March 23, 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. RP04, RP05, RP07, RV03, RV04, AND RV05 FOR THE THIRD 10-YEAR INSERVICE TESTING PROGRAM INTERVAL (TAC NOS. MD3537, MD3538, MD3539, MD3541, MD3542, MD3550, MD3551, AND MD3552)

Dear Mr. Parrish:

By letter dated October 10, 2005, as supplemented by letter dated February 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.

By letter dated March 22, 2007, the licensee withdrew relief requests RP02 and RP08. Based on the information provided in the relief request, the NRC staff concluded that the following requests for relief were acceptable: RP04, RP05, RP07, RV03, RV04, and RV05.

For relief request RP04, 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 requests RP05, RP07, RV03, RV04, and RV05, the licensee's proposed alternatives are authorized pursuant to 10 CFR 50.55a(a)(3)(i) based on the determination that the proposed alternatives provide an acceptable level of quality and safety.

The above reliefs are applicable to the third 10-year IST program interval for CGS. Relief requests RP01, RP03, RP06, RV01, and RV02 will be addressed by separate NRC correspondence.

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/

David Terao, 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. RP04, RP05, RP07, RV03, RV04, AND RV05

ENERGY NORTHWEST

COLUMBIA GENERATING STATION

DOCKET NO. 50-397

1.0 INTRODUCTION

By letter dated October 10, 2005, as supplemented by letter dated February 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). The Nuclear Regulatory Commission (NRC) evaluation of relief requests RP04, RP05, RP07, RV03, RV04, and RV05 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 or requesting relief, the licensee must demonstrate that: (1) the proposed alternatives provide an acceptable level of quality and safety; (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety; or (3) conformance is impractical for the 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'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 RP04

3.1.1 Code Requirements

The applicable Code edition and addenda for CGS is ASME OM Code, 2001 Edition through the 2003 Addenda.

Pump RCIC-P-1 (Centrifugal Pump)

Group B Test: ISTB-5122(a) states that the pump shall be operated at nominal motor speed for constant-speed drives or at a speed adjusted to the reference point (±1 percent) for variable-speed drives. ISTB-5122(b) states that the differential pressure or flow rate shall be determined and compared to its reference value. ISTB-5122(c) states that the system resistance may be varied as necessary to achieve the reference point.

Comprehensive Test: ISTB-5123(a) states that the pump shall be operated at nominal motor speed for constant-speed drives or at a speed adjusted to the reference point (±1 percent) for variable-speed drives. ISTB-5123(b) states that for centrifugal and vertical line shaft pumps, 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.

Pumps LPCS-P-1, RHR-P-2A, RHR-P-2B, RHR-P-2C, and HPCS-P-1 (Vertical-line Shaft Centrifugal Pumps)

Group B Test: ISTB-5222(b) states that the pump shall be operated at nominal motor speed for constant-speed drives or at a speed adjusted to the reference point (±1 percent) for variable-speed drives. ISTB-5222(c) states that system resistance may be varied as necessary to achieve the reference point.

Group A and Comprehensive Test: ISTB-5221(b) states that 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. ISTB-5223(b) states that 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.

3.1.2 Licensee's Basis for Relief Request

The licensee requests relief from pump testing requirements of the ASME OM Code for the following pumps:

Pump	ASME Code Class	Pump Group	System
LPCS-P-1	2	B	Low-Pressure Core Spray
RHR-P-2A	2	A	Residual Heat Removal
RHR-P-2B	2	A	
RHR-P-2C	2	A	
HPCS-P-1	2	B	High-Pressure Core Spray
RCIC-P-1	2	B	Reactor Core Isolation Cooling

Relief is requested for pump RCIC-P-1 from the requirements of the ASME OM Code Paragraphs ISTB-5122(a), (b), and (c) for Group B testing and ISTB-5123(a) and (b) for Comprehensive testing. Relief is also requested for pumps LPCS-P-1, RHR-P-2A, RHR-P-2B, RHR-P-2C, and HPCS-P-1 from the requirements of the ASME OM Code, Paragraphs ISTB-5222(b) and ISTB-5222(c) Group B testing, and ISTB 5221(b) and ISTB-5223(b) for Group A and Comprehensive testing. The licensee has proposed to use reference-pump curves instead of fixed reference values in the pump testing.

Relief is requested pursuant to 10 CFR 50.55a(f)(5)(iii), as the IST for these pumps using fixed reference values is impractical for the following reason:

The impracticality of compliance with the Code is due to the establishment of specific reference values as being impractical for these pumps. The burden caused by compliance with the Code is that the 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 IST) 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 the percent they are 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.

3.1.3 Licensee's Proposed Alternative Testing

As discussed in Section 3.1.2, 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 Revision 1, Paragraph 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-9, "Use of Pump Curves for Testing," is included in Regulatory Guide (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 percent of the reference-flow rate and the corresponding differential pressure shall be measured and compared to the reference-differential pressure value determined from the reference-pump curve established for this narrow range of flow rate. The slope of the reference-pump 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's pump curves in the stable design-flow rate region.

For pump RCIC-P-1, both flow rate and speed are adjusted to be within ±2 percent of their respective reference values and the differential pressure is measured.

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. differential pressure) has been established for pumps RHR-P-2A, RHR-P-2B, and RHR-P-2C 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 percent 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. Additionally, evaluation of the manufacturer's pump data, preoperational and special test data used to establish the reference-pump curve indicates insignificant change (0.25 pounds per square inch/gallons per minute (psi/gpm)) in differential pressure with small variation (±12 gpm) in flow rate.

3. For pumps HPCS-P-1 and LPCS-P-1, the reference-pump curve is based on the manufacturer's pump curve which was validated during the preoperational testing.

4. Pump curves for RHR-P-2A, RHR-P-2B, RHR-P-2C, and RCIC-P-1 are based on seven or more test points beyond the flat portion of the curve. These pumps have minimum flow-rate requirements specified in Technical Specifications (TSs) and are being tested at or near full-design flow rate.

5. To reduce the uncertainty associated with the pump curves and to ensure the adequacy of the acceptance criteria, special test gauges (±0.5 percent 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.

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

7. Acceptance criteria curves are based on differential pressure limits given in the applicable Table ISTB-5100-1 or Table ISTB-5200-1. The acceptance criteria limits do not conflict with TSs or Final Safety Analysis Report (FSAR) operability criteria.

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

3.1.4 Evaluation

ASME OM Code, 2001 Edition with 2002 and 2003 Addenda, ISTB-5122, "Group B Test Procedure," ISTB-5123, "Comprehensive Test Procedure," ISTB-5123, and ISTB-5221, "Group A Test Procedure," require that pump-flow rate and differential pressure be evaluated against reference values to monitor pump condition and allow detection of hydraulic degradation. For pumps where it is impractical to test at a reference value of flow and differential pressure, testing in the "as-found" condition and comparing values to an established reference curve may be an acceptable alternative. Pump curves represent an infinite set of reference points of flow rate and differential pressure. Establishing a reference curve for a pump when it is known to be operating acceptably, and basing the acceptance criteria on this curve, can permit evaluation of pump condition and detection of degradation, though not in accordance with the Code. There is, however, a higher degree of uncertainty associated with using a curve to assess operational readiness. Therefore, the development of the reference curve should be completed as accurately as possible. Additionally, when using reference curves, it may be more difficult to identify instrument drift or to trend changes in component condition.

For the pumps LPCS-P-1, RHR-P-2A, RHR-P-2B, RHR-P-2C, HPCS-P-1, and RCIC-P-1, the licensee has stated that it is impractical to alter the pump-flow rate to obtain a repeatable reference value. The flow-control valves used in these systems are large motor-operated globe

valves which do not have any position indication that would facilitate achieving a repeatable reference value. Requiring the licensee to install flow-control valves with more accurate flow adjustment capability would be a burden because of the design, fabrication, and installation changes that would have to be made.

The licensee has proposed to limit the variance in the flow rate of these pumps to ±2 percent of the reference-flow rate. This is different from the Code, which requires that the flow rate be within ±1 percent of the reference-flow rate. The licensee proposes this higher variance due to their past attempts (documented in their submittal dated December 22, 1992) to obtain the ±1 percent variance of the value. These attempts resulted in testing which required up to 2 hours of jogging the throttle valve to achieve the desired flow rate. Therefore the licensee has provided reference-pump curves for Group A and Group B pumps which reflect the ±2 percent variance in the pump-flow rate. The licensee stated that these curves were developed when the pumps were known to be operating acceptably. The data points were generated by instrumentation that was at least as accurate as required by the Code. The range covered by the curve does not reside on the flat portion of the pump curve and its acceptance criteria is based on the differential pressure limits in Table ISTB-5100-1 or Table ISTB-5200-1. The licensee stated that these acceptance limits do not conflict with TS or FSAR operability criteria. The licensee also stated that pump vibration does not vary significantly over the range of pump curves being used; therefore, one reference-vibration value has been assigned for each vibration location. Finally, the licensee stated that a new reference-pump curve containing a minimum of 5 points will be generated after any maintenance or repair is performed on the pump which could possibly affect the existing pump curve. The alternative procedure described by the licensee to generate and validate reference-pump curves for purposes of IST related to the use of reference curves provides an adequate method for monitoring the hydraulic condition of these pumps when it is impractical to meet the Code requirements.

The proposed alternative testing follows the guidance of Code Case OMN-9 and will provide a reasonable assurance of the operational readiness of the pumps listed above.

3.1.5 Conclusion

Based on the above evaluation, the NRC staff concludes it is impractical for the licensee to comply with the specified requirement. Granting relief pursuant to paragraph 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 licensee's proposed alternative provides reasonable assurance of the operational readiness of the pumps. This relief is granted for the third 10-year IST program interval.

3.2 Pump Relief Request RP05

3.2.1 Code Requirements

The applicable Code edition and addenda for CGS is ASME OM Code, 2001 Edition through the 2003 Addenda.

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

3.2.2 Licensee's Basis for Relief Request

The licensee requests relief from ISTB-3510(b)(1) for the pumps listed below for Group A testing, Group B testing, and preservice testing. The Licensee proposed to use TDAS points to measure discharge pressure during Group A and B pump IST in lieu of using analog instruments. Temporary test gauges meeting the Code requirements shall be used for the comprehensive pump tests.

Pump	Code Class	Pump Group	System
RHR-P-2A	2	A	Residual Heat Removal (RHR)
RHR-P-2B	2	A	
RHR-P-2C	2	A	
HPCS-P-1	2	B	High-Pressure Core Spray (HPCS)

Relief is requested pursuant to 10 CFR 50.55a(a)(3)(i), as the proposed alternative would provide an acceptable level of quality and safety.

3.2.3 Licensee's Proposed Alternative Testing

During Group A and B pump IST, pump-discharge pressure, which is used to determine differential pressure, shall be measured by respective TDAS points listed below for each pump. TDAS data averages 100 readings taken at an interval of 1 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.

2. Since the TDAS data is being obtained to an accuracy of ±1 percent of full scale, it consistently yields measurements more accurate than would be provided by instruments meeting the Code accuracy requirement of ±2 percent of full scale

and range requirement of three times the reference value. Equivalent Code accuracy being obtained by TDAS measurements is calculated 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	132	±1%, ±6 psig	[6/(3x132)]x100=1.52%
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	430	±1%, ±15 psig	[15/(3x430)]x100=1.16%

* The licensee has stated that the reference values are specified in the implementing procedures. This table will not be updated to reflect small changes in reference values.
**Pounds per square inch gauge.

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 visual observation of a gauge.

3. The ranges 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 pressures for the RHR and HPCS pumps are approximately 450 psig and 1400 psig, respectively). However, during IST, 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.

4. NUREG-1482, Revision 1, Paragraph 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 the 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).

3.2.4 Evaluation

The licensee has requested relief from the Code instrument range requirements for the instruments listed in this relief request which are used for Group A, Group B, and preservice testing of pumps RHR-P-2A, RHR-P-2B, RHR-P-2C, and HPCS-P-1. The Code requires that the full-scale range of each instrument shall be three times the reference value or less. The licensee has proposed to use the installed instrumentation to measure pump-discharge pressure.

The installed instruments are calibrated to an accuracy of ±1 percent of full scale. The licensee's calculations provided in the table in Section 3.2.3 show that the actual variance has a value which is less than the maximum variance allowed by the Code. The installed instrumentation provides an acceptable level of quality and safety because the variance in the actual test results is more conservative than that allowed by the Code for analog instruments. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the pumps.

3.2.5 Conclusion

Based on the above evaluation, the NRC staff concludes that the licensee's proposed alternative to the Code accuracy requirements for instruments during pump testing is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the alternative provides an acceptable level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the pumps. This alternative is authorized for the third 10-year IST program interval.

3.3 Pump Relief Request RP07

3.3.1 Code Requirements

The applicable Code edition and addenda for CGS is ASME OM Code, 2001 Edition through the 2003 Addenda.

ISTB-3510(b)(2) states that digital instruments shall be selected such that the reference value does not exceed 70 percent of the calibrated range of the instrument.

3.3.2 Licensee's Basis for Relief Request

The licensee is requesting to use ASME OM Code Case OMN-6 for its third 10-year IST program interval. Code Case OMN-6 allows the use of digital instruments where the reference value does not exceed 90 percent of the calibrated range of the instrument. Code Case OMN-6 applies to ASME OM Code, 1990 Edition through ASME OMb Code, 1997 Addenda. The licensee will use ASME OM Code, 2001 Edition through the 2003 Addenda for its third 10-year IST program interval.

Relief is requested pursuant to 10 CFR 50.55a(a)(3)(i), as the proposed alternative would provide an acceptable level of quality and safety.

NUREG-1492, Revision 1, Section 5.5 states in part: “The NRC has accepted Code Case OMN-6 as specified in RG 1.192, which allows each digital instrument to be such that the reference values do not exceed 90 percent of the calibrated range of the instrument.”

The use of the OMN-6 Code Case, approved by the NRC in RG 1.192, will provide at least equivalent instrumentation accuracy requirements for the required parameters to be measured in the IST program and will provide results consistent with Code requirements. This will provide adequate assurance of acceptable pump performance.

3.3.3 Licensee’s Proposed Alternative Testing

The licensee is proposing to use in its third 10-year IST program interval digital instruments where the reference value does not exceed 90 percent of the calibrated range of the instrument.

3.3.4 Evaluation

The licensee requested relief from ASME OM Code, Paragraph ISTB-3510(b)(2), which states that digital instruments shall be selected such that the reference value does not exceed 70 percent of the calibrated range of the instrument.

The licensee is requesting to use ASME OM Code Case OMN-6 for its third 10-year IST program interval. Code Case OMN-6 allows the use of digital instruments where the reference value does not exceed 90 percent of the calibrated range of the instrument. Code Case OMN-6 applies to ASME OM Code, 1990 Edition through ASME OMb Code, 1997 Addenda. The licensee’s IST program is based upon the 2001 Edition through the 2003 Addenda of the OM Code, and the Code Case OMN-6 contained in this edition states that it shall expire on March 30, 2004, unless previously annulled or reaffirmed.

Code Case OMN-6 was reaffirmed in the 2006 Addenda to the 2004 Edition of the OM Code with a new expiration date of March 30, 2008. Application of ASME OM Code cases is addressed in 10 CFR 50.55a(b)(6) through reference to RG 1.192, which lists acceptable and conditionally acceptable Code Cases for implementation in IST programs. RG 1.192, Table 1, approves the use of Code Case OMN-6 in lieu of provisions for digital instruments used in IST in ISTB-3510(b)(2) of the ASME OM Code and references the 1998 Edition up to and including OMa-2005 Addenda of the Code. Code Case OMN-6 provides an acceptable level of quality and safety for testing of pumps and is an acceptable alternative for use in the licensee’s IST program.

The licensee has proposed to apply Code Case OMN-6, which is listed as an acceptable OM Code Case in Table 1 of RG 1.192. OMN-6 has been recognized as an acceptable alternative for the use of digital instruments in the performance of IST. The staff finds that the application of Code Case OMN-6 provides an acceptable level of quality and safety for the testing of pumps during the licensee’s third 10-year IST program interval. The licensee’s alternative provides reasonable assurance of the operational readiness of the pumps.

3.3.5 Conclusion

Based on the above evaluation, the NRC staff concludes that the licensee's proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative would provide an acceptable level of quality and safety for testing of the pumps. The licensee's alternative provides reasonable assurance of the operational readiness of the pumps. This alternative is authorized for the third 10-year IST program interval.

3.4 Valve Relief Request RV03

3.4.1 Code Requirements

The applicable Code edition and addenda for CGS is ASME OM Code, 2001 Edition through the 2003 Addenda.

The licensee requested relief from ISTC-5150 of the ASME OM Code. The Code requires solenoid-operated valves be individually stroke-time tested. Relief was requested for the following Post Accident Sampling (PSR) system valves:

PSR-V-X73-1
PSR-V-X80-1
PSR-V-X83-1
PSR-V-X77A1
PSR-V-X82-1
PSR-V-X84-1
PSR-V-X77A3
PSR-V-X82-7
PSR-V-X88-1

3.4.2 Licensee's Basis for Relief Request

In its letter dated October 10, 2005, the licensee stated:

> Subsection ISTC-5151 requires the stroke time of all solenoid-operated valves 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 stoke 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.

3.4.3 Licensee's Proposed Alternative Testing

In its letter dated October 10, 2005, the licensee stated:

> These solenoid valves stroke under 2 seconds and are considered rapid-acting valves. Their safety function is to close to provide containment isolation. The stoke 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 stoke time of the slowest valve is in the acceptance range (less than or equal to 2 seconds), then the stoke 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.

3.4.4 Evaluation

ASME OM Code ISTC-5151 requires the stroke time of all solenoid-operated valves be measured to at least the nearest second. The licensee has proposed timing only the slowest of these nine 1-inch PSR system containment-isolation solenoid valves. The licensee states that if the slowest valve's stroke time is acceptable, then the stroke times of the other eight valves will be acceptable. However, if the stroke time of the slowest valve exceeds the acceptance criteria, all nine valves will be declared inoperable and corrective actions will be taken in accordance with ISTC-5153. Generally, small solenoid valves, such as these which stroke in under 2 seconds, are considered rapid-acting valves. ISTC-5152(c) requires that the rapid-acting valves meet stroke-time requirement of 2 seconds; therefore, this alternative ensures that each valve meets the OM Code stroke-time requirement, and provides an equivalent level of quality and safety. The licensee also states that it shall record any abnormality or erratic action and will perform an evaluation regarding the need for corrective action as required by the Code. The proposed alternative to the ASME OM Code requirements in ISTC-5150 provides reasonable assurance of the operational readiness of the PSR system containment isolation valves.

3.4.5 Conclusion

Pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the licensee's proposed alternative on the basis that it would provide an acceptable level of quality and safety for testing of the valves. The proposed alternative to the ASME OM Code requirements in ISTC-5150 provides reasonable assurance of the operational readiness of the PSR system containment isolation valves. This alternative is authorized for the third 10-year IST program interval.

3.5 Valve Relief Request RV04

3.5.1 Code Requirements

The applicable Code edition and addenda for CGS is ASME OM Code, 2001 Edition through the 2003 Addenda.

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 valves(s);

(e) determination of pressure integrity and stroke capability of air actuator;

(f) 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.

3.5.2 Licensee's Basis for Relief Request

The licensee requests relief for the Main Steam Relief Valves (MSRVs) listed below.

Affected Valves	Code Class	Category	Function	System
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 (LPCI) (RHR, LPCI mode)	
MS-RV-4A, B, C, D	1	C		
MS-RV-5B, C	1	C		

Relief is requested from requirements for sequence of periodic testing of Class 1 Main Steam Pressure Relief Valves With Auxiliary Actuating Devices in Mandatory Appendix I, Paragraph I-3310. The valves in the above table are part of the main steam system and function to provide overpressure protection or overpressure protection in conjunction with automatic depressurization to allow initiation of LPCI.

The licensee has requested relief from the test sequence provisions of the OM Code, Mandatory Appendix I, Paragraph I-3310. The licensee states:

1. Remote set point verification devices (SPVD) have been permanently installed on all eighteen MSRVs to allow set point testing at low power operation, typically during shutdown for refueling outage and on startup if necessary. Crosby's SPVD 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 heads remain deenergized and do not interfere with normal safety or relief valve functions. Removal and replacement of the MSRVs is normally used only for valve maintenance and normally 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 the MSRVs are removed and replaced for maintenance.

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. This will require Paragraph I-3310(d), (e), (f), (g) and (h) tests to be performed during outage prior to Paragraph I-3310(a), (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 [CGS] 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.

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 nominally every 24 months. Although the existing tests do not have a one-to-one correspondence 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.

3.5.3 Licensee's Proposed Alternative Testing

The licensee proposed the following alternative to the Code requirements:

- "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. If MSRV periodic set-pressure testing could not be performed at power during shutdown for refueling outage due to reactor scram, it will be performed during power ascension from refueling outage. This will require Paragraph I-3310(d) and (e) tests to be performed during outage prior to Paragraph I-3310(a), (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.

- 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 on nominally 24 month frequency during shutdowns. These tests will be credited for satisfying the requirements of Paragraph I-3310(f).

- 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).

3.5.4 Evaluation

Mandatory Appendix I, Paragraph I-3310 requires the performance of specific tests in sequence. The licensee has proposed an alternate testing sequencing for the MSRVs by proposing to perform the determination of operation and electrical characteristics of the MSRV position indicators to satisfy the requirements of Paragraph I-3310(f), and determination of actuating pressure of auxiliary actuating device-sensing elements and electrical continuity to satisfy the requirements of Paragraph I-3310(h), independent of testing the valves or actuators. The licensee proposes to perform testing of position indicators in accordance with existing surveillance procedures for monthly channel checks, and for channel calibration and channel functional testing on a nominal 24-month frequency during shutdowns. Auxiliary actuating device-sensing elements (pressure switches) would be tested and calibrated on a 24-month frequency. The Code requires that these devices be tested at the same frequency as the MSRV set pressure and auxiliary actuating device testing. Periodic valve testing is required on a nominal 5-year frequency in accordance with the provisions of Paragraph I-1320. The proposed monthly channel checks for position indicators and nominal 24-month calibrations and tests for position indicators and auxiliary actuating device-sensing elements will be sufficient in determining the operability and electrical characteristics of these components.

To meet the requirements of Paragraphs I-3310(a), (b), (c), (d), (e) and (i), the licensee proposed to normally have MSRV periodic set-pressure testing performed in the proper sequential order at power during a plant shutdown for a refueling outage. However, if MSRV

periodic set-pressure testing could not be performed at power during plant shutdown for a refueling outage due to reactor scram, it would be performed during power ascension from the refueling outage. This would cause the testing sequence to be out of order, and the test requirements in Paragraphs I-3310(d) and (e) would be performed during an outage prior to the test requirements in Paragraphs I-3310(a), (b), (c) and (i). Valves and accessories (actuators, solenoids, etc.) have different maintenance and test cycles at CGS. 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 elements, 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 the testing of accessories. 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. As a result, the requirements of Paragraphs I-3310(a), (b), (c), (d), (e) and (i) would be satisfied during normal shutdown conditions or scram shutdown conditions, and the operability and electrical characteristics of the MSRVs would be sufficiently determined. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the MSRVs.

3.5.5 Conclusion

Based on the above evaluation, the NRC staff concludes that the licensee's proposed alternative to testing the MSRVs and accessories is authorized pursuant to 10 CFR 50.55a(3)(i) on the basis that the proposed alternative would provide an acceptable level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the MSRVs. This alternative is authorized for the third 10-year IST program interval.

3.6 Valve Relief Request RV05

3.6.1 Code Requirements

The applicable Code edition and addenda for CGS is ASME OM Code, 2001 Edition through the 2003 Addenda.

ISTC-3522(c) states that if exercising a Category C check valve is not practicable during operation at power and cold shutdowns, it shall be performed during refueling outages.

ISTC-3700 states that 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.

3.6.2 Licensee's Basis for Relief Request

The licensee requests relief from the requirements of ISTC-3522(c) and ISTC-3700 for the following excess flow check valves (EFCVs):

Affected Valves	Code Class	Category	System(s) / Function
PI-EFC-X18A, B, C, D	1	C	System(s): Process Instrumentation for various systems connected to the reactor pressure vessel Function: EFCVs are provided in each instrument process line that is part of the reactor coolant pressure boundary. Design and installation of the EFCVs at CGS conform to RG 1.11. The reactor instrument-line EFCVs 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-X37E, F	1	C	
PI-EFC-X38A, B, C, D, E, F	1	C	
PI-EFC-X39A, B, D, E	1	C	
PI-EFC-X40C, D	1	C	
PI-EFC-X40E, F	2	C	
PI-EFC-X41C, D	1	C	
PI-EFC-X41E, F	2	C	
PI-EFC-X42A, B	1	C	
PI-EFC-X44A Series (Typ 12)	1	C	
PI-EFC-X44B Series (Typ 12)	1	C	
PI-EFC-X61A, B	1	C	
PI-EFC-X62C, D	1	C	
PI-EFC-X69A, B, E	1	C	
PI-EFC-X70A, B, C, D, E, F	1	C	
PI-EFC-X71A, B, C, D, E, F	1	C	
PI-EFC-X72A	1	C	
PI-EFC-X73A	1	C	
PI-EFC-X74A, B, E, F	1	C	
PI-EFC-X75A, B, C, D, E, F	1	C	
PI-EFC-X78B, C, F	1	C	
PI-EFC-X79A, B	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	

Relief is requested from the OM Code, Subsections ISTC-3522(c) and ISTC-3700 pursuant to 10 CFR 50.55a(a)(3)(i), as the proposed alternative would provide an acceptable level of quality and safety.

The licensee states:

> [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 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 FSAR Subsection 15.6.2. The reactor instrument lines at [CGS] 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 [CGS] 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 [TS Surveillance Requirement] (SR) 3.6.1.3.8.
>
> The GE [General Electric] Licensing Topical Report, NEDO-32977-A, [dated November 1998,] 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 [TS] SR 3.6.1.3.8. The report demonstrates the high degree of EFCV reliability and the low consequences of an EFCV failure. [EFCVs] have been extremely reliable throughout industry. Based on 15 years of testing (up to year 2000) with only one (1) failure, the [CGS] 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. [TS] amendment request for SR 3.6.1.3.8 was reviewed by the NRC staff in a safety evaluation, dated February 20, 2001.
>
> Failure of an EFCV, though not expected as a result of the amended [TS] change, is bounded by the [CGS] 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 [the NRC safety evaluation, dated February 20, 2001,] the NRC staff concluded that the increase in risk associated with the relaxation of EFCV testing is sufficiently low and acceptable.

3.6.3 Licensee's Proposed Alternative Testing

The licensee proposed the following alternative to the Code requirements:

> The reactor instrument line EFCVs will be tested in accordance with the amended TS 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 [CGS] Corrective Action Program.

3.6.4 Evaluation

EFCVs are provided in each instrument process line that is part of the reactor coolant pressure boundary. The EFCVs are designed not to close accidentally during normal operation; they are designed to close if a rupture of the instrument line is indicated downstream of the valve, and to reopen when appropriate and indicate status in the control room. Due to this unique design, testing and verifying EFCV's closure indication require a simulated instrument-line break. Therefore, the licensee has proposed an alternative plan which is to perform the exercise tests and valve position verification tests on a sampling basis, i.e., approximately an equal number of EFCVs are tested every 2 years and each EFCV is tested at least once every 10 years.

The proposed alternative described in this relief request is identical to the licensee's TS amendment request for SR 3.6.1.3.8, which was submitted by letter dated October 30, 2000. The NRC staff approved the proposed TS changes in an amendment dated February 20, 2001, and concluded that the increase in risk associated with licensee's request for relaxation of EFCV testing is sufficiently low and acceptable. The staff also concluded in its February 20, 2001, safety evaluation for the amendment that the EFCV corrective action program and performance evaluation criterion are in conformance with the NRC staff-approved guidance, GE Licensing Topical Report NEDO-32977-A, "Excess Flow Check Valve Testing Relaxation," which would ensure a high degree of valve reliability and operability.

Based on this evaluation, the staff finds that the licensee's proposed alternative to the requirements of Paragraphs ISTC-3522(c), and ISTC-3700 of the ASME OM Code is acceptable. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the EFCVs.

3.6.5 Conclusion

Based on the above evaluation, the NRC staff concludes the licensee's proposed alternative to the Code testing requirements for the EFCVs listed above is authorized pursuant to 10 CFR 50.55a(3)(i) on the basis that the proposed alternative would provide an acceptable level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the EFCVs. This alternative is authorized for the third 10-year IST program interval.

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