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

June 14, 2006

Mr. Randall K. Edington
Vice President-Nuclear and CNO
Nebraska Public Power District
P.O. Box 98
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION RE: RELIEF REQUESTS FOR THE FOURTH 10-YEAR PUMP AND VALVE INSERVICE TESTING PROGRAM (TAC NOS. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, AND MC8992)

Dear Mr. Edington:

By letter dated October 19, 2005, Nebraska Public Power District (the licensee) submitted relief requests for its fourth 10-year inservice testing program interval at Cooper Nuclear Station. On February 9, 2006, the Nuclear Regulatory Commission requested the licensee to submit additional information. The licensee submitted the requested information in a letter dated March 8, 2006. In its March 8, 2006, letter, the licensee withdrew Relief Requests RV-02, RV-03, and RV-05, and revised Relief Requests RP-01, RP-02, RP-03, RP-04, RP-05, and RV-01.

Relief Requests RP-01, RP-02, RP-03, RP-04, RP-05, RP-06, and RP-07 are authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternatives provide an acceptable level of quality and safety. Relief Request RV-04 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) requirements results in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified safety relief valve. Relief Request RV-01 is authorized pursuant to 10 CFR 50.55a(f)(6)(i) on the basis that compliance with the ASME OM Code requirements is impractical.

Sincerely,

David Terao

David Terao, Chief
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Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosure: Safety Evaluation

cc w/encl: See next page

Cooper Nuclear Station

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE INSERVICE TESTING PROGRAM, FOURTH 10-YEAR INTERVAL

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

By letter dated October 19, 2005, Nebraska Public Power District (NPPD) (the licensee) submitted relief requests for the fourth 10-year inservice testing (IST) program interval at Cooper Nuclear Station (CNS). The licensee requested relief from certain inservice test 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 CNS fourth 10-year IST interval commenced March 1, 2006. In response to the Nuclear Regulatory Commission (NRC) staff's request for additional information, the licensee submitted additional information to the NRC in a letter dated March 8, 2006. In its March 8, 2006, letter, the licensee withdrew Relief Requests RV-02, RV-03, and RV-05, and revised Relief Requests RP-01, RP-02, RP-03, RP-04, RP-05, and RV-01. The NRC evaluation of Relief Requests RP-01, RP-02, RP-03, RP-04, RP-05, RP-06, RP-07, RV-01, and RV-04 are contained herein.

2.0 REGULATORY EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a, 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 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 that 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 CNS fourth 10-year IST interval commenced March 1, 2006. The program was developed in accordance with the 2001 Edition through 2003 Addenda of the ASME OM Code. By letter dated October 19, 2005, NPPD requested relief from certain requirements of the ASME OM Code for its CNS fourth 10-year IST 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 RP-01

3.1.1 Code Requirements

The licensee requested relief from ISTB-3510(b)(1), which requires that the full-scale range of each analog instrument shall not be greater than three times the reference value.
Relief was requested for the following pumps:

Core Spray Pump A (CS-P-A)
Core Spray Pump B (CS-P-B)

3.1.2 Licensee's Basis for Requesting Relief

Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction pressure actual values for the CS pumps during IST are approximately 4.0 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 12.0 psig (3 x 4.0 psig) to bound the actual value for suction pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 0.24 psig (0.02 x 12 psig).

Pump discharge pressure actual values for the CS pumps during IST are approximately 300 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 900 psig (3 x 300.0 psig) to bound the actual value for discharge pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 18 psig (0.02 x 900 psig). Therefore, the maximum inaccuracies due to the suction and discharge pressure indications allowed by the ASME Code would be approximately ± 18.24 psig.

The CNS installed suction pressure gauges (PI-36A/B), which were designed to have an accuracy of ± 0.5 percent of full scale, have a range of approximately 45 psig. The 45 psig gauge range is derived from the 30" Hg portion of the gauge range that is in a vacuum, which converts to approximately 15 psig, added to the 30 psig positive portion of the gauge. The ± 0.3 psig current calibration tolerance is essentially a tolerance of approximately 0.66 percent of full scale (0.0066 x 45 psig = ~± 0.3 psig). Currently, the installed discharge pressure indicators (PI-48A/B) are 0 to 500 psig indicators that are calibrated in a loop with corresponding pressure transmitters (PT-38A/B). These loops are being calibrated to ± 10 psig, or ± 2 percent of full scale (0.02 x 500 psig = ±10.0 psig).

As an alternative for the Group B quarterly test, CNS will use the installed suction pressure gauge (30" Hg to 30.0 psig) currently calibrated to within a tolerance of ± 0.3 psig, together with the installed discharge pressure gauge (0 psig to 500 psig) currently calibrated in a loop to within a tolerance of ± 10 psig. This results in a combined maximum inaccuracy of ± 10.3 psig due to the installed suction and discharge pressure indications, which is less than the ASME Code-allowed ± 18.24 psig.

Although the permanently installed suction pressure gauges (PI-36A/B) are above the maximum range limits of ASME OM Code ISTB-3510(b)(1), they, in conjunction with the permanently installed discharge pressure gauges (PI-48A/B), yield a better accuracy for differential pressure than the minimum requirements dictated by the ASME Code and are, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6 percent of the differential pressure reference value.

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth 10-year interval or actual suction and discharge pressure readings were to change significantly, this relief request will remain valid as long as the combination of range and accuracy will be less than the ± 6 percent of the differential pressure reference value.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3510(b)(1), identified above, will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), NPPD requests relief from the specific ISTB requirements identified in this request.

3.1.3 Licensee's Proposed Alternative Testing

CNS will use the installed suction pressure gauge (30" Hg to 30.0 psig), currently calibrated to within a tolerance of ± 0.3 psig together with the installed discharge pressure gauge (0 psig to 500 psig) currently calibrated in a loop to within a tolerance of ± 10 psig for the Group B quarterly test. This results in a combined maximum inaccuracy of ± 10.3 psig due to the installed suction and discharge pressure indications, which is less than the ASME Code-allowed ± 18.24 psig.

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth 10-year interval or actual suction and discharge pressure readings were to change significantly, this relief request will remain valid as long as the combination of range and accuracy will be less than the ± 6 percent of the differential pressure reference value.

3.1.4 Evaluation

The instrument accuracy and range requirements of ISTB-3510(b)(1) are to ensure that test measurements are sufficiently sensitive to changes in pump condition to allow detection of degradation. ISTB-3510(b)(1) states that the full-scale range of each analog instrument shall not be greater than three times the reference values, and ISTB-3510(a) states that the instrument accuracy shall be within the limits of Table-3500-1, e.g., ± 2 percent for differential pressure measurements.

The CNS installed gauges for the CS pumps are 0 to 500 psig for discharge pressure and have a range of 45 psig for suction pressure. The respective reference values are approximately 300 psig and 4 psig. The installed suction pressure gauges have a range of about eleven times the reference value and, therefore, are above the maximum limits of ISTB-3510(b)(1). In lieu of replacing the over-the-limit suction pressure gauges, the licensee requested relief from ISTB-3510(b)(1), on the basis that the range and accuracy of the combined suction and discharge pressure gauges meet the intent of the accuracy requirements of ± 6 percent of the differential pressure reference value.

Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction pressure actual values for the CS pumps during IST are approximately 4.0 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 12.0 psig (3 x 4.0 psig) to bound the actual value for suction pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the code-allowed inaccuracies due to pressure effects would be ± 0.24 psig (± 0.02 X 12 psig). Pump discharge pressure actual values for the CS pumps during IST are approximately 300 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 900 psig (3 x 300.0 psig) to bound the actual value for discharge pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the ASME Code-allowed inaccuracies due to pressure effects would be ± 18 psig (0.02 x 900 psig). Therefore, the maximum inaccuracies due to the suction and discharge pressure indications allowed by the ASME Code would be approximately ± 18.24 psig.

The CNS installed suction pressure gauges (PI-36A/B), which were designed to have an accuracy of ± 0.5 percent of full scale, have a range of approximately 45 psig. The current calibration tolerance is approximately ± 0.3 psig. Currently, the installed discharge pressure indicators (PI-48A/B) are 0 to 500 psig indicators and are calibrated in a loop with corresponding pressure transmitters (PT-38A/B). These loops are being calibrated to ± 10 psig, or ± 2 percent of full scale (0.02 x 500 psig = ±10.0 psig). This results in a combined maximum inaccuracy of ± 10.3 psig from the installed suction and discharge pressure indications, which is less than the ASME Code-allowed ± 18.24 psig.

The currently installed suction pressure gauges are above the range limits of ISTB-3510(b)(1), but as discussed above, the combined suction and discharge pressure gauges yield a result within the ASME Code-allowed limits of ± 6 percent of the reference value. As indicated in Section 5.5.1 of NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1, an alternative can be authorized if the combination of range and accuracy yields a reading that meets ± 6 percent of the reference value. Therefore, the staff finds that the proposed use of currently installed over-the-limit suction pressure gauges together with the installed discharge pressure gauges meets the intent of the ASME Code requirements and is acceptable.

3.1.5 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified pumps. Accordingly, the proposed alternative is authorized for the fourth 10-year IST interval at CNS.

3.2 Pump Relief Request RP-02

3.2.1 Code Requirements

The licensee requested relief from ISTB-3510(b)(1) which requires that the full-scale range of each analog instrument shall not be greater than three times the reference value. Relief was requested for the following pumps:

Residual Heat Removal Pump A (RHR-P-A)
Residual Heat Removal Pump B (RHR-P-B)
Residual Heat Removal Pump C (RHR-P-C)
Residual Heat Removal Pump D (RHR-P-D)

3.2.2 Licensee's Basis for Requesting Relief

Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction pressure actual values for the RHR pumps during IST are approximately 5.0 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 15.0 psig (3 x 5.0 psig) to bound the actual value for suction pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group A pump test, the resulting inaccuracies due to pressure effects would be ± 0.3 psig (0.02 x 15 psig).

Pump discharge pressure actual values for the residual heat removal pumps during IST are approximately 170 - 195 psig. Conservatively basing it on the lowest of these discharge pressure readings, ISTB-3510(b)(1) would require, as a maximum, a gauge with a range of 0 to 510 psig (3 x 170.0 psig) to bound the actual value for discharge pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group A pump test, the resulting inaccuracies due to pressure effects would be ± 10.2 psig (0.02 x 510 psig). Therefore, the maximum inaccuracies due to the suction and discharge pressure indications allowed by the ASME Code would be approximately ± 10.5 psig.

The CNS installed suction pressure gauges (PI-106A/B/C/D), which were designed to have an accuracy of ± 0.5 percent of full scale, have a range of approximately 165 psig. The 165 psig gauge range is derived from the 30" Hg portion of the gauge range that is in a vacuum, which converts to approximately 15 psig, added to the 150 psig positive portion of the gauge. The ± 1.0 psig current calibration tolerance is essentially a tolerance of approximately 0.6 percent of full scale (0.006 x 165 psig = ~± 1.0 psig). Currently, the installed discharge pressure indicators (PI-106A/B/C/D) are 0 to 400 psig indicators. The discharge indicators are being calibrated to ± 5 psig, or ± 1.25 percent of full scale (0.0125 x 400 psig = ± 5.0 psig).

As an alternative for the Group A quarterly test, CNS will use the installed suction pressure gauge (30" Hg to 150.0 psig) currently calibrated to within a tolerance of ± 1 psig at the 5 psig point, together with the installed discharge pressure gauge (0 psig to 400 psig) currently calibrated to within a tolerance of ± 5 psig. This results in a combined maximum inaccuracy of ± 6 psig due to the installed suction and discharge pressure indications, which is less than the ASME Code-allowed ± 10.5 psig.

Although the permanently installed suction pressure gauges (PI-106A/B/C/D) are above the maximum range limits of ASME OM Code ISTB-3510(b)(1), they, in conjunction with the permanently installed discharge pressure gauges (PI-107A/B/C/D), yield a better accuracy for differential pressure than the minimum requirements dictated by the ASME Code and are, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6 percent of the differential pressure reference value.

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth 10-year interval or actual suction and discharge pressure readings were to change significantly, this relief request will remain valid as long as the combination of range and accuracy will be less than the ± 6 percent of the differential pressure reference value.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3510(b)(1), identified above, will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee requests relief from the specific ISTB requirements identified in this request.

3.2.3 Licensee's Proposed Alternative Testing

CNS will use the installed suction pressure gauge (30" Hg to 150.0 psig), currently calibrated to within a tolerance of ± 1 psig at the 5 psig point, together with the installed discharge pressure gauge (0 psig to 400 psig), currently calibrated to within a tolerance of ± 5 psig for the Group A quarterly test. This results in a combined maximum inaccuracy of ± 6 psig due to the installed suction and discharge pressure indications, which is less than the ASME Code-allowed ± 10.5 psig.

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth 10-year interval or actual suction and discharge pressure readings were to change significantly, this relief request will remain valid as long as the combination of range and accuracy will be less than the ± 6 percent of the differential pressure reference value.

3.2.4 Evaluation

The instrument accuracy and range requirements of ISTB-3510(b)(1) are to ensure that test measurements are sufficiently sensitive to changes in pump condition to allow detection of degradation. ISTB-3510(b)(1) states that the full-scale range of each analog instrument shall not be greater than three times the reference values, and ISTB-3510(a) states that the instrument accuracy shall be within the limits of Table-3500-1, e.g., ± 2 percent for differential pressure measurements.

The CNS installed gauges for the RHR pumps are 0 to 400 psig for discharge pressure and have a range of 165 psig for suction pressure. The respective reference values are approximately 170 psig and 5 psig. The installed suction pressure gauges have a range of 33 times the reference value and, therefore, are above the maximum limits of the ISTB-3510(b)(1). In lieu of replacing the over-the-limit suction pressure gauges, the licensee requested relief from ISTB-3510(b)(1), on the basis that the range and accuracy of the combined suction and discharge pressure gauges meet the intent of the accuracy requirements of ± 6 percent of the differential pressure reference value.

Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction pressure actual values for the RHR pumps during IST are approximately 5.0 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 15.0 psig (3 x 5.0 psig) to bound the actual value for suction pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group A pump test, the ASME Code-allowed inaccuracies due to pressure effects would be ± 0.3 psig (± 0.02 x 15 psig). Pump discharge pressure actual values for the RHR pumps during IST are approximately 170 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 510 psig (3 x 170.0 psig) to bound the actual value for discharge pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group A pump test, the ASME Code-allowed inaccuracies due to pressure effects would be ± 10.2 psig (0.02 x 510 psig). Therefore, the maximum inaccuracies due to the suction and discharge pressure indications allowed by the ASME Code would be approximately ± 10.5 psig.

The CNS installed suction pressure gauges (PI-106A/B/C/D), which were designed to have an accuracy of ± 0.5 percent of full scale, have a range of approximately 165 psig. The current calibration tolerance is approximately ± 1.0 psig. Currently, the installed discharge pressure gauges (PI-107A/B/C/D) are 0 to 400 psig indicators and are calibrated to within a tolerance of ± 5 psig, or ± 1.25 percent of full scale (0.125 x 400 psig = ± 5 psig). This results in a combined maximum inaccuracy of ± 6 psig from the installed suction and discharge pressure indications, which is less than the ASME Code-allowed ± 10.5 psig.

The currently installed suction pressure gauges are above the range requirements of ISTB-3510(b)(1), but as discussed above, the combined suction and discharge pressure gauges can yield a result within the ASME Code-allowed limits of ± 6 percent of the reference value. As indicated in Section 5.5.1 of NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1, an alternative can be authorized if the combination of range and accuracy yields a reading that meets ± 6 percent of the reference value. Therefore, the staff finds that the proposed use of the currently installed over-the-limit suction pressure gauges together with the installed discharge pressure gauges meets the intent of the ASME Code requirements and is acceptable.

3.2.5 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified pumps. Accordingly, the proposed alternative is authorized for the fourth 10-year IST interval at CNS.

3.3 Pump Relief Request RP-03

3.3.1 Code Requirements

The licensee requested relief from ISTB-3510(b)(1) which requires that the full-scale range of each analog instrument shall not be greater than three times the reference value. Relief was requested for the following pumps:

High-Pressure Coolant Injection Main Pump (HPCI-MP)
High-Pressure Coolant Injection Booster Pump (HPCI-BP)

3.3.2 Licensee's Basis for Requesting Relief

Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction pressure actual values for the HPCI pumps during IST are approximately 15.0 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 45.0 psig (3 x 15.0 psig) to bound the actual value for suction pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 0.9 psig (0.02 x 45 psig).

The pump discharge pressure actual values for the HPCI pumps during IST are approximately 1200 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 3600 psig (3 x 1200.0 psig) to bound the actual value for discharge pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 72 psig (0.02 x 3600 psig). Therefore, the maximum inaccuracies due to the suction and discharge pressure indications allowed by the ASME Code would be approximately ± 72.9 psig.

The CNS installed suction pressure gauge (PI-99), which was designed to have an accuracy of ± 0.5 percent of full scale, has a range of approximately 165 psig. The 165 psig gauge range is derived from the 30" Hg portion of the gauge range that is in a vacuum, which converts to approximately 15 psig, added to the 150 psig positive portion of the gauge. The ± 1.0 psig current calibration tolerance is essentially a tolerance of approximately 0.6 percent of full scale (0.006 x 165 psig = ~± 1.0 psig). Currently, the installed discharge pressure indicator (PI-81) is a 0 to 1500 psig indicator. The discharge indicator is being calibrated to ± 7.5 psig, or ± 0.5 percent of full scale (0.005 x 1500 psig = ± 7.5 psig).

As an alternative for the Group B quarterly test, CNS will use the installed suction pressure gauge (30" Hg to 150.0 psig) currently calibrated to within a tolerance of ± 1 psig, together with the installed discharge pressure gauge (0 psig to 1500 psig) currently calibrated to within a tolerance of ± 7.5 psig. This results in a combined maximum inaccuracy of ± 8.5 psig due to the installed suction and discharge pressure indications, which is less than the ASME Code-allowed ± 72.9 psig.

Although the permanently installed suction pressure gauge (PI-99) is above the maximum range limits of ASME OM Code ISTB-3510(b)(1), it, in conjunction with the permanently installed discharge pressure gauge (PI-81), yields a better accuracy for differential pressure than the minimum requirements dictated by the ASME Code and is, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6 percent of the differential pressure reference value.

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth 10-year interval or actual suction and discharge pressure readings were to change significantly, this relief request will remain valid as long as the combination of range and accuracy will be less than the ± 6 percent of the differential pressure reference value.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3510(b)(1), identified above, will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), NPPD requests relief from the specific ISTB requirements identified in this request.

3.3.3 Licensee's Proposed Alternative Testing

CNS will use the installed suction pressure gauge (30" Hg to 150.0 psig), currently calibrated to within a tolerance of ± 1 psig, together with the installed discharge pressure gauge (0 psig to 1500 psig), currently calibrated to within a tolerance of ± 7.5 psig for the Group B quarterly test. This results in a combined maximum inaccuracy of ± 8.5 psig due to the installed suction and discharge pressure indications, which is less than the ASME Code-allowed ± 72.9 psig.

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth 10-year interval or actual suction and discharge pressure readings were to change significantly, this relief request will remain valid as long as the combination of range and accuracy will be less than the ± 6 percent of the differential pressure reference value.

3.3.4 Evaluation

The instrument accuracy and range requirements of ISTB-3510(b)(1) are to ensure that test measurements are sufficiently sensitive to changes in pump condition to allow detection of degradation. ISTB-3510(b)(1) states that the full-scale range of each analog instrument shall not be greater than three times the reference value, and ISTB-3510(a) states that the instrument accuracy shall be within the limits of Table-3500-1, e.g., ± 2 percent for pressure differential measurements.

The CNS installed gauges for the HPCI pumps are 0 to 1500 psig for discharge pressure and have a range of 165 psig for suction pressure. The respective reference values are approximately 1200 psig and 15 psig. The installed suction pressure gauge has a range of eleven times the reference value and, therefore, is above the maximum limits of ISTB-3510(b)(1). In lieu of replacing the over-the-limit suction pressure gauge, the licensee requested relief from ISTB-3510(b)(1), on the basis that the range and accuracy of the combined suction and discharge pressure gauges meet the intent of the accuracy requirements of ± 6 percent of the differential pressure reference value.

Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction pressure actual values for the HPCI pumps during IST are approximately 15 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 45 psig (3 x 15.0 psig) to bound the actual value for suction pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 0.9 psig (± 0.02 x 45 psig). Pump discharge pressure actual values for the HPCI pumps during IST are approximately 1200 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 3600 psig (3 x 1200.0 psig) to bound the actual value for discharge pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 72 psig (0.02 x 3600 psig). Therefore, the maximum inaccuracies due to the suction and discharge pressure indications allowed by the ASME Code would be approximately ± 72.9 psig.

The CNS installed suction pressure gauge (PI-99), which was designed to have an accuracy of ± 0.5 percent of full scale, has a range of approximately 165 psig. The current calibration tolerance is approximately ± 1.0 psig. Currently, the installed discharge pressure indicators (PI-81) are 0 to 1500 psig indicators and are calibrated to within a tolerance of ± 7.5 psig, or ± 0.5 percent of full scale (0.005 x 1500 psig = ± 7.5.0 psig). This results in a combined maximum inaccuracy of ± 8.5 psig due to the installed suction and discharge pressure indications, which is less than the ASME Code allowed ± 72.9 psig.

The currently installed suction pressure gauges are above the range requirements of ISTB-3510(b)(1), but as discussed above, the combined suction and discharge pressure gauges can yield a result within the ASME Code-allowed limits of ± 6 percent of the reference value. As indicated in Section 5.5.1 of NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1, an alternative can be authorized if the combination of range and accuracy yields a reading that meets ± 6 percent of the reference value. Therefore, the staff finds that the proposed use of the currently installed over-the-limit suction pressure gauge together with the installed discharge pressure gauge meets the intent of the ASME Code requirements and is acceptable.

3.3.5 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified pumps. Accordingly, the proposed alternative is authorized for the fourth 10-year IST interval at CNS.

3.4 Pump Relief Request RP-04

3.4.1 Code Requirements

The licensee requested relief from ISTB-3510(b)(1) which requires that the full-scale range of each analog instrument shall not be greater than three times the reference value. Relief was requested for the following pump:

Reactor Core Isolation Cooling Main Pump (RCIC-P-MP)

3.4.2 Licensee's Basis for Requesting Relief

Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction pressure actual values for the RCIC pumps during IST are approximately 15.0 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 45.0 psig (3 x 15.0 psig) to bound the actual value for suction pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 0.9 psig (0.02 x 45 psig).

The discharge pressure actual values for the RCIC pump during IST are approximately 1250 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 3750 psig (3 x 1250.0 psig) to bound the actual value for discharge pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 75 psig (0.02 x 3750 psig). Therefore, the maximum inaccuracies due to the suction and discharge pressure indications allowed by the ASME Code would be approximately ± 75.9 psig.

The CNS installed suction pressure gauge (PI-66), which was designed to have an accuracy of ± 0.5 percent of full scale, has a range of approximately 165 psig. The 165 psig gauge range is derived from the 30" Hg portion of the gauge range that is in a vacuum, which converts to approximately 15 psig, added to the 150 psig positive portion of the gauge. The ± 1.0 psig current calibration tolerance is essentially a tolerance of approximately 0.6 percent of full scale (0.006 x 165 psig = ~± 1.0 psig). Currently, the installed discharge pressure indicator (PI-59) is a 0 to 1500 psig indicator. The discharge indicator is being calibrated to ± 15 psig, or ± 1.0 percent of full scale (0.01 x 1500 psig = ± 15 psig).

As an alternative for the Group B quarterly test, CNS will use the installed suction pressure gauge (30" Hg to 150.0 psig) currently calibrated to within a tolerance of ± 1 psig, together with the installed discharge pressure gauge (0 psig to 1500 psig) currently calibrated to within a tolerance of ± 15.0psig. This results in a combined maximum inaccuracy of ± 16.0 psig due to the installed suction and discharge pressure indications, which is less than the ASME Code-allowed ± 75.9 psig.

Although the permanently installed suction pressure gauge (PI-66) is above the maximum range limits of ASME OM Code ISTB-3510(b)(1), it, in conjunction with the permanently installed discharge pressure gauge (PI-59), yields a better accuracy for differential pressure than the minimum requirements dictated by the ASME Code and is, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6 percent of the differential pressure reference value. Reference NUREG 1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1, Section 5.5.1.

Although not anticipated, if any revisions to the current tolerance information provided occur within the CNS fourth 10-year interval or actual suction and discharge pressure readings were to change significantly, this relief request will remain valid as long as the combination of range and accuracy will be less than the ± 6 percent of the differential pressure reference value.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3510(b)(1), identified above, will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), NPPD requests relief from the specific ISTB requirements identified in this request.

3.4.3 Licensee's Proposed Alternative Testing

CNS will use the installed suction pressure gauge (30" Hg to 150.0 psig), currently calibrated to within a tolerance of ± 1 psig, together with the installed discharge pressure gauge (0 psig to 1500 psig), currently calibrated to within a tolerance of ± 15.0 psig for the Group B quarterly test. This results in a combined maximum inaccuracy of ± 16.0 psig due to the installed suction and discharge pressure indications, which is less than the ASME Code allowed ± 75.9 psig.

Although not anticipated, if any revisions to the current tolerance information provided occur within the CNS fourth 10-year interval or actual suction and discharge pressure readings were to change significantly, this relief request will remain valid as long as the combination of range and accuracy will be less than the ± 6 percent of the differential pressure reference value.

3.4.4 Evaluation

The instrument accuracy and range requirements of ISTB-3510(b)(1) are to ensure that test measurements are sufficiently sensitive to changes in pump condition to allow detection of degradation. ISTB-3510(b)(1) states that the full-scale range of each analog instrument shall not be greater than three times the reference value, and ISTB-3510(a) states that the instrument accuracy shall be within the limits of Table-3500-1, e.g., ± 2 percent for differential pressure measurements.

The CNS installed gauge for the RCIC pump is 0 to 1500 psig for discharge pressure and has a range of 165 psig for suction pressure. The respective reference values are approximately 1250 psig and 15 psig. The installed suction pressure gauge has a range of eleven times the reference value and, therefore, is above the maximum limits of the ISTB-3510(b)(1). In lieu of replacing the over-the limit suction pressure gauge, the licensee requested relief from ISTB-3510(b)(1), on the basis that the range and accuracy of the combined suction and discharge pressure gauges meet the intent of the accuracy requirements of ± 6 percent of the differential pressure reference value.

Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction pressure actual value for the RCIC pump during IST is approximately 15 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 45 psig (3 x 15.0 psig) to bound the actual value for suction pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 0.9 psig (0.02 x 45 psig). Pump discharge pressure actual values for the RCIC pump during IST is approximately 1250 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 3750 psig (3 x 1250.0 psig) to bound the actual value for discharge pressure. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 75 psig (0.02 x 3750 psig). Therefore, the maximum inaccuracies due to the suction and discharge pressure indications allowed by the ASME Code would be approximately ± 75.9 psig.

The CNS installed suction pressure gauge (PI-66), which was designed to have an accuracy of ± 0.5 percent of full scale, has a range of approximately 165 psig. The current calibration tolerance is approximately ± 1.0 psig. Currently, the installed discharge pressure indicator (PI-59) is a 0 to 1500 psig indicator and is calibrated to within a tolerance of ± 15 psig, or ± 1 percent of full scale (0.01 x 1500 psig = ±15.0 psig). This results in a combined maximum inaccuracy of ± 16.0 psig due to the installed suction and discharge pressure indications, which is less than the ASME Code-allowed ± 75.9 psig.

The currently installed suction pressure gauge is above the range requirements of ISTB-3510(b)(1), but as discussed above, the combined suction and discharge pressure gauges can yield a result within the ASME Code-allowed limits of ± 6 percent of the reference value. As indicated in Section 5.5.1 of NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1, an alternative can be authorized if the combination of range and accuracy yields a reading that meets ± 6 percent of the reference value. Therefore, the staff finds that the proposed use of the currently installed suction pressure gauge calibrated to within a tolerance of ± 1 psig, together with the installed discharge pressure gauge calibrated to within a tolerance of ± 15.0 psig meets the intent of the ASME Code requirements and is acceptable.

3.4.5 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified pump. Accordingly, the proposed alternative is authorized for the fourth 10-year IST interval at CNS.

3.5 Pump Relief Request RP-05

3.5.1 Code Requirements

The licensee requested relief from Table ISTB-3500-1, which requires an instrument accuracy of ± 2 percent for pressure and flow rate. Relief was requested for the following pumps:

Core Spray Pump A (CS-P-A)
Core Spray Pump B (CS-P-B)
High Pressure Coolant Injection Main Pump (HPCI-P-MP)
High Pressure Coolant Injection Booster Pump (HPCI-P-BP)
Reactor Core Isolation Cooling Pump (RCIC-PMP)
Service Water Booster Pump A (SW-P-BPA)
Service Water Booster Pump B (SW-P-BPB)
Service Water Booster Pump C (SW-P-BPC)
Service Water Booster Pump D (SW-P-BPD)

3.5.2 Licensee's Basis for Requesting Relief

The difference between the ASME Code-required and presently installed instrument loop accuracies is 0.06 percent, at a maximum, as presented above. This difference is insignificant when applied to the quantitative measured values for these parameters. Additionally, all calibration tolerances of the loops involved meet the ASME Code-allowed accuracies of ± 2 percent or better. The installed instrumentation has the following equipment and actual calibration accuracies:

Pump Parameter	Equipment Loop Accuracy (%)	Calibration Loop Accuracy (%)
CS Pump Discharge Pressure	2.06	≤ 2.00
CS Pump Flowrate	2.02	≤ 2.00
HPCI Pump Flowrate	2.03	≤ 2.00
RCIC Pump Flowrate	2.03	≤ 2.00
SWB Pump Flowrate	2.03	≤ 2.00

The CS pump discharge pressure loop is made up of a pressure indicator (range of 0 - 500 psig) and a pressure transmitter. The pressure indicator (PI-48A/B) has a nameplate accuracy of ± 2 percent, and the pressure transmitter (PT-38A/B) has a nameplate accuracy of ± 0.5 percent. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for discharge pressure indication is ± 2.06 percent (square root of the sum of the squares), which exceeds the ASME Code requirement of ± 2 percent. The variation from the ASME Code of 0.06 percent, with a gauge range of 0 to 500 psig, would amount to a potential deviation of only 0.3 psig (0.0006 x 500). However, CNS is currently calibrating this discharge pressure loop to within ± 10 psig, which is equivalent to a ± 2 percent of full-scale tolerance (0.02 x 500 psig = + 10 psig), which meets the accuracy requirements of the ASME Code.

The CS pump flow rate loop is made up of a flow indicator (range of 0 - 6000 gpm) and a flow transmitter. The flow indicator (FI-50A/B) has a nameplate accuracy of ± 2 percent, and the flow transmitter (FT- 40A/B) has a nameplate accuracy of ± 0.25 percent. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for discharge pressure indication is ± 2.02 percent (square root of the sum of the squares), which exceeds the ASME Code requirement of ± 2 percent. The variation from the ASME Code of 0.02 percent, with a gauge range of 0 - 6000 gpm, would amount to a potential deviation of only 1.2 gpm (6000 x .0002). However, CNS is currently calibrating this flow loop to within ± 50 gpm (at the IST reference value of 5000 gpm) or approximately ± 0.83 percent of full scale (± 0.0083 x 6000 =

~± 50 gpm), which is better than the ± 2 percent of full scale accuracy requirements of the ASME Code. If a preservice test were to be run, CNS would ensure that the loop was calibrated to ≤ 2 percent over the full range of the test prior to performing it.

The HPCI pump flow rate loop is made up of a flow indicating controller (range of 0 - 5000 gpm), a flow transmitter, and a flow square rooter. The flow indicating controller (FIC-108) has a nameplate accuracy of ± 0.25 percent, the flow transmitter (FT-82) has a nameplate accuracy of ± 0.25 percent, and the flow square rooter (SQRT-118) has a nameplate accuracy of ± 2 percent from approximately 0 - 1000 gpm and ± 0.5 percent from approximately 1000 - 5000 gpm. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately ± 2.03 percent (square root of the sum of the squares) from 0 -1000 gpm, which does not meet the ASME Code requirement of ± 2 percent, and approximately ± 0.61 percent from 1000 - 5000 gpm, which does meet the ASME Code requirement of ± 2 percent. The variation from the ASME Code of 0.03 percent in the range of 0 - 1000 gpm, with a gauge range of 0 to 5000 gpm, would amount to a potential deviation of only 1.5 gpm (5,000 x .0003). However, CNS is currently calibrating this flow loop to within ± 100 gpm (at the IST reference of 4250 gpm and at other points from 1000 gpm to 5000 gpm) or ± 2 percent of full scale (± 0.02 x 5000 = ~± 100 gpm), which is equivalent to the ± 2 percent of full-scale accuracy requirements of the ASME Code. If a preservice test were to be run, CNS would ensure that the loop was calibrated to ± 2 percent over the full range of the test prior to performing it.

The RCIC pump flow rate loop is made up of a flow indicating controller (range of 0 - 500 gpm), a flow transmitter, and a flow square rooter. The flow indicating controller (FIC-91) has a nameplate accuracy of ± 0.25 percent, the flow transmitter (FT-58) has a nameplate accuracy of ± 0.25 percent, and the flow square rooter (SQRT-99) has a nameplate accuracy of ± 2 percent from approximately 0 - 100 gpm and ± 0.25 percent from approximately 100 - 500 gpm. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately 2.03 percent (square root of the sum of the squares) from 0 -100 gpm, which does not meet the ASME Code requirement of ± 2 percent, and approximately ± 0.61 percent from 100 - 500 gpm, which does meet the ASME Code requirement of ± 2 percent. The variation from the ASME Code of 0.03 percent in the range of 0 - 100 gpm, with a gauge range of 0 to 500 gpm, would amount to a potential deviation of only 0.15 gpm (500 x .0003). However, CNS is currently calibrating this flow loop to within ± 10 gpm over the entire range of flow or ± 2 percent of full scale (± 0.02 x 500 = ~± 10 gpm), which is equivalent to the ± 2 percent of full-scale accuracy requirements of the ASME Code.

The Service Water Booster (SWB) Pump flow rate loop is made up of a flow indicator (range of 0 - 10,000 gpm), a flow transmitter, and a flow square rooter. The flow indicator (FI-I32A/B) has a nameplate accuracy of ± 2 percent, the flow transmitter (FT-97) has a nameplate accuracy of ± 0.25 percent, the flow square rooter (SQRT-132A) has a nameplate accuracy of ± 0.25 percent, and the flow square rooter (SQRT-132B) has a nameplate accuracy of ± 0.27 percent from 1 to 2.5 percent input (1000 to 1580 gpm) and 0.14 percent from 2.5 to 100 percent input (1580 to 10,000 gpm). Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately ± 2.03 percent (square root of the sum of the squares) for A loop and approximately ± 2.03 percent (square root of the sum of the squares) from 1000 to 1580 gpm and approximately 2.02 percent from 1580 to 10,000 gpm for B loop, which exceeds the ASME Code requirement of ± 2 percent. The variation from the

ASME Code of 0.03 percent, with a gauge range of 0 to 10,000 gpm, would amount to a potential deviation of only 3 gpm (0.0003 x 10,000). The variation from the ASME Code of 0.03 percent for B loop (1000 to 1580 gpm), with the gauge range of 0 to 10,000 gpm, would amount to a potential deviation of only 3 gpm (0.0003 x 10,000) and the variation from the ASME Code of 0.02 percent (1580 to 10,000 gpm), with a gauge range of 0 to 10,000 gpm, would amount to a potential deviation of only 2 gpm (0.0002 x 10,000). However, CNS is currently calibrating this flow loop to within ± 100 gpm, which is equivalent to a ± 1 percent of full-scale tolerance (0.01 x 10,000 gpm = ± 100 gpm), which is better than the ± 2 percent of full-scale accuracy requirements of the ASME Code. As an alternative for Group A and B pump pressure accuracies (± 2 percent) and for all flow rate accuracies (± 2 percent), CNS will use the installed instruments calibrated such that the loop accuracies are as indicated in the above table. No adjustments to acceptance criteria will be made as the calibrated loop accuracies will meet the ASME Code tolerances.

Although the permanently installed instrument loops do not meet the accuracy requirements of ASME OM Code ISTB Table ISTB-3500-1 when looking at nameplate accuracies, the effects of these small inaccuracies are insignificant when compared to the measured values, and credit will be taken for the ability to calibrate the loop within the ASME Code-allowed tolerance.

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth 10-year interval, this relief request will remain valid as long as the calibrated loop accuracies meet the ASME Code-required tolerances of ≤ 2.00 percent of full scale.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB Table 3500-1 will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), NPPD requests relief from the specific ISTB requirements identified in this request.

3.5.3 Licensee's Proposed Alternative Testing

CNS will use the installed instruments calibrated such that the loop accuracies are as indicated in the above table for Group A and B pump pressure accuracies (± 2 percent) and for all flow rate accuracies (± 2 percent). No adjustments to acceptance criteria will be made as the calibrated loop accuracies will meet the ASME Code tolerances.

Although not anticipated, if any revisions to the current tolerance information provided occur within the CNS fourth 10-year interval, this relief request will remain valid as long as the calibrated loop accuracies meet the ASME Code-required tolerances of ≤ 2.00 percent of full scale.

3.5.4 Evaluation

The instrument accuracy and range requirements of ISTB-3510(b)(1) are to ensure that test measurements are sufficiently sensitive to changes in pump condition to allow detection of degradation. ISTB-3510(a) states that the instrument accuracy shall be within the limits of Table-3500-1, e.g., ± 2 percent for flow rate and differential pressure measurements.

As indicated above, the nameplate accuracies of the installed instruments for the affected pumps in relief request RP-05 are slightly above the ASME Code-required value of ± 2 percent. In lieu of replacing the installed instruments, the licensee requested relief from ISTB-3510(a), on the basis that the installed instrument loops can be calibrated to meet the ASME Code-allowed accuracies of ± 2 percent.

Although the permanently installed instrument loops do not meet the accuracy requirements of Table ISTB-3500-1 when looking at nameplate accuracies, the licensee has demonstrated in Section 3.5.2 above that the effects of the small inaccuracies are insignificant when compared to the measured values. Additionally, all installed instrument loops are calibrated to meet the ASME Code-allowed accuracies of ± 2 percent. Therefore, the staff finds that the proposed alternative of using the existing instruments is acceptable.

3.5.5 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified pumps. Accordingly, the proposed alternative is authorized for the fourth 10-year IST interval at CNS.

3.6 Pump Relief Request RP-06

3.6.1 Code Requirements

The licensee requested relief from ISTB-35l0(b)(1), which requires that the full-scale range of each analog instrument shall not be greater than three times the reference value. Relief was requested for the following reactor equipment cooling (REC) pumps:

Reactor Equipment Cooling Pump A (REC-P-A)
Reactor Equipment Cooling Pump B (REC-P-B)
Reactor Equipment Cooling Pump C (REC-P-C)
Reactor Equipment Cooling Pump D (REC-P-D)

3.6.2 Licensee's Basis for Requesting Relief

The permanent plant flow Instruments REC-FI-450A and REC-FI-450B are calibrated such that their accuracy is 1.25 percent of full scale. This yields a total inaccuracy of 50 gpm (0.0125 x 4000 gpm). Reference flow rates for the reactor equipment cooling pumps are 1100 gpm. Based on ISTB-3510(b)(1) this would require, as a maximum, a gauge of 0 to 3300 gpm (3 x 1100 gpm) to bound the lowest reference value for flow.

Applying the accuracy requirement of ± 2 percent for the pump test, the resulting inaccuracies due to flow would be ± 66 gpm (0.02x 3300 gpm).

As an alternative, for the REC pump inservice tests, CNS will use the installed flow rate instrumentation (0 to 4000 gpm) calibrated to less than ± 2 percent such that the inaccuracies due to flow will be less than or equal to that required by the ASME Code (± 66 gpm). This will ensure that the installed flow rate instrumentation is equivalent to the ASME Code, or better, in terms of measuring flow rate.

Although the permanently installed flow gauges are above the maximum range limits of ASME OM Code ISTB-3510(b)(1), they are within the accuracy requirements and are, therefore, suitable for the test. Reference NUREG-1482, Revision 1, Section 5.5.1.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB 3510(b)(1), identified above, will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), NPPD requests relief from the specific ISTB requirements identified in this request.

3.6.3 Licensee's Proposed Alternative Testing

CNS will use the installed flow rate instrumentation (0 to 4000 gpm) calibrated to less than ± 2 percent such that the inaccuracies due to flow will be less than or equal to those required by the ASME Code (± 66 gpm) for the reactor equipment cooling pump inservice tests. This will ensure that the installed flow rate instrumentation is equivalent to the ASME Code, or better, in terms of measuring flow rate.

3.6.4 Evaluation

The instrument accuracy and range requirements of ISTB-3510(b)(1) are to ensure that test measurements are sufficiently sensitive to changes in pump condition to allow detection of degradation. ISTB-3510(b)(1) states that the full-scale range of each analog instrument shall not be greater than three times the reference value, and ISTB-3510(a) states that the instrument accuracy shall be within the limits of Table-3500-1, e.g., ± 2 percent for flow rate measurements.

The CNS installed gauges for the REC pumps are 0 to 4000 gpm for flow rate. The reference values for flow rate during IST are approximately 1100 gpm. The installed flow rate gauges have a range of 3.63 times the reference value and, therefore, are above the maximum limits of ISTB-3510(b)(1). In lieu of replacing the over-the-limit flow rate gauges, the licensee requested relief from ISTB-3510(b)(1), on the basis that the combined range and accuracy of the installed gauges meets the intent of the accuracy requirements of ± 6 percent of the reference value.

Reference flow rates for the REC pumps are 1100 gpm. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 3300 gpm (3 x 1100 gpm) to bound the lowest value for flow. Applying the accuracy requirement of ± 2 percent of full scale (± 6 percent of reference) for the quarterly Group A or Group B pump test, the maximum inaccuracies due to flow indications allowed by the ASME Code would be ± 66 gpm (± 0.02 x 1100 gpm).

CNS proposes to use the installed flow rate gauges but will calibrate them to less than ± 2 percent such that the inaccuracies due to flow will be less than or equal to that required by the ASME Code (± 66 gpm). Currently the instruments are calibrated to within 1.25 percent of full scale, which yields a total accuracy of within 50 gpm (0.0125x 4000 gpm), and is less than the ASME Code allowed ± 66 gpm.

The currently installed flow rate gauges are above the range requirements of ISTB-3510(b)(1), but, as discussed above, the combined range and accuracy can yield a result within the ASME Code-allowed limits of ± 6 percent of the reference value. As indicated in Section 5.5.1 of NUREG-1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1, an alternative can be authorized if the combination of range and accuracy yields a reading that meets ± 6 percent of the reference value. Therefore, the staff finds that the proposed use of the currently installed over-the-limit flow rate gauges but calibrated to within 1.25 percent of full scale meets the intent of the ASME Code requirements and is acceptable.

3.6.5 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternative provides an acceptable level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified pumps. Accordingly, the proposed alternative is authorized for the fourth 10-year IST interval at CNS.

3.7 Pump Relief Request RP-07

3.7.1 Code Requirements

The licensee requested relief from the requirements of ISTB Table-5100-1. In lieu of meeting the ASME Code requirements for the vibration alert range from 0.325 to 0.7 ips, the licensee proposes to increase the alert range to 0.4 to 0.7 ips for the affected pump vibration test at points 1H and 5H. Relief was requested for the following pump:

Core Spray Pump B (CS-P-B)

3.7.2 Licensee's Basis for Requesting Relief

In this relief request, the licensee states:

> The IST Program has consistently required (prior to obtaining relief per RP-06 of the third interval program) that CS-P-B be tested on an increased frequency due to vibration values at Points 1H and 5H, as shown in Figure 1 of this attachment [October 19, 2005, application], periodically being in the alert range. Relief is requested from ISTB Table ISTB-5100-1 requirements to test the pump on an increased periodicity due to vibration levels for Points 1H and/or 5H exceeding the ISTB alert range absolute limit for the comprehensive pump test. This request is based on analysis of vibration and pump differential pressure data indicating that no pump vibration is taking place. CNS is proposing to use alternative vibration alert range limits for vibration Points 1H and 5H. This provides an alternative method that continues to meet the intended function of monitoring the pump for degradation over time while keeping the required action level unchanged.

By this relief request, the licensee is proposing to increase the lower alert range limit for vibration Points 1H and 5H to 0.4 in/s. The piping-induced vibration, which occurs at low frequencies, occasionally causes the overall vibration value for these two points to exceed 0.325 in/s, resulting in CS-P-B being on an increased test frequency. However, several expert analyses and maintenance history reviews have shown that this piping-induced vibration has not resulted in degradation to the pump. Additionally, the overall vibration levels have remained steady over the past 15 years. Therefore, it has been demonstrated that doubling the test frequency under the current conditions does not provide additional assurance as to the condition of the pump and its ability to perform its safety function.

The licensee has evaluated this relief request to the four key components identified in NUREG/CP-0152 that should be addressed in a relief request of this type. These key components and the licensee's evaluation are briefly summarized below.

Vibration History

The licensee should have sufficient vibration history from IST which verifies that the pump has operated at this vibration level for a significant amount of time, with any "spikes" in data justified.

The licensee explained that inconsistent vibrations on CS-P-B have been a condition that has existed since original installation of this pump in 1973 due to randomly distributed bursts of energy at the natural frequency of the total system and it was determined that the hydraulic disturbances found in the piping was the source of energy. Consistent with ASME Code requirements prior to 1990, at least one displacement vibration amplitude was read. Since 1990, vibration levels were measured in velocity units (inches per second). Velocity data since 1990 has been submitted with the relief request to demonstrate that vibration levels are not trending upward.

Consultation with Pump Manufacturer/Vibration Expert

The licensee should have consulted with the pump manufacturer or vibration expert about the level of vibration the pump is experiencing to determine if pump operation is acceptable.

The licensee identified Byron Jackson as the pump manufacturer and high vibration has been recognized in the preoperational test data. In 1973, Byron Jackson determined there is unusual turbulence in the piping and the vibrating piping was, in turn, vibrating the pump. The pump manufacturer determined that the motor and pump can operate with these levels of vibration with absolutely no impairment of operating life. Although the vibration was found to be acceptable, CNS took successful actions to install new pipe supports to reduce these piping-induced vibrations. In 2001, an independent industry vibration expert evaluated the CS-P-B vibrations and determined that there is no evidence of motor bearing wear and that this poses no threat to the long-term reliability of either the pump or the motor. The consultant concluded that the only negative impact is on vibration levels relative to a generic standard and it was recommended to continue to collect data to verify that the system response does not change. CNS continued to monitor the source of the vibrations and in 2002 concluded that several years of spectral data shows no degrading trend and the low-frequency piping-induced vibrations are not expected to adversely impact pump operability.

Attempts to Lower Vibration

The licensee should describe attempts to lower the vibration below the defined ASME Code absolute levels through modifications to the pump.

As identified above, CNS installed additional pipe restraints during the preoperational period to reduce piping-induced vibration. In 1993, CNS also replaced single stage orifices with multi-stage orifices to reduce flow-induced vibrations.

Spectral Analysis

The licensee should perform a spectral analysis of the pump-driver system to identify all contributors to the vibration levels. The licensee submitted spectrum trend data that validate the analysis performed by an independent consultant that vibrations are piping induced and are not indicative of degraded pump performance.

3.7.3 Licensee's Proposed Alternative Testing

NPPD is proposing to increase the absolute alert limit for vibration Points 1H and 5H from 0.325 in/s to 0.400 in/s. The new alert limits will still allow for early detection of pump degradation or piping-induced vibration increases prior to component failure, while the required action absolute limit will remain at the ASME Code value of 0.700 in/s.

3.7.4 Evaluation

Background

The CS pump has an active safety function to provide cooling water to the reactor vessel to mitigate the consequences of a loss-of-coolant accident. The pump delivers water from the suppression pool to the spray spargers in the reactor vessel above the fuel to cool and limit cladding temperature.

Inconsistent higher vibrations on CS-P-B have been a condition that has existed since original installation of this pump in 1973. Beginning in April 1990, five points (1V, 1H, 2H, 3H, and 5H) were measured and recorded for CS-P-B. The data show that the vibrations at Points 1H and 5H occasionally exceed the lower end of the "Alert Range" criteria of 0.325 to 0.7 ips.
In accordance with ASME Code requirements, the licensee had previously increased the test frequency for CS-P-B when vibration exceeds the Alert Limit. A relief request was granted for an earlier ASME Code edition in the third 10-year interval as relief request RP-06 on the basis of actions and evaluations by the licensee.

Based on its review of the historical and recent vibration data and actions taken to reduce the vibrations, the licensee concluded that doubling the test frequency would not provide any additional information nor additional assurance on information as to the condition of the pump and its ability to perform its safety function.

By letter dated February 25, 2004, the staff found that the licensee's proposal to use the slightly increased "Alert" range of 0.400 in/s is acceptable on the basis that the affected pump has been operating acceptably at vibration velocities occasionally above the ASME Code "Alert Range" with little change in performance and without any detectable degradation since 1973; and that testing the pumps on an increased frequency has not produced any additional information for improving pump vibration performance. Therefore, the slight increase of the vibration alert range will have little effect on the timely detection of pump degradation prior to component failure, especially since the "Required Action" level (0.7 ips) is unchanged.

The staff evaluated the licensee's current request for alternative testing against the key components identified in NUREG/CP-0152. Additional information was required to support the staff evaluation of certain key components.

Vibration History

The licensee should have sufficient vibration history from IST which verifies that the pump has operated at this vibration level for a significant amount of time, with any "spikes" in data justified.

The licensee has performed a review of the historical test data for CS-P-B pump. The review indicates that the low-frequency vibration has remained at a consistent amplitude, trending neither upward nor downward, and that the induced vibrations are not impairing pump operability, nor capable of preventing the pump from fulfilling its safety function.

The staff found that the licensee has submitted sufficient vibration history to verify that the pump has operated at this vibration level for a significant period of time with no adverse effects on performance. Spikes in data have been justified by consultation with the pump manufacturer, independent consultants, and spectral analysis.

Consultation with Pump Manufacturer/Vibration Expert

The licensee should have consulted with the pump manufacturer or vibration expert about the level of vibration the pump is experiencing to determine if pump operation is acceptable.

In 1973, a representative of the pump manufacturer indicated that energy is coming from hydraulic disturbances in the piping and the vibrating piping is in turn vibrating the pump. The representative found that the motor and pump can operate with these levels of vibration with absolutely no impact on operating life. The specific levels of vibration were not identified in the relief request.

In 2001, Machinery Solutions, Inc. was retained to perform an independent study of CS-P-B vibrations. Machinery Solutions concluded that most of the vibration is due to excitation of the structural resonances of the motor/pump by turbulent flow. These structural resonances are poorly damped and can be easily excited. Most vertical pumps have similar types of behavior and it is not necessarily problematic by itself. A problem occurs when a pump has a continuous forcing function whose frequency coincides with a resonance (i.e., running speed). The forcing function in this case is flow turbulence caused in large part by the S-curve in the piping just off the pump discharge. The flow through this area generates lateral broadband forces, due to elbow effects, that excite the swings so dramatically on the motor case [the location of vibration points of 1H and 5H]. Machinery Solutions also concluded that the low-frequency vibrations caused by flow turbulence pose no threat to the long-term reliability of either the pump or the motor.

The licensee was requested to identify the levels of vibration in terms of peak-to-peak velocity that are acceptable to the pump manufacturer. By letter dated March 8, 2006, the licensee identified that the current vendor for the Byron Jackson Core Spray Pumps is Flowserve. The licensee clarified that, although Flowserve indicated that they do not have an acceptance vibration limit for 30 days of operation, they did state that, "[b]ased on the nature of the vibration (piping hydraulic turbulence exciting a structural resonance) and the fact that this pump has been running successfully for 15 years, we concur with using a 0.40 in/sec peak as the alert value associated with the vibration points 1H and 5H."

The licensee was requested to identify if there are alternative industry acceptance criteria that may be applied to the alert limits and to identify if other indications of damage, such as bearing temperature or noise level, are monitored. By letter dated March 8, 2006, the applicant identified that Flowserve was not aware of industry standards (other than the ASME Code requirements) that could be applied to these types of pumps. The licensee clarified that, per the Predictive Maintenance Program, CNS will continue to monitor vibrations beyond the requirements of the ASME Code through spectral analysis in addition to performing periodic oil analysis. Although the licensee did not apparently review alternative industry acceptance criteria, the staff finds that the licensee has consulted with the pump supplier and identified appropriate additional compensatory measures as a basis for accepting higher vibration alert levels.

The staff found that the licensee has consulted with the pump manufacturer and vibration experts to demonstrate that the vibration is piping induced and is not indicative of pump degradation. On the basis of these consultations, the licensee has demonstrated that the higher alert limits are acceptable and pump operability at these vibration levels is not affected.

<u>Attempts to Lower Vibration</u>

The licensee should describe attempts to lower the vibration below the defined ASME Code absolute levels through modifications to the pump.

To reduce piping-induced vibrations, CNS installed additional piping restraints during the pre-operational period. Low-frequency flow-induced vibrations continued, but with reduced amplitude following the installation of the pipe restraints. In 1993, a deficiency report was written to address increased frequency IST testing of CS-P-B due to vibration. It was suspected that the pump vibrations were flow-induced. Preliminary investigation of the vibration issue concluded that cavitation at the CS test return line throttle valve and/or restriction orifice was likely causing the elevated piping vibration in both CS system loops. To further reduce these flow-induced vibrations, the licensee replaced the existing simple, single-stage orifices on both CS subsystem test return lines with multi-stage orifices. Post-installation testing with these multi-stage orifices demonstrated lower vibration level on CS-P-A, but higher vibration level on CS-P-B. A multi-hole single-stage orifice was fabricated and installed in the CS-P-B test return line with significantly improved results. Visual observation and vibration data collected during acceptance testing determined that CS-P-B pump vibrations had been reduced, but pump vibrations at locations 1H and 5H still occasionally exceeded the alert limit.

The licensee was requested to describe why high-vibration levels are unique to Pump B and not Pump A. By letter dated March 8, 2006, the licensee identified several significant differences in the discharge piping for the two pumps. In addition to piping configuration differences there are variations in configuration of the valves, pipe supports, and hangers that may contribute to the differences observed between the two systems. The licensee concludes that the differences between the two trains are enough to allow the "B" CS pump structural resonances to become excited in a non-continuous fashion.

The staff finds that the licensee has described attempts to reduce vibration and has demonstrated that the cause of the vibration appears to be dependent on the piping and support configuration rather than the condition of the pumps.

Spectral Analysis

The licensee should perform a spectral analysis of the pump-driver system to identify all contributors to the vibration levels.

The staff finds that the licensee has submitted spectral data that validate the analysis performed by an independent consultant that the elevated vibrations are piping induced and are not indicative of degraded pump performance.

The licensee has also performed a review of maintenance history for CS-P-B. The review of approximately 30 years of maintenance history indicated that there have been no significant work items applicable to CS-P-B due to the low-frequency vibrations that have been experienced since the construction phase of the plant, and that no significant maintenance or corrective actions had to be implemented for the "B" CS pump and motor due to flow-induced vibrations. Oil analyses of CS-P-B lower and upper motor bearing housings were found to be satisfactory for all the results documented from 1995 to the present. Water, metals, contaminants, additives, etc., were all at acceptable levels.

In addition to maintenance history, GL 89-04, Supplement 1, indicates that licensees should consider vendor records of degradation at other facilities when evaluating alternative testing. The licensee was requested to clarify if this level of vibration is unique to CNS or to include other industry-wide operating experience and explain the cause and resolution. By letter dated March 8, 2006, the licensee identified that Flowserve indicated that a Fitzpatrick CS pump also experienced higher vibrations due to hydraulic turbulence and Flowserve personnel concluded that this observed phenomenon would not decrease the pump's expected operating life. Fermi 2 also experienced higher vibrations on the RHR pump B and C motors caused by "flow noise" and an alert range increase from 0.325 in/s to 0.400 in/s was granted by the NRC on the basis of a review of historical data and that compliance would result in hardship without a compensating increase in quality and safety. The staff finds that the licensee has considered sufficient industry-wide operating experience to confirm that this phenomenon is not unique to CNS CS pumps and that flow-induced vibration appears to be the common cause. For generic alternatives such as this, staff encourages licensees to initiate an ASME Code inquiry to obtain Code Committee guidance on developing alternative rules for alert limits resulting from piping-induced vibrations. To improve regulatory efficiency and to obtain a complete review by the entire Code Committee, Code Cases are preferred over individual relief requests when the subject of the relief request is generic and the need is urgent. Therefore, acceptance of this higher alert limit is considered acceptable pending future development of alternative rules by the OM Committee.

3.7.5 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternative is authorized pursuant to 10 CFR50.55a(a)(3)(i), on the basis that the proposed alternative acceptance criteria for the pump provides an acceptable level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified pump. Accordingly, the proposed alternative is authorized for the fourth 10-year IST interval at CNS.

3.8 Valve Relief Request RV-01

3.8.1 Code Requirements

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. Relief was requested for the following solenoid operated valves:

HPCI-SOV-SSV-64
HPCI-SOV-SSV-87

3.8.2 Licensee's Basis for Requesting Relief

The HPCI turbine and exhaust steam drip leg drain to gland condenser and the HPCI turbine exhaust steam drip leg drain to equipment drain isolation valve have an active safety function in the closed position to maintain pressure boundary integrity of the HPCI turbine exhaust line. These valves serve as a Class 2 to non-code boundary barrier.

The 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 operability testing of drain pot level switches. However, remote position indication is not provided for positive verification of disc position. Additionally, their design prevents 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.

Quarterly, each valve shall be exercised to the full closed position. Although valve stroke timing will not be performed, this test will verify that the valve moves to the safe position. Enhanced maintenance shall be performed on an 18-month frequency by disassembling and inspecting each valve to monitor for degradation.

CNS has reviewed the risk implications, work window time-frame, and administrative requirements for performing the proposed enhanced maintenance on-line, if desired, and have determined that this would be an acceptable practice. If performed on-line, this maintenance activity would require the isolation of steam to the HPCI turbine by closing the manual isolation valves on the HPCI steam line and HPCI turbine exhaust line for personnel protection. HPCI would be inoperable and unavailable during this time frame. Based on an estimate from the maintenance department, the disassembly and inspection would not be expected to take longer than one shift (12 hours).

Assuming one shift of unavailability for HPCI, Risk Engineering concluded that the existing 10 CFR 50.65(a)(4) process would be followed to perform work on the HPCI valves and that the HPCI unavailability time of one shift would not be considered risk significant. Additionally, HPCI is routinely removed from service to perform other maintenance activities, which may take longer than a 12-hour duration. The work control process is set up so that the performance of this enhanced maintenance would be scheduled concurrently with these other routine maintenance activities in order to minimize HPCI unavailability and risk impact would be negligible.

3.8.3 Licensee's Proposed Alternative Testing

Quarterly, each valve shall be exercised to the full closed position. Although valve stroke timing will not be performed, this test will verify that the valve moves to the safe position. Enhanced maintenance shall be performed on an 18-month frequency by disassembling and inspecting each valve to monitor for degradation.

3.8.4 Evaluation

Solenoid operated valves 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. 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 ASME 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 an 18-month frequency to monitor for degradation. Imposition of the ASME Code requirements would result in a burden on the licensee in that modification to the valves, valve replacement, or the purchase of more advanced testing equipment would be necessary to comply with the ASME Code requirements. The licensee's proposal to exercise these valves to the closed position quarterly in combination with disassembly and inspection on an 18-month frequency provides reasonable assurance of the operational readiness of these valves.

Relief is granted pursuant to 10 CFR 50.55a(f)(6)(i) based on (1) the impracticality of performing the ASME Code-required testing; (2) consideration of the burden on the licensee if the ASME Code requirements were imposed on the facility, and; (3) the proposed alternative testing providing an acceptable level of assurance of the operational readiness of the valves.

3.8.5 Conclusion

Based on the above evaluation, the staff concludes that the licensee's request for relief is granted pursuant to 10 CFR 50.55a(f)(6)(i) on the basis that compliance with the ASME Code requirements is impractical and that the alternative provides reasonable assurance of the operational readiness of the solenoid operated valves. The staff further concludes that granting the relief 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 identified pump. Accordingly, relief is authorized for the fourth 10-year IST interval.

3.9 Valve Relief Request RV-04

3.9.1 Code Requirements

The licensee requested relief from Appendix I, I-3310, which requires a seat tightness determination during relief valve testing. Relief was requested for the following power-actuated safety relief valves (SRVs):

> MS-RV-71ARV, MS-RV-71BRV, MS-RV-71CRV, MS-RV-71DRV, MS-RV-71ERV, MS-RV-71FRV, MS-RV-71GRV, MS-RV-71HRV.

3.9.2 Licensee's Basis for Requesting Relief

These valves are power-actuated SRVs for the main steam lines. Pressure switches in the SRV discharge lines annunciate in the control room and indicate when the main valve seat is open. In addition, there are temperature elements on the valve discharge lines which provide leakage indication. Thus, valve seat leakage is continuously monitored. Each valve is equipped with a pilot valve assembly that controls the set pressure. The pilot valve assemblies are removed from the main body and sent off site for inspection, refurbishment, and re-qualification testing (setpoint, reseat, and pilot stage seat tightness). The test facility has a main body slave for this purpose. During outages the pilot valve assemblies are removed, and previously refurbished and re-qualified pilot valve assemblies are installed. During startup, a full-stroke exercise test of the main valve is performed.

The seat leakage tightness of the main valve disks will be demonstrated by the pressure switches and the temperature elements in the SRV discharge lines during startup after each refueling outage. Visual examination of the main valve will be performed in place without further disassembly as permitted by Appendix I, I-1310(c).

3.9.3 Licensee's Proposed Alternative Testing

In lieu of the Appendix I, I-3310 requirements, the seat leakage tightness of the main valve disks will be demonstrated by the pressure switches and the temperature elements in the SRV discharge lines during startup after each refueling outage. Visual examination of the main valve will be performed in place without further disassembly as permitted by I-1310(c).

3.9.4 Evaluation

The licensee does not test the SRVs using one complete test sequence. The SRV pilot assemblies are sent to a testing facility for the performance of certain tests required by Appendix I. Common industry practice is to test the Target-Rock SRV pilot assemblies as separate units. As a result, strict adherence to the sequence specified in Appendix I, I-3310 cannot be satisfied.

The testing sequence and practice used must ensure that all the tests specified in Appendix I are performed (as applicable) or relief from the specific ASME Code test requirement must be obtained. The staff notes that valve operability is verified in accordance with Technical Specification 3.4.3.1. Leakage of the main stage disks is monitored continuously during normal plant operation, which is acceptable to the staff.

Removal of the entire valve assembly for testing (in the sequence specified by the ASME Code) would create hardship on the licensee without a compensating increase in the level of quality or safety by (1) extending plant outages for the removal and installation process; (2) resulting in cost increases and schedule delays for decontamination activities; and (3) resulting in increased shipping expenses. The proposed alternative to demonstrate seat leakage tightness of the main valve disks by pressure switches and thermocouples on the SRV discharge lines provides reasonable assurance of the operational readiness of the SRVs.

3.9.5 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternative is authorized pursuant to 10 CFR 50.55a(3)(a)(ii) on the basis that compliance with the ASME Code requirements results in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified SRVs. Accordingly, the proposed alternative is authorized for the fourth 10-year IST interval at CNS.

4.0 CONCLUSION

Relief Requests RP-01, RP-02, RP-03, RP-04, RP-05, RP-06, and RP-07 are authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternatives provide an acceptable level of quality and safety. Relief Request RV-04 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) requirements result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified safety relief valve.

Relief Request RV-01 is authorized pursuant to 10 CFR 50.55a(f)(6)(i) on the basis that compliance with the ASME OM Code requirements is impractical.

The NRC staff also concludes that the withdrawal of Relief Requests RV-02, RV-03, and RV-05 is acceptable.

Principal Contributors: W. Poertner
J. Huang
R. McNally

Date: June 14, 2006

June 14, 2006

Mr. Randall K. Edington
Vice President-Nuclear and CNO
Nebraska Public Power District
P.O. Box 98
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION RE: RELIEF REQUESTS FOR THE FOURTH 10-YEAR PUMP AND VALVE INSERVICE TESTING PROGRAM (TAC NOS. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, AND MC8992)

Dear Mr. Edington:

By letter dated October 19, 2005, Nebraska Public Power District (the licensee) submitted relief requests for its fourth 10-year inservice testing program interval at Cooper Nuclear Station. On February 9, 2006, the Nuclear Regulatory Commission requested the licensee to submit additional information. The licensee submitted the requested information in a letter dated March 8, 2006. In its March 8, 2006, letter, the licensee withdrew Relief Requests RV-02, RV-03, and RV-05, and revised Relief Requests RP-01, RP-02, RP-03, RP-04, RP-05, and RV-01.

Relief Requests RP-01, RP-02, RP-03, RP-04, RP-05, RP-06, and RP-07 are authorized pursuant to 10 CFR 50.55a(a)(3)(i) on the basis that the proposed alternatives provide an acceptable level of quality and safety. Relief Request RV-04 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) based on the determination that compliance with the specified American Society of Mechanical Engineers (ASME) *Code for Operation and Maintenance of Nuclear Power Plants* (OM Code) requirements results in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The licensee's proposed alternative provides reasonable assurance of the operational readiness of the identified safety relief valve. Relief Request RV-01 is authorized pursuant to 10 CFR 50.55a(f)(6)(i) on the basis that compliance with the ASME OM Code requirements is impractical.

Sincerely,
/RA/
David Terao, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosure: Safety Evaluation

cc w/encl: See next page

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