120, Inservice Test Interval, do not apply.
MOV Diagnostic Tests	GL 96-05 required periodic static and dynamic diagnostic test intervals. The MOV Program is required by condition 10 CFR 50.55a(b)(3)(ii).

Relief Request – **RG01** (Contd.)

Reason for Request

Pursuant to 10 CFR 50.55a, "Codes and standards," paragraph (a)(3)(ii), relief is requested from the frequency specifications of the ASME OM Code. The basis of the relief request is that the Code requirement presents an undue hardship without a compensating increase in the level of quality of safety.

ASME OM Code Section IST establishes the IST frequency for all components within the scope of the Code. The frequencies (e.g., quarterly) have always been interpreted as "nominal" frequencies (generally as defined in the Table 3.2 of NUREG-1482, Revision 2) and Owners routinely applied the surveillance extension time period (i.e., grace period) contained in the plant Technical Specifications (TS) Surveillance Requirements (SRs). The TSs typically allow for a less than or equal to 25% extension of the surveillance test interval to accommodate plant conditions that may not be suitable for conducting the surveillance (SR 3.0.2).

However, regulatory issues have been raised concerning the applicability of the Technical Specification (TS) "grace period" to ASME OM Code required IST frequencies irrespective of allowances provided under TS Administrative Controls (i.e., TS 5.5.6, "Inservice Testing Program," invokes Surveillance Requirement (SR) 3.0.2 for various OM Code frequencies).

The lack of a tolerance band on the ASME OM Code IST frequency restricts operational flexibility. There may be a conflict where IST could be required (i.e., its frequency could expire), but where it is not possible or not desired that it be performed until after a plant condition or associated Limiting Condition for Operation (LCO) is within its applicability. Therefore, to avoid this conflict, the IST should be performed when it can and should be performed.

The NRC recognized this potential issue in the TS by allowing a frequency tolerance as described in TS SR 3.0.2. The lack of a similar tolerance applied to the ASME OM Code testing places an unusual hardship on the plant to adequately schedule work tasks without operational flexibility.

Thus, just as with TS required surveillance testing, some tolerance is needed to allow adjusting ASME OM Code testing intervals to suit the plant conditions and other maintenance and testing activities. This assures operational flexibility when scheduling IST that minimizes the conflicts between the need to complete the testing and plant conditions.

Proposed Alternative and Basis for Use

Columbia Generating Station proposes to use the ASME OM Code Case OMN-20 as published in ASME OM-2012 edition for the fourth ten year interval of IST Program. The 2012 edition of Operation and Maintenance of Nuclear Power Plants, was approved by the ASME Board on Nuclear Codes and Standards on December 21, 2012. Code case OMN-20 will be used for determining acceptable tolerances for pump and valve testing frequencies. The code case as published in ASME OM-2012 edition is repeated below.

Relief Request – **RG01** (Contd.)

Published OMN-20 Code Case

1 TEST FREQUENCY GRACE

ASME OM, Division 1, Section IST and all earlier editions and addenda specify component test frequencies based either on elapsed time periods (e.g., quarterly, 2 years, etc.) or the occurrence of plant conditions or events (e.g., cold shutdown, refueling outage, upon detection of a sample failure, following maintenance, etc.).

a) Components whose test frequencies are based on elapsed time periods shall be tested at the frequencies specified in Section IST with a specified time period between tests as shown in Table 1. The specified time period between tests may be reduced or extended as follows:

1) For periods specified as fewer than 2 yr, the period may be extended by up to 25% for any given test.

2) For periods specified as greater than or equal to 2 yr, the period may be extended by up to 6 mo for any given test.

3) All periods specified may be reduced at the discretion of the owner (i.e., there is no minimum period requirement).

Period extension is to facilitate test scheduling and considers plant operating conditions that may not be suitable for performance of the required testing (e.g., performance of the test would cause an unacceptable increase in the plant risk profile due to transient conditions or other ongoing surveillance, test, or maintenance activities). Period extensions are not intended to be used repeatedly merely as an operational convenience to extend test intervals beyond those specified.

Period extensions may also be applied to accelerated test frequencies (e.g., pumps in alert range) and other less than 2 yr test frequencies not specified in Table 1.

Period extensions may not be applied to the test frequency requirements specified in Subsection ISTD, Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-water Reactor Nuclear Power Plants, as Subsection ISTD contains its own rules for period extensions.

(b) Components whose test frequencies are based on the occurrence of plant conditions or events may not have their period between tests extended excepts as allowed by ASME OM, Division 1, Section IST, 2009 Edition through OMa-2011 Addenda and all earlier editions and addenda.

Relief Request – **RG01** (Contd.)

Table 1 Specified Test Frequencies

Frequency	Specified Time Period Between Tests
Quarterly (or every 3 months)	92 days
Semiannually (or every 6 months)	184 days
Annually (or every year)	366 days
X Years	X calendar years Where X is a whole number of years ≥ 2

Quality/Safety Impact

Allowing use of the code case OMN-20 will provide reasonable assurance of operational readiness of pumps and valves subject to ASME OM code 2004 edition through OMb-2006 addenda testing requirements.

Duration of Proposed Alternative

Fourth 10 year interval.

Precedents

The following similar relief requests for Quad Cities Unit 1 and 2, and Three Mile Island Unit 1 were approved by the NRC.

Request Number RV-01 for Quad Cities Units 1 and 2 was approved by the NRC by letter dated February 14, 2013 (ADAMS Accession Number ML13042A348).

Request Number VR-02 for Three Mile Island Unit 1 was approved by the NRC by letter dated August 15, 2013 (ADAMS Accession number ML13227A024).

References

1. Code Case OMN-20, Inservice Test Frequency, published in ASME OM-2012 Edition.

Relief Request – **RP01**

Proposed Alternative
in Accordance with 10 CFR 50.55a(a)(3)(i)

– Alternative Provides Acceptable Level of Quality and Safety –

ASME Code Components Affected

Pump	Code Class	Pump Group	P & ID Dwg. No.	System(s)
SW-P-1A	3	A	M524, SH 1	Standby Service Water
SW-P-1B	3	A	M524, SH 2	Standby Service Water
HPCS-P-2	3	A	M524, SH 1	Standby Service Water, HPCS

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code.

Applicable Code Requirement

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

Reason for Request

There are no inlet pressure gauges installed in the inlet of these vertical line shaft centrifugal pumps, making it impractical to directly measure inlet pressure for use in determining differential pressure for the pump.

Proposed Alternative and Basis for Use

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-5221-1. 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, 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 3.7.1.1 specifies the minimum allowable spray pond level to assure adequate NPSH and ultimate heat sink capability.

Relief Request – **RP01** (Contd.)

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

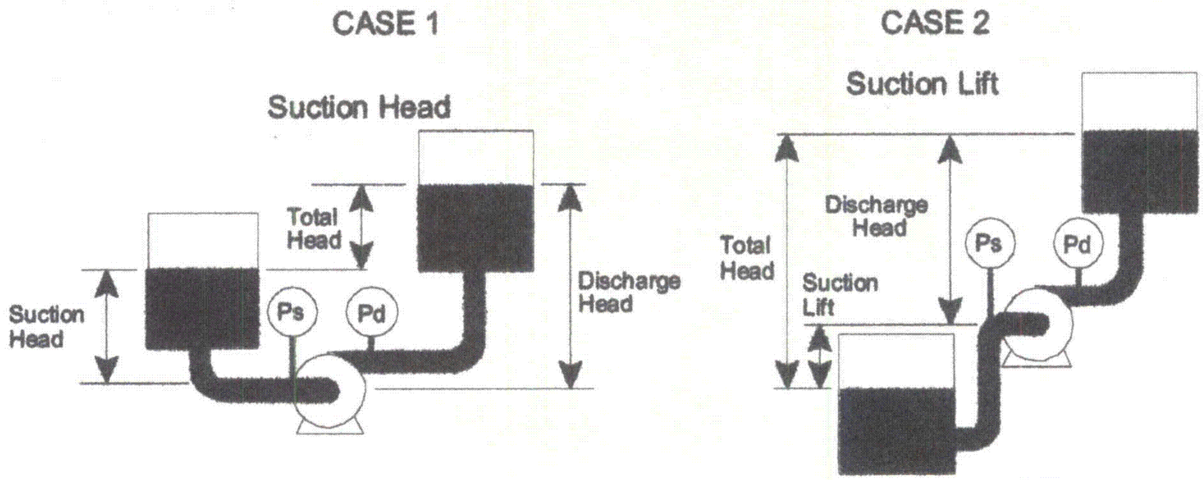
4. Acceptable flow rate and discharge pressure will suffice as proof of adequate suction pressure.

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 minus suction pressure. In the case of a pump with suction lift the suction pressure is negative, thus:

$$\Delta P = P_d - (-P_s)$$
$$\Delta P = P_d + Ps$$

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



IST.RP01 drawing file
Jan 7, 2005

Relief Request – **RP01** (Contd.)

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:

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

Since pump discharge pipe elevation 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.

Duration of Proposed Alternative

Fourth 10 year interval.

Precedents

This relief was granted for the third 10 year interval. NRC approval was documented in a letter dated May 15, 2007 (ADAMS Accession Number ML071010344, TAC No. MD3536) for Relief Request No. RP01.

Relief Request – **RP02**

Relief Request
in Accordance with 10 CFR 50.55a(f)(5)(iii)

– Inservice Testing Impracticality –

ASME Code Components Affected

Pump	Code Class	Pump Group	P&ID Dwg. Number	System(s)
SW-P-1A	3	A	M524, SH 1	Standby Service Water
SW-P-1B	3	A	M524, SH 2	Standby Service Water
HPCS-P-2	3	A	M524, SH 1	Standby Service Water, HPCS

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code.

Applicable Code Requirement

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.

Relief is required for Group A and comprehensive tests.

Impracticality of Compliance

The establishment of specific reference values is impractical for these vertical line shaft centrifugal pumps.

Burden Caused by Compliance

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.

Relief Request – **RP02** (Contd.)

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. Although there are valves in the common return line that are used for throttling total system flow during pre-service testing, use of these valves is impractical for regular testing due to the potential effect on the flow balance for the safety related loads. 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 calculation and surveillance 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 (subsystems) 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 for Operation (LCO) per Technical Specification 3.7.1.

3. Each loop of Service Water is flow balanced annually 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 - 10,200 gallons per minute (gpm) for SW-P-1A and SW-P-1B pumps and approximately 961 – 1,203 gpm for HPCS-P-2 pump. Consequently, the requirement to quarterly adjust service water loop flow to one specific flow value for the performance of inservice testing conflicts with system design and component operability requirements (i.e., flow balance) as required by Technical Specification.

Proposed Alternative and Basis for Use

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 2 Section 5.2, some system designs do not allow for testing at a single reference point or a set of reference points. In such cases, it may be necessary to plot pump curves to use as the basis for variable reference points. Code Case OMN-16,"Use of a Pump Curves for Testing," is included in draft Revision 1 of Regulatory Guide (RG) 1.192,"Operations and Maintenance Code Case Acceptability, ASME OM Code." 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-16.

Relief Request – **RP02** (Contd.)

1. SW-P-1A and SW-P-1B were replaced with new pumps in 2005 and HPCS-P-2 was replaced in 2008. A preservice test as required by the ASME OM Code was performed and a reference pump curve (flow rate vs. discharge pressure) was established for all three pumps using the preservice test data.

2. Pump curves are based on five or more test points beyond the flat portion of the curve (between 6000 gpm and 10200 gpm for SW-P-1A and 1B pumps and between 650 and 1200 gpm for HPCS-P-2 pump). The pumps are being tested near full design flow rate.

3. Temporary test gauges (± 0.5% full scale accuracy) were installed to take discharge pressure test data in addition to plant installed gauges, and Transient Data Acquisition System (TDAS). TDAS data averages 100 readings with a reading taken each second. All instruments used either met or exceeded the Code required accuracy for Group A and comprehensive pump test.

4. 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-5121-1 for 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 attached sample SW-P-1A pump Acceptance Criteria sheet for Group A test. Area 1-2-5-6 is the acceptable range for pump performance. Area 3-4-5-6 defines the Alert Range, and the area outside 1-2-3-4 defines the required Action Range.

5. Similar reference curves are used for comprehensive pump tests using the applicable acceptance criteria and instrument accuracy and range requirements.

6. Only a small portion of the established reference curve is being used to bind the flow rate variance due to flow balancing of various system loads. See the attached sample SW-P-1A pump Acceptance Criteria sheet for Group A test.

7. A single reference value shall be assigned for each vibration measurement location. The selected reference value shall be at the minimum data over the narrow range of pump curves being used as required by Code Case OMN-16.

8. 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 para. 16-3310 of Code Case OMN-16.

9. If it is necessary or desirable, for some reason other than that stated in para. 16-3310 of Code Case OMN-16, to extend the current pump curve or establish an additional reference curve, the new curve(s) must be determined in accordance with para. 16-3320 of Code Case OMN-16.

Relief Request – **RP02** (Contd.)

Quality/Safety Impact

The 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. The 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.

Duration of Proposed Alternative

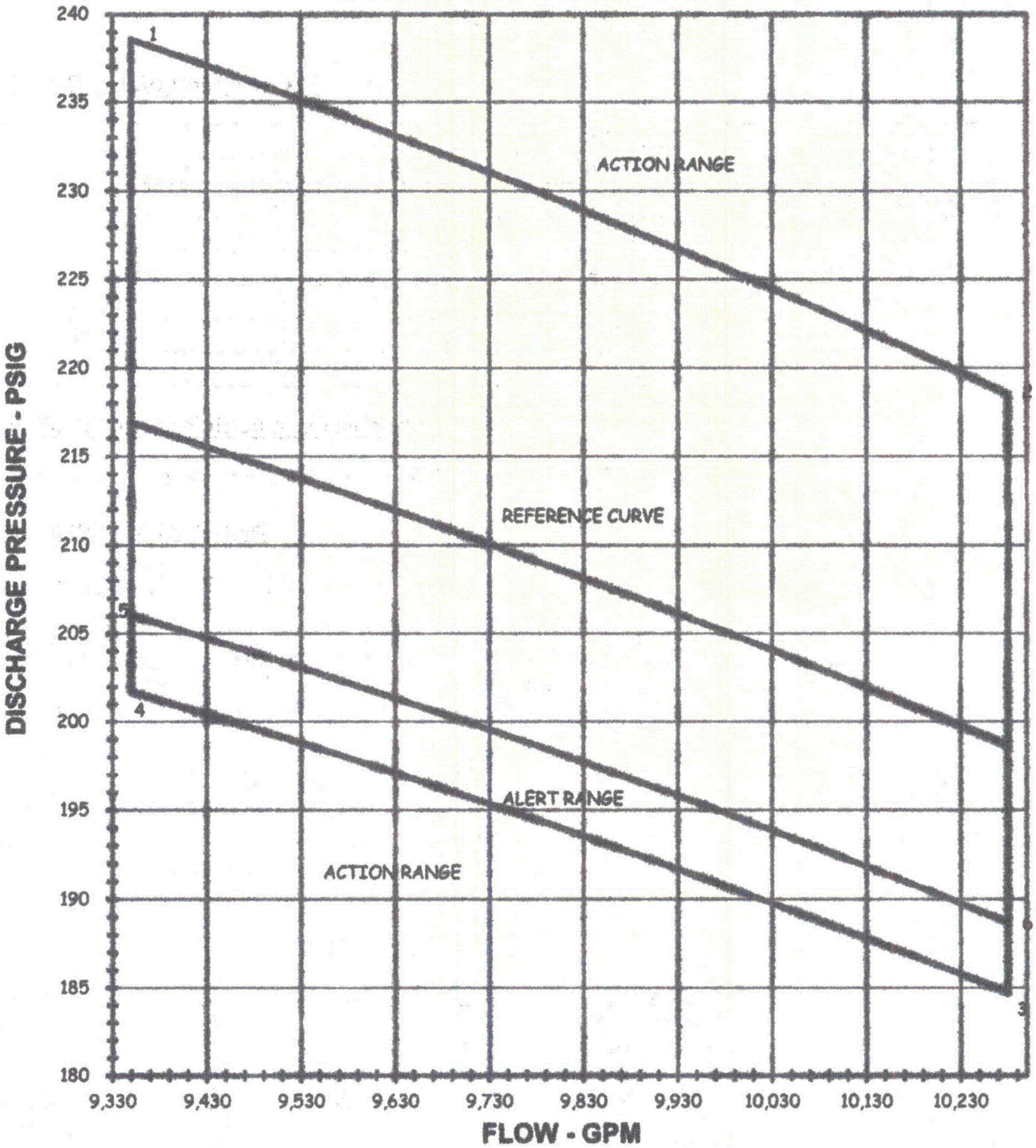
Fourth 10 year interval.

Precedents

Similar relief was granted for the third 10 year interval. NRC approval was documented in a letter dated May 15, 2007 (ADAMS Accession Number ML 071010344, TAC No. MD3540) for Relief Request No. RP03.

Relief Request – **RP02** (Contd.)

SAMPLE DATA SHEET - Group A Test
SW-P-1A ACCEPTANCE CRITERIA



ALERT RANGE = Area Inside 3-4-5-6

ACTION RANGE = Area Outside 1-2-3-4

Relief Request – **RP03**

Relief Request
in Accordance with 10 CFR 50.55a(f)(5)(iii)

– Inservice Testing Impracticality –

ASME Code Components Affected

Pump	Code Class	Pump Group	P&ID Dwg. Number	System(s)
LPCS-P-1	2	B	M520	Low Pressure Core Spray
RHR-P-2A	2	A	M521, SH 1	Residual Heat Removal
RHR-P-2B	2	A	M521, SH 2	
RHR-P-2C	2	A	M521, SH 3	
HPCS-P-1	2	B	M520	High Pressure Core Spray
RCIC-P-1	2	B	M519	Reactor Core Isolation Cooling

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code.

Applicable Code Requirement

RCIC-P-1 (Centrifugal Pump):

Group B Test: Subsection ISTB-5122(a), ISTB-5122(b) and ISTB-5122(c). The pump shall be operated at a speed adjusted to the reference point (± 1%) for variable speed drives. The differential pressure or flow rate shall be determined and compared to its reference value. System resistance may be varied as necessary to achieve the reference point.

Comprehensive Test: Subsection ISTB-5123(a) and ISTB-5123(b). The pump shall be operated at a speed adjusted to the reference point (± 1%) for variable speed drives. 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 its 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.

Other Pumps (Vertical line Shaft Centrifugal Pumps):

Group B Test for LPCS-P-1 and HPCS-P-1: Subsection ISTB-5222(b) and ISTB-5222(c). The differential pressure or flow rate shall be determined and compared to its reference value. System resistance may be varied as necessary to achieve the reference point.

Group A Test for RHR-P 2A, 2B AND 2C and Comprehensive Test for all pumps except RCIC-P-1: 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 its 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.

Relief Request – **RP03** (Contd.)

Impracticality of Compliance

The establishment of specific reference values is impractical for these pumps.

Burden Caused by Compliance

Reference values are defined as one or more fixed sets of values of quantities as measured or observed when the equipment is known to be operating acceptably. All subsequent test results are to be compared to these reference values. Based on operating experience, flow rate (independent variable during inservice testing) for these pumps cannot be readily duplicated with the existing flow control systems. Flow control for these systems can only be accomplished through the operation of relatively large motor operated globe valves as throttling valves. Because these valves are not equipped with position indicators which reflect percent open, the operator must repeatedly jog the motor operator to try to make even minor adjustments in flow rate. These efforts, to exactly duplicate the reference value, would require excessive valve manipulation which could ultimately result in damage to valves or motor operators.

Proposed Alternative and Basis for Use

As discussed above, it is impractical to return to a specific value of flow rate, or differential pressure for testing of these pumps. As stated in NUREG-1482, Rev 2 Section 5.2, some system designs do not allow for testing at a single reference point or a set of reference points. In such cases, it may be necessary to plot pump curves to use as the basis for variable reference points. Code Case OMN-16,"Use of a Pump Curves for Testing," is included in draft Revision 1 of RG 1.192,"Operations and Maintenance Code Case Acceptability, ASME OM Code."

Since the independent reference variable (flow rate) for these pumps is impractical to adjust to a fixed reference value and requires excessive valve manipulation, the maximum variance shall be limited to ± 2% of the reference value. Thus, flow rate shall be adjusted to be within ± 2% of the reference flow rate and the corresponding differential pressure shall be measured and compared to the reference differential pressure value determined from the pump reference curve established for this narrow range of flow rate. Slope of the pump reference curve is not flat even over this narrow range of flow rate. Assuming the flow rate to be fixed over this narrow range can result in additional error in calculating the deviation between the measured and reference differential pressure and at times this deviation can be non-conservative. Since the dependent variable (differential pressure) can be assumed to vary linearly with flow rate in this narrow range, establishing multiple reference points in this narrow range is similar to establishing a reference pump curve representing multiple reference points. This assumption of linearity between differential pressure and flow rate is supported by the manufacturer pump curves in the stable design flow rate region.

Relief Request – **RP03** (Contd.)

The following elements are used in developing and implementing the reference pump curves. These elements follow the guidance of Code Case OMN-16.

1. RHR-P-2B was replaced with a new pump in 2013. A preservice test as required by the ASME OM Code was performed and a reference pump curve (flow rate vs. differential pressure) was established for this pump using the preservice test data. A similar reference pump curve (flow rate vs differential pressure) has been established for RHR-P-2A and RHR-P-2C pumps from data taken on these pumps when they were known to be operating acceptably. These pump curves represent pump performance almost identical to manufacturer's test data.

2. For RCIC-P-1, a variable speed drive pump, flow rate is set within ± 2% of the reference flow rate and the reference curve is based on speed with acceptance criteria based on differential pressure. This is done because of the impracticality of setting speed to a specific reference value to achieve the desired flow rate and pump discharge pressure. See the attached sample RCIC-P-1 pump Acceptance Criteria sheet for Group B test. Additionally, evaluation of the manufacturer pump data, preoperational and special test data used to establish the pump reference curve indicates insignificant change in differential pressure with small variation in flow rate.

3. HPCS-P-1 was replaced with a new pump in 2007. A preservice test as required by the ASME OM Code was performed and a reference pump curve (flow rate vs. differential pressure) was established for this pump using the preservice test data.

4. For LPCS-P-1 pump, the reference pump curve is based on the manufacturer pump curve that was validated during preoperational testing using 5 or more test points beyond the flat portion of the curve.

5. Residual Heat Removal (RHR), High Pressure Core Spray (HPCS) and Reactor Core Isolation Cooling (RCIC) pump curves are based on five or more test points beyond the flat portion of the curve. These ECCS pumps have minimum flow rate requirements specified in Technical Specifications and are being tested near these flow rates.

6. Temporary test gauges (± 0.5% full scale accuracy) were installed to take suction and discharge pressure test data in addition to plant installed gauges and Transient Data Acquisition System (TDAS). TDAS data averages 100 readings with a reading taken each second. All instruments used either met or exceeded the Code required accuracy for applicable Group A, Group B and comprehensive pump test.

7. 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 pumps operational readiness.

8. Acceptance criteria curves are based on differential pressure limits given in applicable Table ISTB-5121-1 or Table ISTB-5221-1. See the attached sample RHR-P-2A pump Acceptance Criteria sheet for Group A test. Area 1-2-5-6 is the acceptable range for pump performance. Area 3-4-5-6 defines the Alert Range and the area outside 1-2-3-4 defines the required Action

Relief Request – RP03 (Contd.)

Range. A similar sample RCIC-P-1 pump Acceptance Criteria sheet for Group B test is also attached.

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

10. Only a small portion of the established reference curve is being used to accommodate flow rate variance. See the attached sample pump Acceptance Criteria sheets.

11. A single reference value shall be assigned for each vibration measurement location. The selected reference value shall be at the minimum data over the narrow range of pump curves being used as required by Code Case OMN-16.

12. 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 para. 16-3310 of Code Case OMN-16.

13. If it is necessary or desirable, for some reason other than that stated in para. 16-3310 of Code Case OMN-16, to extend the current pump curve or establish an additional reference curve, the new curve(s) must be determined in accordance with para. 16-3320 of Code Case OMN-16.

Quality/Safety Impact

Due to impracticality of adjusting independent variables (flow rate, and speed for variable drive RCIC pump) to a fixed reference value for inservice testing without system modifications, alternate testing to vary the variables over a very narrow range (up to ± 2% of reference values) and using pump reference curves for this narrow range is 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 will adequately detect pump degradation. Alternate testing will have no adverse impact on plant and public safety.

Duration of Proposed Alternative

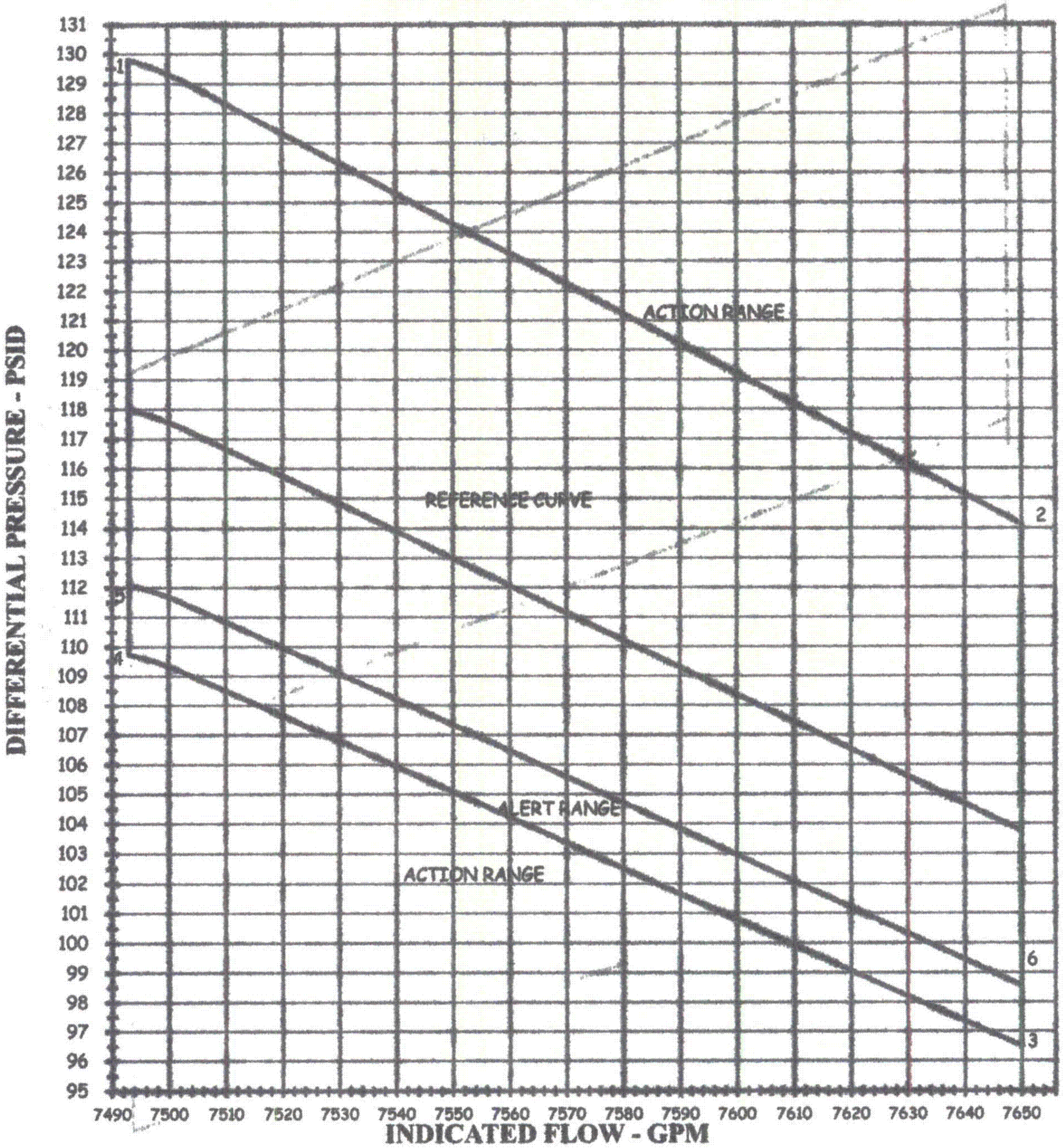
Fourth 10 year interval.

Precedents

Similar relief was granted for the third 10 year interval. NRC approval was documented in a letter dated March 23, 2007 (ADAMS Accession Number ML070600111, TAC No. MD3537) for Relief Request No. RP04.

Relief Request – **RP03** (Contd.)

SAMPLE DATA SHEET - Group A Test
RHR-P-2A ACCEPTANCE CRITERIA

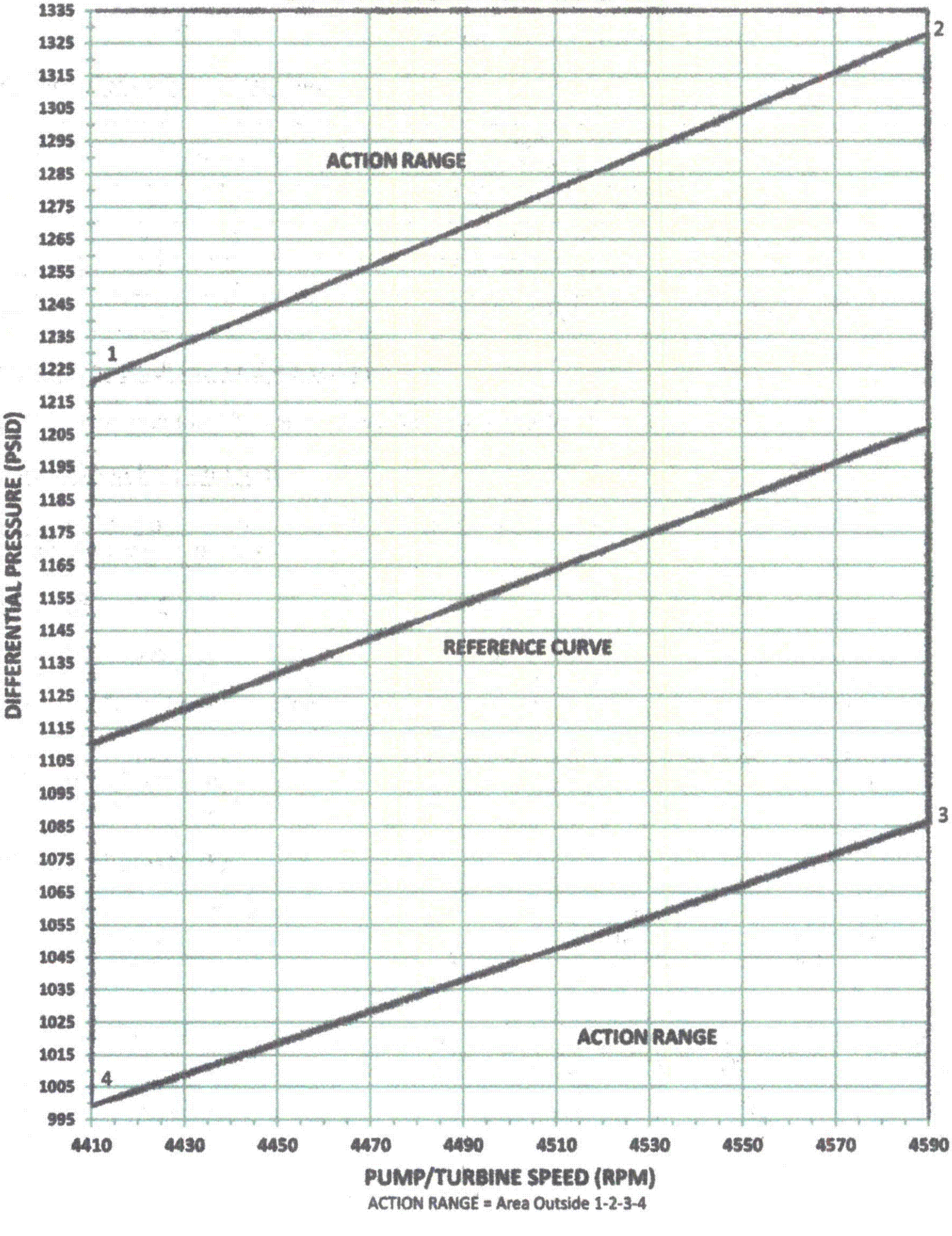


ALERT RANGE = Area Inside 3-4-5-6

ACTION RANGE = Area Outside 1-2-3-4

Relief Request – **RP03** (Contd.)

SAMPLE DATA SHEET - Group B Test
RCIC-P-1 ACCEPTANCE CRITERIA



ACTION RANGE = Area Outside 1-2-3-4

Relief Request – **RP04**

Proposed Alternative
In Accordance with 10 CFR 50.55a(a)(3)(i)

Alternative Provides Acceptable Level of Quality and Safety

ASME Code Components Affected

Pump	Code Class	Pump Group	P&ID Dwg. Number	System(s)
RHR-P-2A	2	A	M521, SH 1	Residual Heat Removal
RHR-P-2B	2	A	M521, SH 2	
RHR-P-2C	2	A	M521, SH 3	
HPCS-P-1	2	B	M520	High Pressure Core Spray

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code.

Applicable Code Requirement

ISTB-3510(b)(1), Range. The full- scale range of each analog instrument shall be not greater than three times the reference value.

Reason for Request

Installed test gauges used to measure the pump discharge pressure, which is used to determine differential pressure, do not meet the Code range requirements. Residual Heat Removal (RHR) and High Pressure Core Spray (HPCS) Pumps discharge pressure instruments (RHR-PT-37A, RHR-PT-37B, RHR-PT-37C, and HPCS-PT-4), exceed or may exceed (dependent upon measured parameters), the Code allowable range limit of three times the reference value. Relief is required for Group A, Group B inservice test and preservice test only. Temporary test gauges meeting the Code requirements shall be used for the comprehensive test.

Proposed Alternative and Basis for Use

During Group A or Group B pump inservice testing, pump discharge pressure which is used to determine differential pressure shall be measured by respective Transient Data Acquisition Data (TDAS) points listed below for each pump. TDAS data averages 100 readings with a reading taken each second.

1. ISTB-3510(a) and ISTB-3510(b)(1) specify both accuracy and range requirements for each instrument used in measuring pump performance parameters. The purpose of instrument requirements is to ensure that pump test measurements are sufficiently accurate and repeatable to permit evaluation of pump condition and detection of degradation. Instrument accuracy limits the inaccuracy associated with the measured test data. Thus, higher instrument accuracy lowers the uncertainty associated with the measured data. The purpose of the Code range requirement is to ensure reading accuracy and repeatability of test data.

Relief Request – **RP04** (Contd.)

2. Since the TDAS data is being obtained to an accuracy of ± 1% of full scale, it consistently yields measurements more accurate than would be provided by instruments meeting the Code instrument accuracy requirement of ± 2% of full scale and range requirement of three times the reference value. Equivalent Code accuracy being obtained by TDAS measurements is calculated in the table below.

Pump	Test Parameter	Instrument I.D.	Range (PSIG)	*Ref. Value (PSIG)	Instrument Loop Accuracy	Equivalent Code Accuracy
RHR-P-2A	Discharge Pressure	RHR-PT-37A TDAS PT 155	0-600	136	± 1%, ± 6 psig	[6/(3x136)]x100 =1.47%
RHR-P-2B	Discharge Pressure	RHR-PT-37B TDAS PT 076	0-600	148	± 1%, ± 6 psig	[6/(3x148)]x100 =1.35%
RHR-P-2C	Discharge Pressure	RHR-PT-37C TDAS PT 091	0-600	143	± 1%, ± 6 psig	[6/(3x143)]x100 =1.40%
HPCS-P-1	Discharge Pressure	HPCS-PT-4 TDAS PT 107	0-1500	465	± 1%, ± 15 psig	[15/(3x465)]x100 =1.08%

*The above table reflects latest reference values as specified in the implementing procedures. This table will not be updated to reflect small changes in future reference values.

Thus, the range and accuracy of TDAS instruments being used to measure pump discharge pressure result in data measurements of higher accuracy than that required by the Code and thus will provide reasonable assurance of pump operational readiness. It should also be noted that the TDAS system averages many readings, therefore giving a significantly more accurate reading than would be obtained by using the averaging technique as allowed by ISTB-3510(d) on visual observation of a fluctuating test gauge.

3. The range of the pressure transmitters (PTs) used for these applications were selected to bound the expected pump discharge pressure range during all normal and emergency operating conditions (the maximum expected discharge pressure for the RHR and HPCS pumps is approximately 450 psig and 1400 psig respectively). However, during inservice testing the pumps are tested at full flow, resulting in lower discharge pressures than the elevated discharge pressure that can occur during some operating conditions. For this reason the pump reference value is significantly below the maximum expected operational discharge pressure. A reduction of the range of the PTs to three times the reference value would, in these cases, no longer bound the expected discharge pressure range for these pumps, and therefore is not practicable. If a PT were to fail, a like replacement would have to be used due to the above identified reasons of replacing a PT with one not suited for all pump flow conditions. However, this is not a concern because the existing instrumentation provides pump discharge pressure indication of higher accuracy and better resolution than that required by the Code for evaluating pump condition and detecting degradation.

Relief Request – **RP04** (Contd.)

4. NUREG-1482, Revision 2 Section 5.5.1 states that when the range of a permanently installed analog instrument is greater than three times the reference value, but the accuracy of the instrument is more conservative than that required by the Code, the [NRC] staff may grant relief when the combination of the range and accuracy yields a reading that is at least equivalent to that achieved using instruments that meet the Code requirements (i.e. up to ± 6 percent for Group A and B tests, and ± 1.5 percent for pressure and differential pressure instruments for Preservice and Comprehensive tests).

Quality/Safety Impact

TDAS data will consistently provide acceptable accuracy to ensure that the pumps are performing at the flow and pressure conditions to fulfill their design function. TDAS data is sufficiently accurate for evaluating pump condition and in detecting pump degradation. The effect of granting this relief request will have no adverse impact on plant and public safety. Test quality will be enhanced by obtaining slightly better, more repeatable data.

Duration of Proposed Alternative

Fourth 10 year interval.

Precedents

This relief was granted for the third 10 year interval. NRC approval was documented in a letter dated March 23, 2007 (ADAMS Accession Number ML 070600111, TAC No. MD3538) for Relief Request No. RP05.

Relief Request – **RP05**

Proposed Alternative
In Accordance with 10 CFR 50.55a(a)(3)(ii)

– Hardship or Unusual Difficulty
Without Compensating Increase in Level of Quality or Safety –

ASME Code Components Affected

Pump	Code Class	Pump Group	P&ID Dwg. No.	System(s)
SLC-P-1A	2	B	M522	Standby Liquid Control
SLC-P-1B	2	B	M522	

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code

Applicable Code Requirement

Subsection ISTB-3550. When Measuring flow rate, a rate or quantity meter shall be installed in the pump test circuit. If a meter does not indicate the flow rate directly, the record shall include the method used to reduce the data.

Subsection ISTB-5300(a). (1) 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 min. 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. (2) For the Group B test, after the pump conditions are stable, at least one measurement or determination of the quantity required by Table ISTB-3000-1 shall be made and recorded.

Relief is required for Group B and comprehensive and preservice tests.

Reason for Request

A rate or quantity meter is not installed in the test circuit. 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 Standby Liquid Control 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.

Relief Request – **RP05** (Contd.)

Proposed Alternative and Basis for Use

NUREG-1482, Revision 2 Section 5.5.2 states, "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. Therefore, compliance with the Code requirements would be a hardship".

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-3510-1. 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 of determining pump condition.

Quality/Safety Impact

The test tank fluid volume is approximately 236 gallons. The measured flow rate is approximately 43 gpm. The accuracy of the level reading is ± 1/8 inch. The accuracy of volume or level change is ±1/4 inch (1/8 inch at initial level and 1/8 inch at final level). The pump is required 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. A 2% error over 18 inches corresponds to 0.36 inches that is greater than 0.25 inches. 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 for the Standby Liquid Control Pumps, and meet the quality assurance requirements for the Columbia Generating Station.

Duration of Proposed Alternative

Fourth 10 year interval.

Precedents

Similar relief was granted for the third 10 year interval. NRC approval was documented in a letter dated May 15, 2007 (ADAMS Accession Number ML071010344, TAC No. MD3548) for Relief Request No. RP06.

Relief Request – **RP06**

Proposed Alternative
In Accordance with 10 CFR 50.55a(a)(3)(i)

– Alternative Provides Acceptable Level of Quality and Safety –

ASME Code Components Affected

Pump	Code Class	Pump Group	Design Basis Accident Flow rate (GPM)	Test Flow Rate (GPM)
FPC-P-1A	3	A	*575	595 to 605
FPC-P-1B	3	A	*575	595 t0 605
HPCS-P-1	2	B	6250 @ 0 psid	6500 to 6690
HPCS-P-2	3	A	*1022	1030 to 1180
LPCS-P-1	2	B	5625 @ 122 psid	6435 to 6630
RCIC-P-1	2	B	600	610 to 628
RHR-P-2A	2	A	7034 @ 0 psid	7493 to 7550
RHR-P-2B	2	A	7034 @ 0 psid	7493 to 7550
RHR-P-2C	2	A	7034 @ 0 psid	7493 to 7650
SLC-P-1A	2	B	41.2	GE 41.49
SLC-P-1B	2	B	41.2	GE 41.49
SW-P-1A	3	A	*8928	9350 to 10270
SW-P-1B	3	A	*8880	9350 to 10270

*These values are design flow rates rather than design basis accident flow rates.

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code.

Applicable Code Requirement

ISTB-5123(e), Comprehensive Test Procedure refers to Table ISTB-5121-1 "Centrifugal Pump Test Acceptance Criteria" that requires "Required Action Range" High limit of 3% above the established reference value for the measured hydraulic value of differential pressure or flow rate for the Comprehensive Test.

ISTB-5223(e), Comprehensive Test Procedure refers to Table ISTB-5221-1 Vertical Line Shaft Centrifugal Pump Test Acceptance Criteria that requires "Required Action Range" High limit of 3% above the established reference value for the measured hydraulic value of differential pressure or flow rate for the Comprehensive Test.

Relief Request – **RP06** (Contd.)

ISTB-5323(e), Comprehensive Test Procedure refers to Table ISTB-5321-2 Reciprocating Positive Displacement Pump Test Acceptance Criteria that requires "Required Action Range" High limit of 3% above the established reference value for the measured hydraulic value of discharge pressure or flow rate for the Comprehensive Test.

Reason for Request

For some comprehensive pump tests, Energy Northwest had difficulty in implementing the high required action range limit of 1.03% above the established hydraulic parameter reference value due to normal data scatter. Energy Northwest had to develop contingency plans in the pump operability surveillance procedures in the event the pump enters the action high range and is declared inoperable and applicable Technical Specification LCO entered for reasons other than a pump degradation issue.

Based on the similar difficulties experienced by other Owners, ASME OM Code Case OMN-19 was developed and has been published in the ASME OM-2012 edition. The white paper for this code case, Standards Committee Ballot 09-610, record 09-657, discussed the impact of instrument inaccuracies, human factors involved with setting and measuring test parameters, readability of gauges and other miscellaneous factors on the ability to meet the 1.03% acceptance criteria. Industry operating experience is also discussed in the white paper.

Code Case OMN-19 has not been approved for use in RG 1.192, "Operations and Maintenance Code Case Acceptability, ASME OM Code."

Proposed Alternative and Basis for Use

Columbia Generating Station proposes to use the ASME OM Code Case OMN-19 as published in ASME OM-2012 edition for the fourth ten year interval of IST Program. The 2012 edition of Operation and Maintenance of Nuclear Power Plants, was approved by the ASME Board on Nuclear Codes and Standards on December 21, 2012. ASME OMN-19 code case allows the use of a multiplier of 1.06 times the reference value in lieu of the 1.03 multiplier for the comprehensive pump test's upper "Acceptable Range" criteria and "Required Action Range, High" criteria referenced in the applicable ISTB test acceptance criteria tables ISTB-5121-1, ISTB-5221-1, and ISTB-5321-2.

As stated in the Standards Committee Ballot white paper, this issue was also discussed at the ASME/NRC special meeting on June 4th, 2007. The NRC questioned the basis for the upper required action limits. The inaccuracies that are the basis for the change as discussed in the white paper are summarized below.

1. Instrument inaccuracies of measured hydraulic value.
2. Instrument inaccuracies of set value and its effect on measured value.
3. Instrument inaccuracies and allowed tolerance for speed.
4. Human factors involved with setting and measuring flow, D/P, and speed.
5. Readability of Gauges based on the smallest gauge increment.
6. Miscellaneous Factors.

Relief Request – **RP06** (Contd.)

The above discussed inaccuracies associated with obtaining the comprehensive pump test hydraulic data may easily cause the measured value to exceed the existing code allowed upper required action limit of 3%. The new upper limit of 6% as approved in the code case OMN-19 will eliminate declaring the pump inoperable and entering unplanned Technical Specification LCO.

The mandatory Appendix V pump periodic verification test program has been published in ASME OM-2012 edition. This mandatory appendix contains requirements to augment the rules of subsection ISTB for inservice testing of pumps. It also states that the Owner is not required to perform a pump periodic verification test if the design basis accident flow rate in the Owner's safety analysis is bounded by the comprehensive pump test or Group A test. As specified in the pump table above, the quarterly Group A or B and biennial comprehensive tests bound the verification of pump design basis flow rate and associated differential pressure or discharge pressure for positive displacement pumps.

Quality/Safety Impact

Using the upper limit of 1.06 times the reference value in lieu of the 1.03 multiplier for the comprehensive pump test's upper "Acceptable Range" criteria and "Required Action Range, High" criteria referenced in the applicable ISTB test acceptance criteria tables will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Each pump performance is also monitored by subsection ISTB required quarterly applicable Group A or Group B test that verifies operational readiness of the pump. The quarterly Group A or B pump test and biennial comprehensive pump test bounds the verification of pump design basis flow rate and associated differential or discharge pressure as applicable.

Duration of Proposed Alternative

Fourth 10 year interval.

Precedents

None

References

1. Code Case OMN-19, Alternative Upper Limit for the Comprehensive Pump Test. Published In ASME OM-2012 Edition.

2. Division 1, Mandatory Appendix V Pump Periodic Verification Test Program. Published In ASME OM-2012 Edition.

3. White Paper for ISTB Code Change, December / 2007, [Standards Committee Ballot 09-610, Record 09-657] Change C, A relaxation of the high required action range for the Comprehensive Pump Test Hydraulic Parameters (1.03 to 1.06)

Relief Request – **RV01**

Relief Request
in Accordance with 10 CFR 50.55a(f)(5)(iii)

– Inservice Testing Impracticality –

ASME Code Components Affected

Affected Valves	Class	Cat.	Function	System(s)
CVB-V-1AB, CVB-V-1CD, CVB-V-1EF, CVB-V-1GH, CVB-V-1JK, CVB V-1LM, CVB-V-1NP, CVB-V-1QR, CVB-V-1ST	2	AC	To break vacuum on the drywell to suppression chamber downcomers and to limit steam leakage from the downcomer to the wetwell gas space.	Primary Containment Cooling and Purge

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code

Applicable Code Requirement

OM Subsection ISTC-3630, Leakage Rate for Other Than Containment Isolation Valves.

Impracticality of Compliance

These check valves cannot be tested individually therefore, assigning a limiting leakage rate for each valve or valve combination is not practical.

Burden Caused by Compliance

Subsection ISTC-3630 requires Category A valves, other than containment isolation valves, to be individually leak tested at least once every two years. Each vacuum relief valve assembly consists of two independent testable check valves in series with no instrument located between them to allow testing of each of the two check valves. 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.

Proposed Alternative and Basis for Use

These valves will be leak tested in accordance with 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.

Relief Request – **RV01** (Contd.)

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 also verified-closed by position indicators, exercised, and tested in the open direction using a torque wrench per Technical Specification SR 3.6.1.7.1, SR 3.6.1.7.2, and SR 3.6.1.7.3. In accordance with a separate commitment, the valves are visually inspected each refueling outage.

Quality/Safety Impact

The leakage criteria and corrective actions specified in the Columbia Generating Station 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 refuel outage provides adequate assurance of the relief valve assembly's ability to remain leak tight and to prevent a suppression pool bypass. Thus, proposed alternative provides adequate assurance of material quality and public safety.

Duration of Proposed Alternative

Fourth 10 year interval.

Precedents

This relief was granted for the third 10 year interval. NRC approval was documented in a letter dated May 15, 2007 (ADAMS Accession Number ML 071010344, TAC No. MD3549) for Relief Request No. RV01.

References

Letter dated February 9, 2007, Carl F. Lyon (NRC) to J. V. Parish (Energy Northwest), "Columbia Generating Station - Issuance of Amendment RE: Suppression Chamber-to-Drywell Vacuum Breakers and Drywell-to-Suppression Chamber Bypass Leakage Test (TAC No. MD1225)".

Relief Request – **RV02**

Proposed Alternative
in Accordance with 10 CFR 50.55a(a)(3)(i)

– Alternative Provides Acceptable Level of Quality and Safety –

ASME Code Components Affected

Affected Valves	Class	Cat.	Function	System(s)
PSR-V-X73-1	2	A	Containment Isolation	Post Accident Sampling
PSR-V-X80-1	2	A		
PSR-V-X83-1	2	A		
PSR-V-X77A1	1	A		
PSR-V-X82-1	2	A		
PSR-V-X84-1	2	A		
PSR-V-X77A3	1	A		
PSR-V-X82-7	2	A		
PSR-V-X88-1	2	A		

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code

Applicable Code Requirement

OM Subsection ISTC-5150, Solenoid-Operated Valves, Stroke Testing

Reason for Request

Subsection ISTC-5151(c) requires the stroke time of all solenoid-operated valves to be measured to at least the nearest second. These nine PSR solenoid valves are the inboard Containment Isolation Valve for nine different penetrations and are operated from a single keylock control switch. It is impractical to measure the individual valve stroke times. To do so would require repetitive cycling of the control switch causing unnecessary wear on the valves and control switch with little compensating benefit.

Relief Request – **RV02** (Contd.)

Proposed Alternative and Basis for Use

All of these solenoid valves stroke in less than 2 seconds and are considered Fast-Acting valves. Their safety function is to close to provide containment isolation. The stroke time of the slowest valve will be measured by terminating the stroke time measurement when the last of the nine indicating lights becomes illuminated. If the stroke time of the slowest valve is in the acceptance range (less than or equal to 2 seconds), then the stroke times of all valves will be considered acceptable. However, if the stroke time of the slowest valve exceeds the acceptance criteria (2 seconds), all 9 valves will be declared inoperable and corrective actions in accordance with Subsection ISTC-5153 taken. After corrective actions, the required reference values shall be established in accordance with ISTC-3300. Also any abnormality or erratic action shall be recorded and an evaluation shall be made regarding need for corrective action as required by ISTC-5151(d).

Quality/Safety Impact

The proposed alternate testing will verify that the valves respond in a timely manner and provide information for monitoring signs of material degradation. This provides adequate assurance of material quality and public safety.

Duration of Proposed Alternative

Fourth 10 year interval.

Precedents

Similar relief was granted for the third 10 year interval. NRC approval was documented in a letter dated March 23, 2007 (ADAMS Accession Number ML 070600111, TAC No. MD3550) for Relief Request No. RV03.

Relief Request – **RV03**

Proposed Alternative
in Accordance with 10 CFR 50.55a(a)(3)(i)

– Alternative Provides Acceptable Level of Quality and Safety –

ASME Code Components Affected

Affected Valves	Class	Cat.	Function	System(s)
MS-RV-1A, B, C, D	1	C	Overpressure Protection	Main Steam
MS-RV-2A, B, C, D	1	C		
MS-RV-3A, B, C	1	C		
MS-RV-3D	1	C	Overpressure Protection and Auto Depressurization System to lower reactor pressure sufficient to allow initiation of Low Pressure Coolant Injection (RHR, LPCI mode)	
MS-RV-4A, B, C, D	1	C		
MS-RV-5B, C	1	C		

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code

Applicable Code Requirement

Mandatory Appendix I, Paragraph I-3310: Sequence of Periodic Testing of Class 1 Main Steam Pressure Relief Valves with Auxiliary Actuating Devices.

Mandatory Appendix I, Paragraph I-3310, states that tests before maintenance or set-pressure adjustment, or both, shall be performed for I-3310(a), (b), and (c) in sequence. The remaining shall be performed after maintenance or set-pressure adjustments:

(a) visual examination;
(b) seat tightness determination, if practicable;
(c) set-pressure determination;
(d) determination of electrical characteristics and pressure integrity of solenoid valve(s);
(e) determination of pressure integrity and stroke capability of air actuator;
(f) determination of operation and electrical characteristics of position indicators;
(g) determination of operation and electrical characteristics of bellows alarm switch;
(h) determination of actuating pressure of auxiliary actuating device sensing element, where applicable, and electrical continuity; and
(i) determination of compliance with the Owner's seat tightness criteria.

Relief Request – **RV03** (Contd.)

Reason for Request

Relief is requested from requirements for sequence of periodic testing of Class 1 Main Steam pressure relief valves with auxiliary actuating devices.

1. Remote set pressure verification devices (SPVDs) have been permanently installed on all eighteen Main Steam Relief Valves (MSRVs) to allow set pressure testing at low power operation, typically during shutdown for refueling outage and on startup if necessary. These SPVDs incorporate a nitrogen powered metal bellows assembly that adds a quantified lifting force on the valve stem until the MSRV's popping pressure is reached. During normal power operation, these SPVDs remain deenergized and do not interfere with normal safety or relief valve functions. Removal and replacement of the MSRVs is normally performed only for valve maintenance and not for the purpose of As-Found set pressure determination. MSRVs are removed and replaced for maintenance purposes (e.g., seat leakage, refurbishment) nominally each refueling outage. The valves which are required to be As-Found set pressure tested, as part of the Code required periodic testing, do not necessarily correspond to those required to be replaced for maintenance. Actuators and solenoids are separated from the valve and remain in place when MSRVs are removed and replaced for maintenance.

   As found visual examinations cannot be performed per the Code required sequence while the drywell is inerted. Visual examinations are performed after reactor shutdown but prior to valve maintenance or set-pressure adjustments.

   If due to a reactor scram, MSRV periodic set pressure testing could not be performed at power during shutdown for refueling outage, it will be required to be performed during power ascension from refueling outage or by removing the valves and sending them to the vendor for as-found set pressure testing. This would require Paragraphs I-3310(a), (d), (e), (f), and (h) tests to be performed during outage prior to Paragraphs I-3310(b), (c) and (i) tests. Paragraph I-3310(g) is not applicable to these valve designs.

2. "Valves" and "accessories" (actuators, solenoids, etc.) have different maintenance and test cycles due to the methods used for maintenance and testing at Columbia Generating Station as discussed in item 1, and should be considered separately for the purposes of meeting the required test frequency and testing requirements. Valve testing (i.e., visual examination, seat tightness, set pressure determination and compliance with Owner's seat tightness criteria, in accordance with Paragraphs I-3310(a), (b), (c) and (i)) are independent of and can be separate from testing of "accessories" (i.e., solenoids, actuator, position indicators and pressure sensing element, in accordance with Paragraphs I-3310(d), (e), (f), and (h)). Paragraph I-3310 states that tests before maintenance or set-pressure adjustment, or both, shall be performed for I-3310(a), (b), and (c) in sequence. The remaining shall be performed after maintenance or set pressure adjustments. Valve maintenance or set pressure adjustment does not affect "accessories" testing; likewise, maintenance on "accessories" does not affect valve set pressure or seat leakage. Therefore, the MSRVs and the "accessories" may be tracked separately for the purpose of satisfying the Paragraph I-1320 test frequency requirements.

Relief Request – **RV03** (Contd.)

3. Paragraph I-3310(f) requires determination of operation and electrical characteristics of position indicators, and Paragraph I-3310(h) requires determination of actuating pressure of auxiliary actuating device sensing element and electrical continuity. These tests are required to be performed at the same frequency as the valve set pressure and auxiliary actuating device testing.

   The position indicators are all calibrated and functional tested during outages; the sensing elements (pressure switches) are all checked and calibrated at least once per 24 months. Although the existing tests do not have a one-to-one correlation to the valve or actuator tests, these calibrations and functional tests meet all testing requirements of this Subsection, and far exceed the required test frequency and testing requirements.

Proposed Alternative and Basis for Use

1. "Valves" and "accessories" (actuators, solenoids, etc.) shall be tested separately and meet Paragraph I-1320 test frequency requirements. Since the valve and actuator test and maintenance cycles are different, the plant positions of the actuators selected, or due, for periodic testing may not match the plant positions of the MSRVs selected, or due, for As-Found set pressure testing.

   MSRV periodic set pressure testing will normally be performed at power during shutdown for refueling outage. As-found visual examination will be performed after set-pressure testing, which is out of the specified Code required sequence.

   If MSRV periodic set pressure testing could not be performed at power during shutdown for refueling outage due to reactor scram it will be required to be performed during power ascension from refueling outage or by removing the valves and sending them to the vendor for as-found set pressure testing. This will require Paragraphs I-3310(a), (d) and (e) tests to be performed during outage prior to Paragraphs I-3310(b), (c) and (i) tests.

   The actuators and solenoids will be tested at the end of the outage after other maintenance is complete, and the tests will be credited as satisfying the Code periodic test requirements provided that no actuator or solenoid maintenance (other than actuator assembly re-installation on a replaced valve) is performed that would affect their As-Found status prior to testing or that could affect the valve's future set pressure determination.

2. All MSRV position indicators will continue to be tested in accordance with existing surveillance procedures for monthly channel checks, and for channel calibration and channel functional testing at least once per 24 months during shutdowns. These tests will be credited for satisfying the requirements of Paragraph I-3310(f).

3. All auxiliary actuating device sensing elements (pressure switches) will continue to be tested and calibrated on a 24 month frequency. These tests will be credited for satisfying the requirements of paragraph I-3310(h).

Relief Request – **RV03** (Contd.)

Quality/Safety Impact

Due to different maintenance and test cycles of valves and accessories and also due to methods used for testing and maintenance, it is impractical to meet the Code required testing requirements without subjecting the valves to unnecessary challenges and increased risk of seat degradation. The requirement for testing actuators and accessories in a specific sequence does not enhance system or component operability, or in any way improve nuclear safety. The proposed alternate testing adequately evaluates the operational readiness of these valves commensurate with their safety function. This will help reduce the number of challenges and failures of safety relief valves and still provide timely information regarding operability and degradation. This will provide adequate assurance of material quality and public safety.

Duration of Proposed Alternative

Fourth 10 year interval.

Precedents

Similar relief was granted for the third 10 year interval. NRC approval was documented in a letter dated March 23, 2007 (ADAMS Accession Number ML 070600111, TAC No. MD3551) for Relief Request No. RV04.

Relief Request – **RV04**

Proposed Alternative
in Accordance with 10 CFR 50.55a(a)(3)(i)

– Alternative Provides Acceptable Level of Quality and Safety –

ASME Code Components Affected

Affected Valves	Class	Cat.	System(s) / Function
PI-EFC-X37E, PI-EFC-X37F	1	C	System(s): Process Instrumentation for various systems connected to RPV Function: Excess flow check valves are provided in each instrument process line that is part of the reactor coolant pressure boundary. Design and installation of the excess flow check valves at Columbia Generating Station conform to Regulatory Guide 1.11. Close: The reactor instrument line excess flow check valves close to limit the flow in the respective instrument lines in the event of an instrument line break downstream of the EFCVs outside containment.
PI-EFC-X38A, PI-EFC-X38B, PI-EFC-X38C, PI-EFC-X38D, PI-EFC-X38E, PI-EFC-X38F	1	C	
PI-EFC-X39A, PI-EFC-X39B, PI-EFC-X39D, PI-EFC-X39E	1	C	
PI-EFC-X40C, PI-EFC-X40D	1	C	
PI-EFC-X40E, PI-EFC-X40F	2	C	
PI-EFC-X41C, PI-EFC-X41D	1	C	
PI-EFC-X41E, PI-EFC-X41F	2	C	
PI-EFC-X42A, PI-EFC-X42B	1	C	
PI-EFC-X44AA, PI EFC X44AB, PI-EFC-X44AC, PI-EFC-X44AD, PI-EFC-X44AE, PI-EFC-X44AF, PI-EFC-X44AG, PI-EFC-X44AH, PI-EFC-X44AJ, PI-EFC-X44AK, PI-EFC-X44AL, PI-EFC-X44AM	1	C	
PI-EFC-X44BA, PI-EFC-X44BB, PI-EFC-X44BC, PI-EFC-X44BD, PI-EFC-X44BE, PI-EFC-X44BF, PI-EFC-X44BG, PI-EFC-X44BH, PI-EFC-X44BJ, PI-EFC-X44BK, PI-EFC-X44BL, PI-EFC-X44BM	1	C	
PI-EFC-X61A, PI-EFC-X61B	1	C	
PI-EFC-X62C, PI-EFC-X62D	1	C	
PI-EFC-X69A, PI-EFC-X69B, PI-EFC-X69E	1	C	
PI-EFC-X70A, PI-EFC-X70B, PI-EFC-X70C, PI-EFC-X70D, PI-EFC-X70E, PI-EFC-X70F	1	C	
PI-EFC-X71A, PI-EFC-X71B, PI-EFC-X71C, PI-EFC-X71D, PI-EFC-X71E, PI-EFC-X71F	1	C	
PI-EFC-X72A	1	C	
PI-EFC-X73A	1	C	

Relief Request – **RV04** (Contd.)

Affected Valves	Class	Cat.	System(s) / Function
PI-EFC-X74A, PI-EFC-X74B, PI-EFC-X74E, PI-EFC-X74F	1	C	System(s): Process Instrumentation for various systems connected to RPV Function: Excess flow check valves are provided in each instrument process line that is part of the reactor coolant pressure boundary. Design and installation of the excess flow check valves at Columbia Generating Station conform to Regulatory Guide 1.11. Close: The reactor instrument line excess flow check valves close to limit the flow in the respective instrument lines in the event of an instrument line break downstream of the EFCVs outside containment
PI-EFC-X75A, PI-EFC-X75B, PI-EFC-X75C, PI-EFC-X75D, PI-EFC-X75E, PI-EFC-X75F	1	C	
PI-EFC-X78B, PI-EFC-X78C, PI-EFC-X78F	1	C	
PI-EFC-X79A, PI-EFC-X79B	1	C	
PI-EFC-X106	1	C	
PI-EFC-X107	1	C	
PI-EFC-X108	1	C	
PI-EFC-X109	1	C	
PI-EFC-X110	1	C	
PI-EFC-X111	1	C	
PI-EFC-X112	1	C	
PI-EFC-X113	1	C	
PI-EFC-X114	1	C	
PI-EFC-X115	1	C	

Applicable Code Edition and Addenda

The 2004 Edition and the 2005 and 2006 Addenda of the ASME OM Code

Applicable Code Requirement

OM Subsection ISTC-3522(c), Category C Check Valves. If exercising is not practicable during operation at power and cold shutdowns, it shall be performed during refueling outages.

OM Subsection ISTC-3700, Valve Position Verification. Valves with remote position indicators shall be observed locally at least once every 2 years to verify that valve operation is accurately indicated. Where practicable, this local observation should be supplemented by other indications such as use of flow meters or other suitable instrumentation to verify obturator position. These observations need not be concurrent. Where local observation is not possible, other indications shall be used for verification of valve operation.

Reason for Request and Basis for Use

ASME OM Code Subsection ISTC requires testing of active or passive valves that are required to perform a specific function in shutting down a reactor to the cold shutdown condition, in maintaining the cold shutdown condition, or in mitigating the consequences of an accident. The EFCVs are not required to perform a specific function for shutting down or maintaining the reactor in a cold shutdown

Relief Request – **RV04** (Contd.)

condition. Additionally, the reactor instrument lines are assumed to maintain integrity for all accidents except for the Instrument Line Break Accident (ILBA) as described in Final Safety Analysis Report (FSAR) Subsection 15.6.2. The reactor instrument lines at Columbia Generating Station have a flow-restricting orifice upstream of the EFCV to limit reactor coolant leakage in the event of an instrument line rupture. Isolation of the instrument line by the EFCV is not credited for mitigating the ILBA. Thus, a failure of an EFCV is bounded by the Columbia Generating Station safety analysis. These EFCVs close to limit the flow of reactor coolant to the secondary containment in the event of an instrument line break and as such are included in the IST program at the Owner's discretion and are tested in accordance with the amended Technical Specification SR 3.6.1.3.8.

The GE (General Electric) Licensing Topical Report, NEDO-32977-A dated November 1998 (Reference 2), and associated NRC safety evaluation, dated March 14, 2000, provides the basis for this relief. The report provides justification for relaxation of the testing frequency as described in the amended Technical Specification SR 3.6.1.3.8. The report demonstrates the high degree of EFCV reliability and the low consequences of an EFCV failure. Excess flow check valves have been extremely reliable throughout the industry. Based on 15 years of testing (up to year 2000) with only one (1) failure, the Columbia Generating Station revised Best Estimate Failure Rate is 7.9E-8 per hour; less than the industry average of 1.01E-7 per hour. There have been no failures since year 2000. Technical Specification amendment request for SR 3.6.1.3.8 was reviewed by the NRC staff in safety evaluation (SE) dated February 20, 2001 (Reference 3).

Failure of an EFCV, though not expected as a result of the amended Technical Specification change, is bounded by the Columbia Generating Station safety analysis. Based on the GE Topical report and the analysis contained in the FSAR, the proposed alternative to the required exercise frequency and valve indication verification frequency for EFCVs provide an acceptable level of quality and safety. In Reference 3, the NRC staff concluded that the increase in risk associated with the relaxation of EFCV testing is sufficiently low and acceptable.

Proposed Alternative

Energy Northwest requests relief pursuant to 10 CFR 50.55a(a)(3)(i) to test reactor instrument line excess flow check valves in accordance with the amended Technical Specification SR 3.6.1.3.8. This SR requires verification every 24 months that a representative sample of reactor instrument line EFCVs actuate to the isolation position on an actual or simulated instrument line break signal. The representative sample consists of an approximately equal number of EFCVs such that each EFCV is tested at least once every 10 years (nominal). Valve position indication verification of the representative sample will also be performed during valve testing. Any EFCV failure will be evaluated per the Columbia Generating Station Corrective Action Program.

Duration of Proposed Alternative

Fourth 10 year interval.

Relief Request – **RV04** (Contd.)

Precedents

This relief was granted for the third 10 year interval. NRC approval was documented in a letter dated March 23, 2007 (ADAMS Accession Number ML 070600111, TAC No. MD3552) for Relief Request No. RV05.

References

1. FSAR 15.6.2

2. Letter BWROG-00069, dated June 14, 2000, from W.G. Warren, (BWR Owners Group) to Office of Nuclear Reactor Regulation, "Transmittal of Approved GE Licensing Topical Report NEDO-32977-A, Excess Flow Check Valve Testing Relaxation", dated November 1998

3 Letter dated February 20, 2001, Jack Cushing (NRC) to JV Parish (EN), "Columbia Generating station - Issuance of Amendment RE: Technical Specifications Surveillance Requirement 3.6.1.3.8 (TAC NO. MB0421)"