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

August 28, 2012

Mr. Brian J. O'Grady
Vice President-Nuclear and CNO
Nebraska Public Power District
72676 648A Avenue
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION - RELIEF REQUEST NOS. RV-07, REVISION 0, AND RV-01, REVISION 1, FOR FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL REGARDING WELD OVERLAY REPAIR (TAC NO. ME7021)

Dear Mr. O'Grady:

By letter dated August 24, 2011, as supplemented by letters dated March 12, June 22, and August 14, 2012, Nebraska Public Power District (the licensee), submitted Relief Requests RV-07, Revision 0, and RV-01, Revision 1, to the Nuclear Regulatory Commission (NRC). Requests RV-07, Revision 0, and RV-01, Revision 1, are applicable to the fourth 10-year inservice testing (IST) program interval at the Cooper Nuclear Station (CNS). In RV-07, the licensee requested authorization to use a performance-based approach to the scheduling of Pressure Isolation Valve (PIV) leakage testing rather than the required frequency per the American Society of Mechanical Engineers *Code for Operation and Maintenance of Nuclear Power Plants* for several PIVs. In RV-01, Revision 1, the licensee requested authorization to extend the disassembly and maintenance intervals imposed as alternative requirements in response to the NRC granting the licensee's previous request, RV-01, Revision 0 via letter dated June 14, 2006. This current request proposed to extend the disassembly and maintenance intervals, for two solenoid operated valves, from 18 to 36 months.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(a)(3)(i), the licensee requested to use the proposed alternatives in RV-07, Revision 0, and RV-01, Revision 1, on the basis that the alternatives provide an acceptable level of quality and safety.

The NRC staff has reviewed the licensee's submittal, as supplemented, and concludes that the proposed alternatives in Relief Requests RV-07, Revision 0, and RV-01, Revision 1, provide an acceptable level of quality and safety. However, the staff's analysis does not support extending the leakage test interval to 72 months (6 years) as requested by the licensee. Therefore, the proposed alternative, RV-07, is authorized in accordance with 10 CFR 50.55a(a)(3)(i) for the remainder of the CNS fourth 10-year IST interval that commenced on March 6, 2006, given that the leakage test interval for the PIVs shall not exceed 60 months. In addition, the proposed alternative, RV-01, is authorized in accordance with 10 CFR 50.55a(a)(3)(i) for the remainder of the CNS fourth 10-year IST interval that commenced on March 6, 2006.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

The detailed results of the NRC staff review are provided in the enclosed safety evaluation. If you have any questions concerning this matter, please contact Ms. L. Wilkins of my staff at (301) 415-1377 or via e-mail at Lynnea.Wilkins@nrc.gov.

Sincerely,

CFLyon for

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosure:
As stated

cc w/encl: Distribution via Listserv

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL

REQUEST FOR RELIEF NOS. RV-07, REVISION 0 AND RV-01, REVISION 1

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

By letter dated August 24, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11242A129), as supplemented by letters dated March 12, June 22, and August 14, 2012 (ADAMS Accession Nos. ML12079A032, ML12178A062 and ML12233A160, respectively), Nebraska Public Power District (NPPD, the licensee), submitted Relief Requests RV-07, Revision 0, and RV-01, Revision 1, to the Nuclear Regulatory Commission (NRC). Requests RV-07, Revision 0, and RV-01, Revision 1, are applicable to the fourth 10-year inservice testing (IST) program interval at the Cooper Nuclear Station (CNS). In RV-07, the licensee requested authorization to use a performance-based approach to the scheduling of Pressure Isolation Valve (PIV) leakage testing rather than the required frequency per the American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) for several PIVs. In RV-01, Revision 1, the licensee requested authorization to extend the disassembly and maintenance intervals imposed as alternative requirements in response to the NRC granting the licensee's previous request, RV-01, Revision 0, via letter dated June 14, 2006. This current request proposed to extend the disassembly and maintenance intervals, for two solenoid-operated valves (SOVs), from 18 to 36 months.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(a)(3)(i), the licensee requested to use the proposed alternatives in RV-07, Revision 0, and RV-01, Revision 1, on the basis that the alternatives provide an acceptable level of quality and safety.

2.0 REGULATORY EVALUATION

Section 50.55a(f) of 10 CFR "Inservice Testing Requirements," requires, in part, that IST of certain ASME Code Class 1, 2, and 3 pumps and valves be performed in accordance with the specified ASME OM Code and applicable addenda incorporated by reference in the regulations. Exceptions are allowed where alternatives have been authorized or relief has been requested by the licensee and granted by the NRC pursuant to paragraphs (a)(3)(i), (a)(3)(ii), or (f)(6)(i) of 10 CFR 50.55a.

In proposing alternatives or requesting relief, the licensee must demonstrate that: (1) the proposed alternative provides an acceptable level of quality and safety (10 CFR 50.55a(a)(3)(i)); (2) compliance would result in hardship or unusual difficulty without a compensating increase in the level of quality or safety (10 CFR 50.55a(a)(3)(ii)); or (3) conformance is impractical for the facility (10 CFR 50.55a(f)(6)(i)). Section 50.55a allows the NRC to authorize alternatives and to grant relief from ASME OM Code requirements upon making necessary findings.

The CNS fourth 10-year IST program interval began on March 1, 2006, and ends on February 28, 2016. The applicable ASME OM Code edition and addenda for the CNS fourth 10-year IST program interval is the 2001 Edition through the 2003 Addenda.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Alternative Request RV-07, Revision 0

3.1.1 Applicable ASME Code Components Affected

The licensee requested to use an alternative testing schedule for the following Category A and A/C PIVs:

Valve	Functional Test Frequency	Position Indicator Test (PIT) Frequency
RHR-MOV-MO25A	Quarterly	2 yrs
RHR-MOV-MO25B	Quarterly	2 yrs
RHR-MOV-MO274A	Normally De-energized Closed	Refueling Outage (RFO)
RHR-MOV-MO274B	Normally De-energized closed	Refueling Outage
RHR-CV-26CV	Refueling Outage	Refueling Outage
RHR-CV-27CV	Refueling Outage	Refueling Outage
RHR-MOV-MO17	Cold Shutdown	Refueling Outage
RHR-MOV-MO18	Cold Shutdown	Refueling Outage
CS-MOV-MO12A	Cold Shutdown	Refueling Outage
CS-MOV-MO12B	Cold Shutdown	Refueling Outage
CS-CV-18CV	Refueling Outage	Refueling Outage
CS-CV-19CV	Refueling Outage	Refueling Outage

3.1.2 Applicable Code Edition and Addenda (as stated by the licensee)

ASME Code for Operation and Maintenance of Nuclear Power Plants (OM Code) 2001 Edition through 2003 Addenda

3.1.3 ASME Code Requirements for which Relief is Requested

ISTC-3630, "Leakage Rate for Other Than Containment Isolation Valves," states, in part, that "Category A valves with a leakage requirement not based on an Owner's 10 CFR 50, Nonmandatory Appendix J program, shall be tested to verify their seat leakages within

acceptable limits. Valve closure before seat leakage testing shall be by using the valve operator with no additional closing force applied."

ISTC-3630(a), "Frequency," states that, "Tests shall be conducted at least once every 2 years."

3.1.4 Reason for Request (as stated by the licensee)

> Pursuant to 10 CFR 50.55a, "Codes and standards," paragraph (a)(3), relief is requested from the requirement of ASME OM Code ISTC-3630(a). ISTC-3630(a) requires that leakage rate testing (water) for pressure isolation valves (PIV) be performed at least once every two years. Recent historical data was used to identify that PIV testing alone each refueling outage incurs a total dose of at least 600 millirem (mRem). The reason for this relief request is to reduce outage dose. The basis of this relief request is that the proposed alternative would provide an acceptable level of quality and safety and interpass temperatures.

3.1.5 Proposed Alternative and Basis for Use

The licensee noted that ASME OM Code ISTC-3630(a) requires that leakage rate testing for the PIVs listed above, in Section 3.1, be performed at least once every 2 years. One reason for this alternative test request is to reduce outage dose. Recent historical data identified that PIV testing alone incurred a total dose of approximately 600 mRem in Refueling Outage 26 and approximately 1600 mRem in Refueling Outage 25. Extending the PIV testing interval from one to three cycles would provide a savings of at least 1200 mRem over a three-cycle period.

By letter dated August 24, 2011, the licensee stated:

> PIVs are not specifically included in the scope for performance-based testing as provided for in 10 CFR 50 Appendix J, Option B. The concept behind the Option B alternative for containment isolation valves is that licensees should be allowed to adopt cost effective methods for complying with regulatory requirements.
>
> [...]
>
> The valves identified in the relief request are in water applications. The PIV testing is performed with water pressurized to normal plant operating pressures.
>
> [...]
>
> Typical PIV testing does not identify functional problems which may inhibit the valves' ability to re-position from open to closed. For check valves, such functional testing is accomplished per ASME OM ISTC-3522 and ISTC-3520.
>
> [...]
>
> The periodic functional testing of the PIVs is adequate to identify any abnormal

condition that might affect closure capability. Performance of the separate 18 month (or 24 month) PIV leak rate testing does not contribute any additional assurance of functional capability; it only verifies the seat tightness of the closed valves.

CNS proposes to perform PIV testing at intervals ranging from every refueling outage to every third refueling outage. CNS anticipates transitioning from 18-month refueling cycles to 24-month refueling cycles following Refueling Outage 27, which is scheduled for the Fall of 2012. The specific interval for each valve would be a function of its performance and would be established in a manner consistent with the containment isolation valve (CIV) process under 10 CFR 50 Appendix J, Option B. Five of the 12 valves listed in Section 1 (RHR-MOV-MO25A, RHR-MOV-MO25B, CS-MOVMOI2A, CS-MOV-MO12B, RHR-MOV-MO17) are also classified as CIVs and are leak rate tested with air at intervals determined by 10 CFR 50 Appendix J, Option B. Appendix J and inservice leak testing program guidance will be established such that if any of those five valves fail either their CIV test or their PIV test, the test interval for both tests will be reduced to every refueling outage until they can be re-classified as good performers per Appendix J, Option B requirements.

The test intervals for the seven remaining valves with a PIV-only function will be determined in the same manner as is done under Option B. That is, the test interval may be extended to every three refueling outages (not to exceed a nominal six year period) upon completion of two consecutive, periodic PIV tests with results within prescribed acceptance criteria. Any test failure will require a return to the initial interval (every refueling outage) until good performance can again be established.

The primary basis for this relief request is the historically good performance of the PIVs. There have been no PIV seat leakage failures since PIV testing began at CNS in 1995 through the present. Leakages recorded have been a very small percentage of the overall allowed leakage. The test results for the PIVs listed in Section 1 have been exceptional.

[...]

NUREG/CR-5928, "ISLOCA Research Program Final Report," evaluated the likelihood and potential severity of inter-system loss-of-coolant accident (ISLOCA) events in boiling water reactors (BWR) and pressurized water reactors [PWR]. The BWR design used as a reference for this analysis was a BWR/4 with a Mark 1 containment. CNS was listed in Section 4.1 of NUREG/CR-5928 as one of the applicable plants. The applicable BWR systems were individually analyzed and in each case, this report concluded that the system was "...judged to not be a concern with respect to ISLOCA risk." Section 4.3 concluded the BWR portion of the analysis by saying "ISLOCA is not a risk concern for the BWR plant examined here."

The intent of this relief request is simply to allow for a performance-based approach to the scheduling of PIV leakage testing. It has been shown that ISLOCA represents a small risk impact to BWRs such as CNS. CNS PIVs have an excellent performance history in terms of seat leakage testing. The risks associated with extending the leakage

test interval to a maximum of three refueling outages (nominal 18 or 24 months) are extremely low. Anticipating CNS moving to 24-month refueling cycles, the performance-based interval shall not exceed 72 months. Standard scheduling practice may extend the program interval by 25%, not to exceed six months. This relief will provide significant reductions in radiation dose.

Additionally, the licensee requested to be allowed to extend the required test interval by 25%, not to exceed six months, as a standard scheduling practice.

3.1.6 NRC Staff Technical Evaluation

The licensee has proposed an alternative test in lieu of the requirements found in the 2001 Edition through the 2003 Addenda of the ASME OM Code Section ISTC-3630 for all 12 of the PIVs listed in the Table in Section 3.1.1. Specifically, the licensee proposes to verify the leakage rate of these 12 PIVs using the 10 CFR Part 50 Appendix J, Option B performance-based schedule. Valves would initially be tested at the required interval schedule, which is currently every RFO or 2 years as specified by ASME OM Code Section ISTC-3630(a). Per the licensee's request, valves that have demonstrated good performance for two consecutive cycles may have their test interval extended up three refueling outages or 72 months. Additionally, the licensee requested to be allowed an additional 6 month extension as a standard scheduling practice. Any PIV leakage test failure would require the component to return to the initial testing interval of every RFO or 2 years until it can be reclassified as a good performer per the performance evaluation requirements of Appendix J, Option B.

PIVs are defined as two valves in series within the reactor coolant pressure boundary which separate the high pressure reactor coolant system from an attached lower pressure system. Failure of a PIV could result in an over-pressurization event that could lead to a system rupture and possible release of fission products to the environment. This type of failure event was analyzed under NUREG/CR-5928, "ISLOCA Research Program." The purpose of NUREG/CR-5928 was to quantify the risk associated with an ISLOCA event. NUREG/CR-5928 analyzed BWR and PWR designs. Specifically, NUREG/CR-5928 reviewed the BWR-4 design, which included CNS. The conclusion of the analysis showed that an ISLOCA was not a risk concern for the BWR-4 design.

The licensee proposed to initiate a performance-based program consistent with 10 CFR Part 50 Appendix J, Option B. The licensee stated that the twelve PIVs would be placed into a performance-based program where each valve would have to complete two consecutive leakage tests within the acceptance criteria before the leakage test interval can be extended. The specific interval for each valve would be a function of its performance and would be established in a manner consistent with the CIV process under 10 CFR Part 50 Appendix J, Option B.

Additionally, five of the PIVs (RHR-MOV-MO25A, RHR-MOV-MO25B, CS-MOV-MOI2A, CS-MOV-MO12B, RHR-MOV-MO17) are also classified as CIVs and are leak rate tested at intervals determined by 10 CFR Part 50 Appendix J, Option B. Appendix J and the inservice leak testing program guidance will be established such that if any of these five valves fail either their CIV or PIV test, the test interval for both tests will be reduced to every refueling outage,

until the valve can be reclassified as a good performer per the Appendix J, Option B requirements. Upon completion of two successful tests, the component leakage test interval can be extended.

It is noted in 10 CFR 50 Appendix J, Option B that specific guidance concerning a performance-based leakage test program, acceptable leakage rate test methods, procedures, and analyses that may be used to implement these requirements and criteria are provided in Regulatory Guide (RG) 1.163, "Performance-Based Containment Leak-Test Program" (Accession No. ML003740058). RG 1.163 endorses Nuclear Energy Institute (NEI) Topical Report (TR) 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50 Appendix J," dated July 26, 1995, with the limitation that "Type C Tests" intervals cannot be extended greater than 60 months. "Type C Tests," per 10 CFR Part 50 Appendix J, are tests intended to measure CIV leakage rates. Therefore, the information provided by the licensee in RV-07, Revision 0, supports extending the leakage test interval to 60 months (5 years), but not to 72 months (6 years) as requested by the licensee. In addition, NEI 94-01, Revision 2 was reviewed by the NRC staff on June 25, 2008, (see the safety evaluation at Accession No. ML0811401050), and this review evaluated allowing a 25 percent extension of Type C test intervals due to standard scheduling practices. The NRC staff concluded that intervals up to 60 months for "Type C Tests" may be extended by up to 25 percent of the test interval, not to exceed 9 months. On June 8, 2012, the NRC staff reviewed and endorsed NEI 94-01, Revision 3 (see the safety evaluation at Accession No. ML121030286), which allows for up to a 75 month frequency for "Type C tests." To obtain a frequency extension beyond 60 months (up to 75 months), licensees should provide additional information, such as maintenance history, acceptance tests criteria, condition monitoring programs, etc., to justify the acceptability of the extension. This was discussed with the licensee via teleconference on August 21, 2012. NPPD stated that it will submit a separate relief request requesting the 72 month extension, to the NRC for review and approval.

The 12 PIVs are currently being leak tested every RFO (18 months). CNS plans to transition from 18-month refueling cycles to 24-month refueling cycles following Refueling Outage 27, which is currently scheduled for the fall of 2012. The PIVs have maintained a history of good performance. Extending the leakage test interval based on good performance out to 60 months based on good performance and the low risk factor, as noted in NUREG/CR-5928, is a logical progression to a performance-based program. In addition, the licensee routinely functionally tests and/or PITs the PIV check valves and full stroke tests the other PIVs, in accordance with ASME OM Code requirements, to ensure their functional capabilities. Based on the excellent valve maintenance history, coupled with valve stroking every RFO and low risk factor, the proposed alternative provides an acceptable level of quality and safety and is acceptable for use.

The licensee is authorized to implement a performance-based program for the 12 PIVs listed in the Table in Section 3.1.1. The leakage test interval for these PIVs shall not exceed 60 months. Standard scheduling practice may extend the program interval by 25 percent not to exceed 9 months. Additionally, for the five PIVs that are also classified as CIVs (RHR-MOV-MO25A, RHR-MOV-MO25B, CS-MOV-MOI2A, CS-MOV-MO12B, RHR-MOV-MO17), if any of these valves fail either their CIV or PIV test, the test interval for both tests will be reduced to every refueling outage, until the valve can be re-classified as a good performer per the Appendix J,

Option B requirements. Upon completion of two successful tests, the component leakage test interval can be extended again.

3.2 Licensee's Alternative Request RV-01, Revision 1

3.2.1 Applicable ASME Code Components Affected

Relief was requested for the following SOVs:

HPCI-SOV-SSV-64	Class 2	Category B	Non-code Boundary
HPCI-SOV-SSV-87	Class 2	Category B	Non-code Boundary

3.2.2 Applicable Code Edition and Addenda (as stated by the licensee)

ASME OM Code 2001 Edition through 2003 Addenda

3.2.3 ASME Code Requirements for which Relief is Requested

The licensee requested relief from ISTC-3500, ISTC-3510, and ISTC-3560 which require that valves be tested in accordance with the paragraphs specified in Table ISTC-3500-1, that valves be exercised every 3 months, and that valves with fail-safe actuators be tested by observing the operation of the actuator upon loss of valve actuating power. By letter dated March 12, 2012, the licensee clarified that CNS is also seeking relief from ISTC-5151, ISTC-5152, and ISTC-5153. The applicable requirements of paragraph ISTC-5100 for SOVs include the more specific requirements under that paragraph of ISTC-5151, ISTC-5152, and ISTC-5153.

ISTC-3500, "Valve Testing Requirements," states that, "Active and passive valves in the categories defined in ISTC-1300 shall be tested in accordance with the paragraphs specified in Table ISTC-3500-1 and the applicable requirements of ISTC-5100 and ISTC-5200."

ISTC-3510, "Exercising Test Frequency," states that, "Active Category A, Category B, and Category C check valves shall be exercised nominally every 3 months, except as provided by ISTC-3520, ISTC3540, ISTC-3550, ISTC-3560, ISTC-5221, and ISTC-5222. Power-operated relief valves shall be exercise tested once per fuel cycle."

ISTC-3560, "Fail-Safe Valves," states that, "Valves with fail-safe actuators shall be tested by observing the operation of the actuator upon loss of valve actuating power in accordance with the exercising frequency of ISTC-3510."

ISTC-5151, "Valve Stroke Testing" for SOVs, states, in part, that, "Active valves shall have their stroke times measured when exercised in accordance with ISTC-3500."

ISTC-5152, "Stoke Test Acceptance Criteria" for SOVs, states, in part, that "Test results shall be compared to reference values established in accordance with ISTC-3300, ISTC-3310, or ISTC-3320."

ISTC-5153, "Stroke Test Corrective Action" for SOVs, states, in part, that, "If a valve fails to exhibit the required change of obturator position or exceeds the limiting values of full-stroke time, the valve shall be immediately declared inoperable. Valves with measured stroke times that do not meet the acceptance criteria of ISTC-5152 shall be immediately retested or declared inoperable."

3.2.4 Reason for Request (as stated by the licensee)

By letter dated August 25, 2011, the licensee stated:

> Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the requirements of ASME OM Code ISTC-3500, ISTC-3510, and ISTC-3560. The proposed alternative would provide an acceptable level of quality and safety.

By letter dated March 12, 2012, the licensee clarified the basis for its request for relief from ISTC-3510:

> Nebraska Public Power District (NPPD) took the more general approach by requesting relief from the valve testing requirements of ISTC-3500, which includes ISTC-3510 from table ISTC-3500-1 and the power-operated requirements of ISTC-5100. Essentially, CNS is requesting the existing code requirements as a whole be replaced with the proposed alternative, which includes a unique way of exercise and fail-safe testing the solenoid valves in addition to the enhanced maintenance. This approach was utilized with Revision 0 of RV-01 and was approved by the NRC on June 14, 2006. The only change being requested in Revision 1 of RV-01 is an extension of the enhanced maintenance.

3.2.5 Proposed Alternative and Basis for Use

By letter dated August 25, 2011, the licensee stated:

> These valves are rapid acting, encapsulated, solenoid-operated valves. Their control circuitry is provided with a remote manual switch for valve actuation to the open position and an auto function which allows the valves to actuate from signals received from the associated level switches HPCI-LS-98 and HPCI-LS-680. Both valves receive a signal to change disc position during testing of drain pot level switches. However, remote position indication is not provided for positive verification of disc position. Additionally, their encapsulated design prohibits the ability to visually verify the physical position of the operator, stem, or internal components. Modification of the system to verify valve closure capability and stroke timing is not practicable nor cost beneficial since no commensurate increase in safety would be derived.

By letter dated June 22, 2012, the licensee provided additional information stating that there are no significant differences in the operational conditions or locations of the valves. The valves are in parallel to 1-inch drip leg drain lines that come off the 2-inch drip leg piping. Additionally, the valves' locations are 15 inches apart at the same elevation.

By letter dated March 12, 2012, the licensee stated:

> Only one other solenoid valve at CNS, HPCI-SOV-SSV88, HPCI [high pressure coolant injection] exhaust dripleg drain to equipment drain valve, has the same manufacturer (Circle Seal Controls, formerly Atkomatic Valve Co., Inc.) and model number (15-590) as HPCI-SOV-SSV64 and HPCI-SOV-SSV87 solenoid valves. This additional valve is non-safety related and is in series with HPCI-SOVSSV87. HPCI-SOV-SSV88 was replaced in June of 2005, at the same time as HPCI-SOVSSV87. Since that time, one preventative maintenance refurbishment work order has been completed on HPCI-SOV-SSV88 and no corrective maintenance work orders have been necessary since the valve has been functioning acceptably.
>
> [...]
>
> A failure of HPCI-SOV-SSV64 to open could result in the turbine exhaust dripleg levels continuing to rise above the high alarm level, but would not keep HPCI from fulfilling its required safety function.
>
> A failure of HPCI-SOV-SSV64 to close with the Non-Code class piping intact would result in an open exhaust route through a restricting orifice to the gland seal condenser. During HPCI operation in this situation, the exhaust would be condensed by the gland seal condenser. If the Non-Code class piping were to fail in addition to HPCI-SOV-SSV64 failing open, then the pressure boundary of the turbine exhaust line may be compromised.
>
> Upon a high-high dripleg level condition, the Control Room is alerted via HPCI TURBINE EXH DRIP LEG HI-HI LEVEL alarm and HPCI-SOV-SSV87 (and the redundant drain isolation HPCI-SOV-SSV88) automatically opens to route condensate to the equipment drains system. If the alarm fails to clear with HPCI in standby, procedure guidance in response to the HI-HI alarm instructs Operators to place the HPCI AUXILIARY OIL PUMP switch to PULL-TO-LOCK. In this situation, HPCI would become inoperable and would be prevented from auto initiation, but would remain available for manual operation.
>
> If HPCI is in operation when the HI-HI alarm is received, no operator actions are required and excess dripleg condensate would be carried to the suppression pool by the exhaust flow. A failure of HPCI-SOV-SSV87 to open would not prevent HPCI operation, but could impact the reliability of the system in standby if long-term high dripleg levels were allowed to fill the HPCI exhaust piping to the point of filling the turbine case. A failure of the valve to close (valve closes with loss of power) would allow condensate and/or turbine exhaust to escape to the equipment drain located in the HPCI room.

The licensee proposed to exercise each valve to the full closed position on a quarterly basis. Although valve stroke timing will not be performed, the quarterly exercise test will verify that the valve moves to the safe position. The license noted that the IST results over the last 9 years (since 2003) for the quarterly exercise testing of HPCI-SOV-SSV64 and HPCI-SOV-SSV87 have all been completed satisfactorily. By letter dated March 12, 2012, the licensee stated:

> CNS is meeting the requirements of ISTC-3530 through the quarterly performance of surveillance procedure 6.HPCI.204, HPCI-SOV-SSV64 and HPCI-SOV-SSV87 IST Closure Test. With high pressure coolant injection (HPCI) not in operation, a demineralized water source is utilized to verify that HPCI-SOV-SSV64 opens when level switch HPCI-LS-680 (turbine exhaust drain pot high level) trips, allowing level in the gland seal condenser to start to rise due to water flow through HPCI-SOV-SSV64. After HPCI-LS-680 resets and HPCI-SOV-SSV64 closes, Operators verify the gland seal condenser level is steady.
>
> Similarly, CNS verifies that HPCI-SOV-SSV87 opens when level switch HPCI-LS-98 (turbine exhaust drip leg high) trips, allowing the observation of water flow to a floor drain from a drain pipe downstream of HPCI-SOV-SSV87. After HPCI-LS-98 resets and HPCI-SOV-SSV87 closes, CNS observes the drain pipe downstream of HPCI-SOV-SSV87 for gross leakage past the valve. Therefore, CNS verifies valve obturator movement for both valves open and closed while simultaneously verifying the calibration of two level switches.

By letter dated June 22, 2012, the licensee stated that the current 18-month enhanced maintenance examination for HPCI-SOV-SSV87 and HPCI-SSV-64 includes the following inspections:

- Valve body for damage, erosion, corrosion, and cleanliness
- Insert for damage, erosion, or wear
- Piston for damage, erosion, corrosion, wear, or scoring. Replace if any of the above is evident
- Plunger and stem assembly for erosion, corrosion, and freedom of movement
- If plunger and stem assembly is found defective, replace with new assembly
- Ensure stem spring returns piston rod link to full extended position when depressed and released
- An electrician or qualified valve team technician shall check continuity and physical condition of the coil, recording any discrepancies found
- If coil is replaced, check resistance of replacement coil, recording any discrepancies found. The resistance check is to compare the original coil to the replacement coil to ensure it is the correct replacement.

The licensee proposed to exercise each valve to the full closed position on a quarterly basis. Although valve stroke timing will not be performed, the quarterly exercise test will verify that the valve moves to the safe position. By letter dated August 14, 2012, the licensee stated:

> CNS agreed to collect at least 2 sets of acceptable data before extending the frequency of a specific valve to a frequency beyond 18 months, but not to exceed 36 months. The span of acceptable tests shall support the new test frequency. For future testing, if an unsatisfactory acceptance criteria step is found in either valve, CNS will reduce the frequency back to 18 months for both valves for one cycle. If it can be shown that the deficiency is not from a cause that could be common to both valves, the valve without

the unsatisfactory acceptance criteria can return to a 36 month frequency after the one 18 month cycle.

By letter dated August 25, 2011, the licensee stated:

> Enhanced maintenance shall be performed on a 36-month frequency by disassembling and examining each solenoid valve to monitor for degradation.
>
> A 36-month frequency for the disassembly and examination surveillance (6.HPCI.404) is an acceptable frequency based upon past examinations and maintenance history for these valves. For instance, solenoid valve, HPCI-SOV-SSV87, was replaced in June 2005, and has had an acceptable disassembly and examination completed in November 2006, March 2008, August 2009, and March 2011. Solenoid valve, HPCI-SOV-SSV64, had acceptable examinations completed in February 2005, November 2006, March 2008, and August 2009, and was replaced for parts reasons with a valve upgrade to match that of HPCI-SOV-SSV87 in March 2011. This history dictates that the 36-month frequency for the internal examinations should identify and correct issues with the solenoid valves prior to them becoming a valve functional issue. The history above demonstrates that no functional issues have been identified in the past six years. Therefore, this periodic examination and refurbishment (if needed) every 36 months, in combination with the quarterly exercise tests, will continue to maintain these valves in a reliable manner.

3.2.6 NRC Staff Evaluation

SOVs HPCI-SOV-SSV-64 and HPCI-SOV-SSV-87 are rapid acting and function in the closed position to maintain pressure boundary integrity of the HPCI turbine exhaust line. The failure of either valve to close would result in a loss of the pressure boundary integrity of the turbine exhaust line and could challenge the boundary barrier between ASME Code Class 2 piping and non-code Class piping. A failure of either valve to open would not keep HPCI from fulfilling its required safety function. Remote position indication is not provided and their design prohibits the ability to visually verify the physical position of the operator, stem, or internal components. The licensee states that system modifications to meet the Code requirements for exercise testing, stroke timing, and fail-safe testing are not practicable.

Stroke timing and fail-safe testing these valves is not possible using the conventional method of position indication. The licensee proposes to exercise the valves to the full closed position quarterly and to incorporate enhanced maintenance activities for the valves, involving disassembly and inspection, on a 36-month frequency to monitor for degradation after sufficient performance data is collected. This request is identical to request RV-01, Revision 0, (Accession No. ML052980296), except for an additional 18 months being added to the maintenance interval, if no deficiencies are identified during two consecutive maintenance inspections.

The close proximity of the two valves and the fact that their upstream lines come from the same 2-inch drip leg pipe indicates that they will face identical environmental and operating conditions. The acceptance criteria for the surveillance procedure for the two valves

demonstrates sufficient rigor to determine the need for parts maintenance or replacement and the NRC staff concludes that the examinations performed since 2003 were adequate. The licensee states in the letter dated August 14, 2012, that CNS will collect at least two sets of acceptable data for the valves before extending the disassembly and inspection interval from 18 to 36 months. As a result, the maintenance disassembly and inspection interval for HPCI-SOV-SSV87 can now be extended to 36 months. The extension of the interval for HPCI-SOV-SSV87 to 36 months is acceptable because the NRC staff has determined four disassembly and inspections without any non-conformances since 2005 provides adequate operational data to allow for the extension. For HPCI-SOV-SSV64, two maintenance inspections, at 18 month intervals, will need to be performed, with no identified deficiencies, before the disassembly and maintenance interval can be extended to 36 months. This is due to the fact that the parts in HPCI-SOV-SSV64 were replaced with upgrades to match HPCI-SOV-SSV87 in March 2011 and this valve has not had any subsequent disassembly and examination. The NRC staff concludes that the extension of the HPCI-SOV-SSV64 disassembly and maintenance interval to 36 months after two 18-month intervals is acceptable because of the similarities in internal components, location, and operational conditions to HPCI-SOV-SSV87.

The licensee also stated in its letter dated August 14, 2012, that following a repair for an unsatisfactory acceptance criteria step or replacement for either valve, CNS will collect at least two sets of acceptable data for that valve, before extending the frequency beyond 18 months. For future testing, if an unsatisfactory acceptance criteria step is found in either valve, the licensee will reduce the frequency back to 18 months for both valves for one cycle. If it can be shown that the deficiency is not from a cause that could be common to both valves, the valve without the unsatisfactory acceptance criteria can return to a 36-month frequency after the one 18 month cycle. The licensee's proposed course of action in the event of a non-conformance is acceptable since both valves will undergo increased scrutiny (i.e. 18-month frequency), for at least one cycle to determine if a common cause failure mode exists between the valves. If a common cause failure exists, then both valves remain on an 18-month frequency for two cycles to watch for future degradation. If a common cause is not found, then the acceptable performing valve can resume a 36-month frequency where the non-conforming valve remains on an 18-month frequency for one additional cycle.

Imposition of the Code requirements would result in a burden on the licensee, without increase in the level of quality and safety, in that modification to the valves, valve replacement, or the purchase of more advanced testing equipment would be necessary to comply with the Code requirements. The licensee's proposal to exercise these valves to the closed position quarterly in combination with a 36-month disassembly and inspection frequency after obtaining sufficient data provides reasonable assurance of the operational readiness of these valves. If one of the valves is found to be non-conforming, the non-conforming valve shall complete at least two 18 month disassembly and inspection intervals and the conforming valve much complete at least one 18-month disassembly and inspection intervals before returning to a 36-month disassembly and inspection interval.

4.0 CONCLUSION

On the basis of review and evaluation of the licensee's submittals, the NRC staff concludes that

the proposed alternative in request RV-07, Revision 0, subject to the leakage test interval for the PIVs not exceeding 60 months, provides an acceptable level of quality and safety, for the 12 PIVs noted in the Table in Section 3.1.1. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(i), and is in compliance with the ASME OM Code requirements.

The NRC staff also concludes that the proposed alternative in request RV-01, Revision 1, provides reasonable assurance that SOVs, HPCI-SOV-SSV64 and HPCI-SOV-SSV87, are operationally ready. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(a)(3)(i), and is in compliance with the ASME OM Code requirements.

Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the NRC staff authorizes the alternatives in requests RV-07, Revision 0, and RV-01, Revision 1, for the remainder of the CNS fourth 10-year IST interval that commenced on March 6, 2006.

All other ASME OM Code requirements for which relief was not specifically requested and authorized herein by the NRC staff remain applicable, including the third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: M. Orenak

Date: August 28, 2012

The detailed results of the NRC staff review are provided in the enclosed safety evaluation. If you have any questions concerning this matter, please contact Ms. L. Wilkins of my staff at (301) 415-1377 or via e-mail at Lynnea.Wilkins@nrc.gov.

Sincerely,

/RA by FLyon for/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosure:
As stated

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OFFICE	NRR/LPL4/PM	NRR/LPL4/LA	NRR/DE/EPTB	NRR/LPL4/BC	NRR/LPL4/PM
NAME	LWilkins	JBurkhardt (BClayton for)	AMcMurtray*	MMarkley (FLyon for)	LWilkins
DATE	8/12/12	8/21/12	8/16/12	8/28/12	8/28/12

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