Nebraska Public Power District

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10 CFR 50.55a

NLS2006014
March 8, 2006

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

Subject: Response to U.S. Nuclear Regulatory Commission Request for Additional Information Regarding Fourth Ten-Year Interval Pump and Valve Inservice Testing Program Relief Requests
Cooper Nuclear Station, Docket No. 50-298, DPR-46

References:
1. Letter from Brian Benney, U.S. Nuclear Regulatory Commission, to Randall K. Edington, Nebraska Public Power District, dated February 9, 2006, "Cooper Nuclear Station – Request for Additional Information. RE: Fourth 10-Year Interval Pump and Valve Inservice Testing Program Relief Requests (TAC No. MC8837)"

2. Letter from Randall K. Edington, Nebraska Public Power District, to U.S. Nuclear Regulatory Commission, dated October 19, 2005, "Fourth Ten-Year Interval Pump and Valve Inservice Testing Program Relief Requests" (NLS2005074)

The purpose of this letter is to submit the Nebraska Public Power District's (NPPD's) response to the Nuclear Regulatory Commission's Request for Additional Information (RAI) (Reference 1) regarding Fourth Ten-Year Interval Pump and Valve Inservice Testing (IST) Program Relief Requests (Reference 2). Attachment 1 is the NRC RAI responses to Relief Requests RP-01 through RP-05, RP-07, and RV-01 through RV-03. Proposed Relief Requests RP-01 through RP-05 and RV-01, revised from those submitted in Reference 2, are provided in Attachment 2.

After further consideration, NPPD has determined that the excess flow check valves specified in proposed Relief Request RV-02 and the Service Water (SW) check valves specified in proposed Relief Request RV-05 may be adequately addressed under the Cooper Nuclear Station (CNS) IST Check Valve Condition Monitoring Program. Therefore, proposed Relief Requests RV-02 and RV-05 are being withdrawn.

COOPER NUCLEAR STATION
P.O. Box 98 / Brownville, NE 68321-0098
***Telephone:** (402) 825-3811 / **Fax:** (402) 825-5211*
www.nppd.com

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Proposed Relief Request RV-03 for the SW-MOV-MO89A/B valves is also being withdrawn at this time. Testing will continue to be performed at a frequency in accordance with the American Society of Mechanical Engineers Code for Operation and Maintenance of Nuclear Power Plants. Code Case OMN-1 may be considered for implementation on these valves at a future date.

Should you have any questions concerning this matter, please contact Paul Fleming, Licensing Manager, at (402) 825-2774.

Sincerely,

Randall K. Edington
Vice President – Nuclear and
Chief Nuclear Officer

/sl

Attachments

cc: U.S. Nuclear Regulatory Commission w/attachments
Regional Office - Region IV

Senior Project Manager w/attachments
USNRC – NRR Project Directorate IV-1

Senior Resident Inspector w/attachments
USNRC - CNS

NPG Distribution w/o attachments

CNS Records w/attachments

Attachment 1

Response to NRC Request for Additional Information Regarding Fourth Ten-Year Interval Pump and Valve Inservice Testing Program Relief Requests

Nebraska Public Power District
Cooper Nuclear Station

1. Relief Request Number RP-01

NRC Question No. RAI RP-01-01

The licensee requests relief from the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code requirement of ISTB-3510(b)(1), i.e., the full-scale range of each analog instrument shall not be greater than three times the reference value. The installed suction pressure gauge range of the core spray pumps is 30" Hg - 30.0 psig which is 7.5 times (versus three times as required by the ASME Code) the actual values for the suction pressure. It appears that the equation, 0.0066 x 45 psig = ± 0.3 psi, is used by the licensee to justify that the proposed alternative of using the installed suction pressure gauge provides an acceptable level of quality and safety. However, there is no detailed discussion nor explanation as to why the cited equation demonstrates the acceptability of the proposed alternative. The licensee should discuss or explain:

1. *The basis for 0.0066 and its relation to the instrument accuracy,*

2. *The basis for 45 psig and its relation to the suction pressure, and*

3. *The implication of ± 0.3 psi and its relation to the Code required accuracy.*

NPPD Response to RAI RP-01-01

The Nebraska Public Power District (NPPD) has revised Relief Request RP-01 to include a detailed explanation of the basis for the values utilized in the relief request and how the values relate to supporting the acceptability of the proposed alternative. In summary, the Cooper Nuclear Station (CNS) installed suction pressure gauges for Core Spray (CS) 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% of full scale (0.0066 × 45 psig = ~ ± 0.3 psig). Therefore, the ± 0.3 psig and 0.66% of full scale are both ways of expressing the calibration tolerance of the suction gauge. This calibration tolerance is comparable to the theoretical calibration tolerance allowed by the code for the suction pressure at ± 0.24 psig.

This slight variation in suction pressure inaccuracy is insignificant when compared to the overall inaccuracies associated with the differential pressure reference value. As is explained in the attached relief request, the CS discharge pressure loops are currently being calibrated to a tolerance of ± 10.0 psig, with a tolerance allowed by the code of ± 18.0 psig. Therefore, when determining differential pressure, the combined maximum inaccuracy of ± 10.3 psig due to the installed suction and discharge pressure indications is less than the code-allowed ±18.24 psig. This information, in addition to supporting details, has been incorporated into the revised relief request.

2. **Relief Request RP-02**

NRC Question No. RAI RP-02-01

The licensee requests relief from the ASME OM Code requirement of ISTB-3510(b)(1), i.e., the full-scale range of each analog instrument shall not be greater than three times the reference value. The installed suction pressure gauge range of the residual heat removal pumps is 30" Hg - 150.0 psig which is 30 times (versus three times as required by the ASME Code) the actual values for the suction pressure. It appears that the equation, 0.006 x 165 psig = ± 1.0 psi, is used by the licensee to justify that the proposed alternative of using the installed suction pressure gauge provides an acceptable level of quality and safety. However, there is no detailed discussion nor explanation as to why the cited equation demonstrates the acceptability of the proposed alternative. The licensee should discuss or explain:

1. *The basis for 0.006 and its relation to the instrument accuracy,*

2. *The basis for 165 psig and its relation to the suction pressure, and*

3. *The implication of ± 1.0 psi and its relation to the Code required accuracy.*

NPPD Response to RAI RP-02-01

NPPD has revised Relief Request RP-02 to include a detailed explanation of the basis for the values utilized in the relief request and how the values relate to supporting the acceptability of the proposed alternative. In summary, the CNS-installed suction pressure gauges for Residual Heat Removal (RHR) 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 at the 5 psig suction pressure point is essentially a tolerance of approximately 0.6% of full scale (0.006 × 165 psig = ~ ± 1.0 psig). Therefore, the ± 1.0 psig and 0.6% of full scale are both ways of expressing the calibration tolerance of the suction gauge at the 5 psig point. This calibration tolerance is comparable to the theoretical calibration tolerance allowed by the code for the suction pressure at ± 0.3 psig.

This slight variation in suction pressure inaccuracy is insignificant when compared to the overall inaccuracies associated with the differential pressure reference value. As is explained in the attached relief request, the RHR discharge pressure indicators are currently being calibrated to a tolerance of ± 5.0 psig, with a tolerance allowed by the code of ± 10.2 psig. Therefore, when determining differential pressure, the combined maximum inaccuracy of ± 6.0 psig due to the installed suction and discharge pressure indications is less than the code-allowed ±10.5 psig. This information, in addition to supporting details, has been incorporated into the revised relief request.

3. **Relief Request RP-03**

NRC Question No. RAI RP-03-01

The licensee requests relief from the ASME OM Code requirement of ISTB-3510(b)(1), i.e., the full-scale range of each analog instrument shall not be greater than three times the reference value. The installed suction pressure gauge range of the high pressure injection main and booster pumps is 30" Hg - 150.0 psig which is 10 times (versus three times as required by the ASME Code) the actual values for the suction pressure. It appears that the equation, 0.006 x 165 psig = ± 1.0 psi, is used by the licensee to justify that the proposed alternative of using the installed suction pressure gauge provides an acceptable level of quality and safety. However, there is no detailed discussion nor explanation as to why the cited equation demonstrates the acceptability of the proposed alternative. The licensee should discuss or explain:

1. *The basis for 0.006 and its relation to the instrument accuracy,*

2. *The basis for 165 psig and its relation to the suction pressure, and*

3. *The implication of ± 1.0 psi and its relation to the Code required accuracy.*

NPPD Response to RAI RP-03-01

NPPD has revised Relief Request RP-03 to include a detailed explanation of the basis for the values utilized in the relief request and how the values relate to supporting the acceptability of the proposed alternative. In summary, the CNS-installed suction pressure gauge for High Pressure Coolant Injection (HPCI) 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% of full scale (0.006 × 165 psig = ~ ± 1.0 psig). Therefore, the ± 1.0 psig and 0.6% of full scale are both ways of expressing the calibration tolerance of the suction gauge. This calibration tolerance is comparable to the theoretical calibration tolerance allowed by the code for the suction pressure at ± 0.9 psig.

This slight variation in suction pressure inaccuracy is insignificant when compared to the overall inaccuracies associated with the differential pressure reference value. As is explained in the attached relief request, the HPCI discharge pressure indicator is currently being calibrated to a tolerance of ± 7.5 psig, with a tolerance allowed by the code of ± 72.0 psig. Therefore, when determining differential pressure, the combined maximum inaccuracy of ± 8.5 psig due to the installed suction and discharge pressure indications is less than the code-allowed ± 72.9 psig. This information, in addition to supporting details, has been incorporated into the revised relief request.

4. **Relief Request: RP-04**

NRC Question No. RAI RP-04-01

The licensee requests relief from the ASME OM Code requirement of ISTB-3510(b)(1), i.e., the full-scale range of each analog instrument shall not be greater than three times the reference value. The installed suction pressure gauge range of the reactor core isolation cooling main pump is 30" Hg - 150.0 psig which is 10 times (versus three times as required by the Code) the actual values for the suction pressure. It appears that the equation, 0.006 x 165 psig = ± 1.0 psi, is used by the licensee to justify that the proposed alternative of using the installed suction pressure gauge provides an acceptable level of quality and safety. However, there is no detailed discussion nor explanation as to why the cited equation demonstrates the acceptability of the proposed alternative. The licensee should discuss or explain:

1. *The basis for 0.006 and its relation to the instrument accuracy,*

2. *The basis for 165 psig and its relation to the suction pressure, and*

3. *The implication of ± 1.0 psi and its relation to the Code required accuracy.*

NPPD Response to RAI RP-04-01

NPPD has revised Relief Request RP-04 to include a detailed explanation of the basis for the values utilized in the relief request and how the values relate to supporting the acceptability of the proposed alternative. In summary, the CNS-installed suction pressure gauge for Reactor Core Isolation Cooling (RCIC) 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% of full scale (0.006 × 165 psig = ~ ± 1.0 psig). Therefore, the ± 1.0 psig and 0.6% of full scale are both ways of expressing the calibration tolerance of the suction gauge. This calibration tolerance is comparable to the theoretical calibration tolerance allowed by the code for the suction pressure at ± 0.9 psig.

This slight variation in suction pressure inaccuracy is insignificant when compared to the overall inaccuracies associated with the differential pressure reference value. As is explained in the attached relief request, the RCIC discharge pressure indicator is currently being calibrated to a tolerance of ± 15.0 psig, with a tolerance allowed by the code of ± 75.0 psig. Therefore, when determining differential pressure, the combined maximum inaccuracy of ± 16.0 psig due to the installed suction and discharge pressure indications is less than the code-allowed ± 75.9 psig. This information, in addition to supporting details, has been incorporated into the revised relief request.

5. Relief Request RP-05

NRC Question No. RAI RP-05-01

Describe the procedures for defining/determining the equipment loop accuracy and the calibration loop accuracy and explain why the calibrated loop accuracy will meet or exceed the code tolerances. An instrument loop is defined in the ASME OM Code as two or more components working together to provide a single output.

NPPD Response to RAI RP-05-01

NPPD has revised Relief Request RP-05 to include a detailed explanation of the equipment loop accuracies and calibration loop accuracies for the set of components referenced in the relief request and how this information relates to supporting the acceptability of the proposed alternative. The detailed information provided within the revised relief request is represented in the following paragraphs.

Core Spray 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%, and the pressure transmitter (PT-38A/B) has a nameplate accuracy of ± 0.5%. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for discharge pressure indication is ± 2.06% (square root of the sum of the squares), which exceeds the code requirement of ± 2%. The variation from the code of 0.06%, 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% of full-scale tolerance (0.02 X 500 psig = ± 10 psig), which meets the accuracy requirements of the code.

Core Spray 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%, and the flow transmitter (FT-40A/B) has a nameplate accuracy of ± 0.25%. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for discharge pressure indication is ± 2.02% (square root of the sum of the squares), which exceeds the code requirement of ± 2%. The variation from the code of 0.02%, with a gauge range of 0 - 6000 gpm, would amount to potential deviation of only 1.2 gpm

(6000 X .0002). However, CNS is currently calibrating this flow loop to within ± 50 gpm (at the inservice testing (IST) reference value of 5000 gpm) or approximately ± 0.83% of full scale (± 0.0083 X 6000 = ~ ± 50 gpm), which is better than the ± 2% of full-scale accuracy requirements of the code. If a preservice test were to be run, CNS would ensure that the loop was calibrated to ≤ 2% over the full range of the test prior to performing it.

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%, the flow transmitter (FT-82) has a nameplate accuracy of ± 0.25%, and the flow square rooter (SQRT-118) has a nameplate accuracy of ± 2% from approximately 0 – 1000 gpm and ± 0.5% from approximately 1000 – 5000 gpm. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately ± 2.03% (square root of the sum of the squares) from 0 -1000 gpm, which does not meet the code requirement of ± 2%, and approximately ± 0.61% from 1000 – 5000 gpm, which does meet the code requirement of ± 2%. The variation from the code of 0.03% 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% of full scale (± 0.02 X 5000 = ~ ± 100 gpm), which is equivalent to the ± 2% of full-scale accuracy requirements of the code. If a preservice test were to be run, CNS would ensure that the loop was calibrated to ≤ 2% over the full range of the test prior to performing it.

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%, the flow transmitter (FT-58) has a nameplate accuracy of ± 0.25%, and the flow square rooter (SQRT-99) has a nameplate accuracy of ± 2% from approximately 0 – 100 gpm and ± 0.5% from approximately 100 – 500 gpm. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately ± 2.03% (square root of the sum of the squares) from 0 -100 gpm, which does not meet the code requirement of ± 2%, and approximately ± 0.61% from 100 – 500 gpm, which does meet the code requirement of ± 2%. The variation from the code of 0.03% 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% of full scale (± 0.02 X 500 = ~ ± 10 gpm), which is equivalent to the ± 2% of full-scale accuracy requirements of the code.

The Service Water Booster Pump flow rate 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-132A/B) has a nameplate accuracy of ± 2%, the flow transmitter (FT-97A/B) has a nameplate accuracy of ± 0.25%, flow square rooter (SQRT-132A) has a nameplate accuracy of ± 0.25%, and flow square rooter (SQRT-132B) has a nameplate accuracy of ± 0.27% from 1 to 2.5% input (1000 to 1580 gpm) and ± 0.14% from 2.5 to 100% input (1580 to 10000 gpm). Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately ± 2.03% (square root of the sum of the squares) for A loop and approximately ± 2.03% (square root of the sum of the squares) from 1000 to 1580 gpm and approximately 2.02% from 1580 to 10,000 gpm for B loop, which exceeds the code requirement of ± 2%. The variation from the code of 0.03% for A loop, 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 code of 0.03% for B loop (1000 to 1580 gpm) 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) and the variation from the code of 0.02% (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% of full-scale tolerance (0.01 X 10,000 gpm = ± 100 gpm), which is better than the ± 2% of full-scale accuracy requirements of the code.

6. Relief Request RP-07

NRC Question No. RAI RP-07-1

The relief request includes an evaluation by the pump manufacturer indicating that the vibration is coming from the hydraulic disturbance found in the piping and that the motor and pump can operate with those levels of vibration with no impairment of operating life. To demonstrate that there is a sufficient margin with the new proposed alert limit, the licensee is requested to identify the levels of vibration in terms of peak-to-peak velocity that are acceptable to the pump manufacturer for the required operating period.

NPPD Response to RAI RP-07-1

Through various mergers, Flowserve was created in 1997 and is the current vendor for the Byron Jackson CS Pumps. The Flowserve pump division was contacted concerning the operation of these pumps, and the following conclusions were reached by Flowserve personnel. Flowserve indicated that they do not have an acceptable vibration limit for 30 days of operation, which is what would be required at CNS in a post Loss of Coolant Accident (LOCA) event. They did, however, state that "Based 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 0.40 in/sec. peak as the alert value associated with the vibration at points 1H and 5H."

NRC Question No. RAI RP-07-2

Item C of the relief request includes a statement to the effect that the only negative impact is on vibration levels relative to a generic standard. It is not clear if other industry standards were reviewed to determine alternative acceptance criteria. Industry standards, such as American National Standards Institute/Hydraulic Institute 9.6.4-2000, Centrifugal and Vertical Pumps for Vibration Measurements and Allowable Values, and ISO 10916-3-1998 identify allowable pump field vibration values and these vibration values are to be used as general acceptance criteria with the understanding that vibration levels in excess of these values may be acceptable by mutual agreement (between manufacturer and customer) if they show no continued increase with time and there is no indication of damage, such as an increase in bearing clearance or noise level. The licensee is requested to identify if there is an 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.

NPPD Response to RAI RP-07-2

A Flowserve pump expert indicated that he was not aware of industry standards (other than the ASME Code requirements) that could be applied to these types of pumps. He indicated that these types of pumps (Vertical DVSS) were only manufactured for nuclear plants as CS and RHR pumps. Therefore, no alternate industry standards will be utilized at this time. Per the Predictive Maintenance Program, CNS will continue to monitor vibrations beyond the requirements of the code through spectral analysis in addition to performing periodic oil analysis. The IST code requirements for differential pressure and overall vibration readings will continue to be monitored.

NRC Question No. RAI RP-07-3

The relief request is limited to Core Spray Pump B with no mention of Core Spray Pump A. The licensee is requested to describe why high vibration levels are unique to pump B and not Pump A. For example, clarify if Pump A is different in any way or if the discharge piping is of a different configuration. If there are no differences in piping configuration, explain the basis for the difference in vibration levels.

NPPD Response to RAI RP-07-3

There are no tangible differences between the "A" and "B" CS pumps, themselves. The observed variations in vibrations are due to differences in the stiffness between Train "A" and Train "B." The "B" CS Pump is located in the basement of the Southeast Quadrant of the Reactor Building, and the "A" CS Pump is located in the basement of the Northeast Quadrant of the Reactor Building. A review of the discharge piping for the two pumps results in several significant differences, ultimately resulting in differences between the overall stiffness of Train "A" and Train "B." For example, Pump B discharge flow must pass through two 45-degree elbows not found on the discharge piping from Pump A, and the distance from the Pump B discharge nozzle to the 90-degree elbow that directs the flow upward is longer on Pump B than on Pump A. Because of the dimensional differences on the 12" discharge pipe, the 3" pump minimum flow line is routed quite differently when comparing the two pumps, further widening the gap between the two configurations. One additional piping difference noted between the A and B trains is that the 12" discharge piping from Pump B is routed directly vertical approximately 24' higher than Pump A before turning horizontally. All of the piping differences noted may contribute to the differences in pump/motor vibration levels.

In addition to the piping differences, variations in the configuration of the valves, pipe supports, and hangers may contribute to the differences observed between the two systems.

In conclusion, the discharge piping configuration variations between the pumps are the primary reason for the differences observed between the vibration levels recorded on Pump A and Pump B. Variation in the configuration of the valves, pipe supports, and hangers may also contribute to the differences observed. Based on the differences presented, and due to the nature of the structural resonances, the variations between train A and train B will cause the two trains to act in a different manner. The differences between the two trains are enough to allow the "B" CS Pump structural resonances to become excited in a non-continuous fashion.

<u>NRC Question No. RAI RP-07-4</u>

The relief request references a previous CNS relief request as the only precedence for this type of relief. The licensee does include a comprehensive maintenance history for the CNS pump, but no industry-wide experience is included. In addition to maintenance history at CNS, operating experience with similar equipment at other facilities and utilities should be considered. If this level of vibration and cause is unique to CNS, the licensee is requested to so clarify or to include other industry-wide operating experience and explain the cause and resolution.

<u>NPPD Response to RAI RP-07-4</u>

The Flowserve Pump Division indicated that similar pumps are installed at Fitzpatrick and Brunswick in the CS system. Flowserve indicated that in 1984, a field vibration analysis was performed on the CS pumps at Fitzpatrick. It was determined that the higher vibrations observed at the top motor bearing were not related to internal mechanical problems, but caused by piping-induced shock excitation (piping hydraulic turbulence) of the structural natural frequency of the pump and motor. Flowserve personnel at the time concluded that this observed phenomenon would not decrease the pump's expected operating life.

In addition to the previously approved CNS relief request for CS-P-B vibrations, Fermi 2 requested a very similar relief request for their RHR pumps, which was approved by the NRC on February 17, 2000 (TAC NO. MA6390). The Fermi 2 relief request, PRR-004, proposed to adjust the alert range for all three vibration measurements at the top of the RHR motors from 0.325 in/s to 0.400 in/s, and the required action range would remain at 0.700 in/s. The basis behind this submittal was that the overall vibration limits for these points would periodically exceed the 0.325 in/s alert range limit on some pumps based on structural resonance frequencies. The data was extensively analyzed, and it was concluded that the RHR pumps were operating satisfactorily. The NRC approved this relief request for RHR pumps B and C based on its review of the historical vibration data. The NRC did not approve the relief request for RHR pumps A and D since the vibration data for these pumps had not entered the alert range based on the historical vibration data.

There are many comparisons that could be made between the Fermi 2 relief request and the CNS relief request. CNS is also requesting an alert range increase from 0.325 in/s to 0.400 in/s (for two readings at the top of the pump rather than three), and is keeping the required action range at 0.700 in/s. In both cases, efforts were made to improve the vibration readings, and extensive analysis has been done to indicate that the pumps are not degrading. Finally, the Fermi 2 relief request supports the fact that pumps within the same system may operate at different levels due to differences in the structural resonance vibrations.

7. Relief Request RV-01

NRC Question No. RAI RV-01-01

Please clarify when the enhanced maintenance on the valves will be performed, i.e., will the maintenance be performed during a refueling outage? If the maintenance will be performed on-line please address the risk implications, work window time frame and administrative requirements for performing the activity on-line. Please verify that the maintenance activity will be scheduled on a refueling cycle frequency (18 or 24 months depending on the fuel cycle length) if maintenance will not be performed during refueling.

NPPD Response to RAI RV-01-01

The enhanced maintenance will be performed on an 18-month frequency. CNS has reviewed the risk implications, work window time-frame, and administrative requirements for performing the proposed enhanced maintenance on-line, if desired, and has determined that this would be an acceptable practice. HPCI-SOV-SSV64 and HPCI-SOV-SSV87 are located on the HPCI turbine exhaust line. 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 was asked to determine the risk implications for removing HPCI from service. Risk Engineering concluded that CNS would follow the existing 10 CFR 50.65(a)(4) process to perform work on these HPCI valves and that the HPCI unavailability time of one shift would not be considered risk significant.

Additionally, CNS routinely removes HPCI from service to perform other maintenance activities, which may take longer than a 12-hour duration. The CNS 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. Therefore, the overall impact to HPCI unavailability and risk impact would be negligible.

8. Relief Request RV-02

<u>NRC Question No. RAI RV-02-1</u>

The relief request references the Boiling Water Reactor (BWR) Owners Group Topical Report B21-00658-01, "Excess Flow Check Valve Testing Relaxation," as a basis for the relaxation. By letter dated March 14, 2000, the NRC submitted comments on this topical report concerning generic application of excess flow check valve (EFCV) testing relaxation to the BWR Owners Group and requested that the report be revised accordingly. General Electric NEDO-32977-A dated June 2000 submitted in response to the NRC comments concluded that individual licenses will develop their own EFCV performance criteria. This conclusion considered that the lead plant, Duane Arnold Energy Center, has included the EFCVs as a subset within the Maintenance Rule. As identified in the March 14, 2000, letter to the BWR Owners Group, the EFCV performance criteria should be based on sound reliability modeling that is consistent with generally expected performance of the EFCVs. Further, the corrective action program must evaluate equipment failures and establish appropriate corrective actions to comply with the performance criteria. Such performance criteria and the basis, once developed, will be subject to staff review. Due to the plant-specific nature of the performance criteria, it is considered expeditious and appropriate to review this testing relaxation as a plant-specific relief request, rather than an ASME Code Case. However, the relief request should reference this NEDO report to clarify that this testing relaxation, although generic in nature, applies plant-specific evaluation criteria. To clarify current guidance from the BWR Owners group, the licensee is requested to reference NEDO-32977-A as a basis for this relief request and clarify that the evaluation, including performance criteria and Maintenance Rule inclusion, are plant-specific commitments.

NPPD Response to RAI RV-02-1

After further consideration, NPPD has determined that these excess flow check valves may be adequately addressed under the IST Check Valve Condition Monitoring Program. Proposed Relief Request RV-02 is being withdrawn.

NRC Question No. RAI RV-02-2

The basis for the relief request does not address recent industry-wide experience with the EFCVs and the NEDO report identifies confidence levels presumably based on testing prior to the year 1998. The NEDO report includes conservatism to account for a potentially unknown change in the valve's failure rate. The licensee is requested to either confirm that recent EFCV testing trends are within bounds of the analysis or revise the analysis to consider recent test data.

NPPD Response to RAI RV-02-2

After further consideration, NPPD has determined that these excess flow check valves may be adequately addressed under the IST Check Valve Condition Monitoring Program. Proposed Relief Request RV-02 is being withdrawn.

NRC Question No. RAI RV-02-3

Section 4.1 of NEDO-32977-A speculates that most EFCVs fail to close due to sticking and Attachment A testing data identifies 21 failures on BFN-2 and 5 failures on BFN-3 due to crud buildup and sticking after extended outages. Table 4-1 of NEDO-32977-A does not identify EFCVs for CNS. The licensee is requested to identify the type of information included in Table 4-1, including the valve manufacturer and failure rates. The licensee is also requested to clarify the type of preventive maintenance, if any, performed on the EFCVs to prevent sticking and, if no maintenance is performed, explain why failures reported with similar-make valves are not expected in the future when the valves are not exercised as frequently.

NPPD Response to RAI RV-02-3

After further consideration, NPPD has determined that these excess flow check valves may be adequately addressed under the IST Check Valve Condition Monitoring Program. Proposed Relief Request RV-02 is being withdrawn.

<u>**NRC Question No. RAI RV-02-4**</u>

Attachment B to NEDO-32977-A includes the radiological analysis of the consequences of a unisolable instrument line break. The consequences of several EFCVs sticking open following potential damage to multiple instrument lines caused by postulated high energy line breaks outside containment have not been evaluated in the relief request. The licensee is requested to discuss the consequences of such common cause failures on multiple instrument lines that depend upon closure of excess flow check valves for isolation.

<u>**NPPD Response to RAI RV-02-4**</u>

After further consideration, NPPD has determined that these excess flow check valves may be adequately addressed under the IST Check Valve Condition Monitoring Program. Proposed Relief Request RV-02 is being withdrawn.

9. Relief Request RV-03

<u>**NRC Question No. RAI RV-03-001**</u>

Please describe the test frequency associated with the diagnostic testing conducted in accordance with Generic Letter 96-05 for valves SW-MOV-M089A and B. The NRC staff expectation is that the testing is performed every refueling outage. The ASME Code allows testing of valves during refueling, if they cannot be tested at power or cold shutdowns. Please provide justification for any test frequency that exceeds the ASME OM Code required test frequency.

<u>**NPPD Response to RAI RV-03-001**</u>

After further consideration, NPPD has decided to withdraw proposed Relief Request RV-03. Testing will continue to be performed at a frequency in accordance with the OM code. Code Case OMN-1 may be considered for implementation on these valves at a future date.

Relief Request RP-01
Core Spray Pump Suction Gauge Range Requirements

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

Alternative Provides Acceptable Level of Quality and Safety

1. **ASME Code Component(s) Affected**

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

2. **Applicable Code Edition and Addenda**

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

3. **Applicable Code Requirement**

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

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the requirement of ASME OM Code ISTB-3510(b)(1). The proposed alternative would provide an acceptable level of quality and safety.

The installed suction pressure gauge range of the Core Spray (CS) pumps is 30" Hg – 30.0 psig. The actual values for suction pressure during inservice testing are approximately 4.0 psig. As a result, the instrument range exceeds the requirement of ISTB-3510(b)(1).

5. **Proposed Alternative and Basis for Use**

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 inservice testing 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% of full scale (± 6% 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).

Relief Request RP-01
Core Spray Pump Suction Gauge Range Requirements
(Continued)

Pump discharge pressure actual values for the CS pumps during inservice testing 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% of full scale (± 6% 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 code would be approximately ± 18.24 psig.

The Cooper Nuclear Station (CNS) installed suction pressure gauges (PI-36A/B), which were designed to have an accuracy of ± 0.5% 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% of full scale (0.0066 × 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% of full scale (0.02 × 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 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 code and are, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6% of the differential pressure reference value. Reference NUREG 1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1, Section 5.5.1.

Relief Request RP-01
Core Spray Pump Suction Gauge Range Requirements
(Continued)

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth ten-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% 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), Nebraska Public Power District (NPPD) requests relief from the specific ISTB requirements identified in this request.

6. **Duration of Proposed Alternative**

This proposed alternative will be utilized for the entire fourth ten-year interval.

7. **Precedents**

A version of this relief request was previously approved for the third ten-year interval at CNS as Relief Request RP-01 (TAC No. M94530, February 19, 1997).

Relief Request RP-02
Residual Heat Removal Pump Suction Gauge Range Requirements

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

Alternative Provides Acceptable Level of Quality and Safety

1. **ASME Code Component(s) Affected**

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

2. **Applicable Code Edition and Addenda**

ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

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

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the requirement of ASME OM Code ISTB-3510(b)(1). The proposed alternative would provide an acceptable level of quality and safety.

The installed suction pressure gauge range of the residual heat removal pumps is 30" Hg – 150.0 psig. The actual values for suction pressure during inservice testing are approximately 5.0 psig. As a result, the instrument range exceeds the requirement of ISTB-3510(b)(1).

5. **Proposed Alternative and Basis for Use**

Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction actual values for the residual heat removal pumps during inservice testing is 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% of full scale (± 6% of reference) for the quarterly Group A pump test, the resulting inaccuracies due to pressure effects would be ± 0.3 psig (0.02 X 15.0 psig).

Relief Request RP-02
Residual Heat Removal Pump Suction Gauge Range Requirements
(Continued)

Pump discharge pressure actual values for the Residual Heat Removal pumps during inservice testing 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% of full scale (± 6% 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 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% 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 at the 5 psig suction pressure point is essentially a tolerance of approximately 0.6% of full scale (0.006 × 165 psig = ~ ± 1.0 psig). Currently, the installed discharge pressure indicators (PI-107A/B/C/D) are 0 to 400 psig indicators. The discharge indicators are being calibrated to ± 5 psig, or ± 1.25% of full scale (0.0125 × 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 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 code and are, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6% of the differential pressure reference value. Reference NUREG 1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1, Section 5.5.1.

Relief Request RP-02
Residual Heat Removal Pump Suction Gauge Range Requirements
(Continued)

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth ten-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% 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.

6. **Duration of Proposed Alternative**

This proposed alternative will be utilized for the entire fourth 10-year interval.

7. **Precedents**

A version of this relief request was previously approved for the third 10-year interval at CNS as Relief Request RP-01 (TAC No. M94530, February 19, 1997).

Relief Request RP-03
High Pressure Coolant Injection Pump Suction Gauge Range Requirements

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

Alternative Provides Acceptable Level of Quality and Safety

1. **ASME Code Component(s) Affected**

HPCI-P-MP High Pressure Coolant Injection Main Pump
HPCI-P-BP High Pressure Coolant Injection Booster Pump

2. **Applicable Code Edition and Addenda**

ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

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

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the requirement of ASME OM Code ISTB-3510(b)(1). The proposed alternative would provide an acceptable level of quality and safety.

The installed suction pressure gauge range of the high pressure coolant injection pumps is 30" Hg – 150.0 psig. The actual value for suction pressure during inservice testing is approximately 15.0 psig. As a result, the instrument range exceeds the requirement of ISTB-3510(b)(1).

5. **Proposed Alternative and Basis for Use**

Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction actual values for the high pressure coolant injection pumps during inservice testing 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% of full scale (± 6% of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 0.9 psig (0.02 X 45.0 psig).

Relief Request RP-03
High Pressure Coolant Injection Pump Suction Gauge Range Requirements
(Continued)

The pump discharge pressure actual value for the HPCI pump during inservice testing is 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% of full scale (± 6% 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 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% 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% of full scale (0.006 × 165 psig = ~ ± 1.0 psig). Currently, the installed discharge pressure indicator (PI-81) is a 0 to 1500 psig indicator. The discharge indicator is currently being calibrated to ± 7.5 psig, or ± 0.5% of full scale (0.005 × 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 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 code and is, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6% of the differential pressure reference value. Reference NUREG 1482 Revision 1, Section 5.5.1.

Relief Request RP-03
High Pressure Coolant Injection Pump Suction Gauge Range Requirements
(Continued)

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth ten-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% 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.

6. Duration of Proposed Alternative

This proposed alternative will be utilized for the entire fourth 10-year interval.

7. Precedents

A version of this relief request was previously approved for the third 10-year interval at CNS as Relief Request RP-01 (TAC No. M94530, February 19, 1997).

Relief Request RP-04
Reactor Core Isolation Cooling Pump Suction Gauge Range Requirements

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

Alternative Provides Acceptable Level of Quality and Safety

1. **ASME Code Component(s) Affected**

   RCIC-P-MP Reactor Core Isolation Cooling Main Pump

2. **Applicable Code Edition and Addenda**

   ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

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

4. **Reason for Request**

   Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the requirement of ASME OM Code ISTB-3510(b)(1). The proposed alternative would provide an acceptable level of quality and safety.

   The installed suction pressure gauge range of the reactor core isolation cooling pump is 30" Hg – 150.0 psig. The actual value for suction pressure during inservice testing is approximately 15.0 psig. As a result, the instrument range exceeds the requirement of ISTB-3510(b)(1).

5. **Proposed Alternative and Basis for Use**

   Pump suction pressure is used along with pump discharge pressure to determine pump differential pressure. Pump suction actual values for the high pressure coolant injection pumps during inservice testing is 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 lowest actual value for suction pressure. Applying the accuracy requirement of ± 2% of full scale (± 6% of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 0.9 psig (0.02 X 45.0 psig).

Relief Request RP-04
Reactor Core Isolation Cooling Pump Suction Gauge Range Requirements
(Continued)

The discharge pressure actual value for the RCIC pump during inservice testing 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% of full scale (± 6% 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 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% 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% of full scale (0.006 × 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% of full scale (0.01 × 1500 psig = ± 15.0 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 ± 15.0 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 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 code and is, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6% of the differential pressure reference value. Reference NUREG 1482 Revision 1, Section 5.5.1.

Relief Request RP-04
Reactor Core Isolation Cooling Pump Suction Gauge Range Requirements
(Continued)

Although not anticipated, if any revisions to the current tolerance information provided occurs within the CNS fourth ten-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% 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.

6. **Duration of Proposed Alternative**

This proposed alternative will be utilized for the entire fourth ten-year interval.

7. **Precedents**

A version of this relief request was previously approved for the third ten-year interval at CNS as Relief Request RP-01 (TAC No. M94530, February 19, 1997).

Relief Request RP-05
Loop Accuracy Requirements

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

Alternate Provides Acceptable Level of Quality and Safety

1. **ASME Code Component(s) Affected**

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

2. **Applicable Code Edition and Addenda**

ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

Table ISTB-3500-1, "Required Instrument Accuracy"

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the requirement of ASME OM Code ISTB Table ISTB-3500-1 for Group A and B Pump Pressure accuracy (± 2%) and for flow rate accuracy (± 2%). The proposed alternative would provide an acceptable level of quality and safety.

Relief Request RP-05
Loop Accuracy Requirements
(Continued)

The installed instrumentation for the subject pumps yield the following loop accuracies:

Pump Parameter	Equip. 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%

As a result, the equipment loop accuracies do not meet the ± 2% requirements of Table ISTB-3500-1, "Required Instrument Accuracy."

5. **Proposed Alternative and Basis for Use**

The difference between the code-required and presently installed instrument loop accuracies is 0.06%, 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 code-allowed accuracies of ± 2% or better.

Core Spray 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%, and the pressure transmitter (PT-38A/B) has a nameplate accuracy of ± 0.5%. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for discharge pressure indication is ± 2.06% (square root of the sum of the squares), which exceeds the code requirement of ± 2%. The variation from the code of 0.06%, 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% of full scale tolerance (0.02 X 500 psig = ± 10 psig), which meets the accuracy requirements of the code.

Relief Request RP-05
Loop Accuracy Requirements
(Continued)

Core Spray 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%, and the flow transmitter (FT-40A/B) has a nameplate accuracy of ± 0.25%. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for discharge pressure indication is ± 2.02% (square root of the sum of the squares), which exceeds the code requirement of ± 2%. The variation from the code of 0.02%, with a gauge range of 0 - 6000 gpm, would amount to 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% of full scale (± 0.0083 X 6000 = ~ ± 50 gpm), which is better than the ± 2% of full scale accuracy requirements of the code. If a preservice test were to be run, CNS would ensure that the loop was calibrated to ≤ 2% over the full range of the test prior to performing it.

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%, the flow transmitter (FT-82) has a nameplate accuracy of ± 0.25%, and the flow square rooter (SQRT-118) has a nameplate accuracy of ± 2% from approximately 0 – 1000 gpm and ± 0.5% from approximately 1000 – 5000 gpm. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately ± 2.03% (square root of the sum of the squares) from 0 -1000 gpm, which does not meet the code requirement of ± 2%, and approximately ± 0.61% from 1000 – 5000 gpm, which does meet the code requirement of ± 2%. The variation from the code of 0.03% 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% of full scale (± 0.02 X 5000 = ~ ± 100 gpm), which is equivalent to the ± 2% of full-scale accuracy requirements of the code. If a preservice test were to be run, CNS would ensure that the loop was calibrated to ≤ 2% over the full range of the test prior to performing it.

Relief Request RP-05
Loop Accuracy Requirements
(Continued)

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%, the flow transmitter (FT-58) has a nameplate accuracy of ± 0.25%, and the flow square rooter (SQRT-99) has a nameplate accuracy of ± 2% from approximately 0 – 100 gpm and ± 0.25% from approximately 100 – 500 gpm. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately ± 2.03% (square root of the sum of the squares) from 0 -100 gpm, which does not meet the code requirement of ± 2%, and approximately ± 0.61% from 100 – 500 gpm, which does meet the code requirement of ± 2%. The variation from the code of 0.03% 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% of full scale (± 0.02 X 500 = ~ ± 10 gpm), which is equivalent to the ± 2% of full scale accuracy requirements of the code.

The Service Water Booster (SWB) Pump flow rate 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-132A/B) has a nameplate accuracy of ± 2%, the flow transmitter (FT-97) has a nameplate accuracy of ± 0.25%, flow square rooter (SQRT-132A) has a nameplate accuracy of ± 0.25%, and flow square rooter (SQRT-132B) has a nameplate accuracy of ± 0.27% from 1 to 2.5% input (1000 to 1580 gpm) and 0.14% from 2.5 to 100% input (1580 to 10,000 gpm). Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately ± 2.03% (square root of the sum of the squares) for A loop and approximately ± 2.03% (square root of the sum of the squares) from 1000 to 1580 gpm and approximately 2.02% from 1580 to 10,000 gpm for B loop, which exceeds the code requirement of ± 2%. The variation from the code of 0.03%, 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 code of 0.03% 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 code of 0.02% (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% of full scale tolerance (0.01 X 10,000 gpm = ± 100 gpm), which is better than the ± 2% of full scale accuracy requirements of the code.

Relief Request RP-05
Loop Accuracy Requirements
(Continued)

As an alternative for Group A and B pump pressure accuracies (± 2%) and for all flow rate accuracies (± 2%), 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 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 code-allowed tolerance.

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

Using the provisions of this relief request as an alternative to the specific requirements of ISTB Table 3500-1, 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.

6. **Duration of Proposed Alternative**

This proposed alternative will be utilized for the entire fourth ten-year interval.

7. **Precedents**

A version of this relief request was previously approved for the third ten-year interval at CNS as Relief Request RP-02 (TAC No. M94530, February 19, 1997).

Relief Request RV-01
HPCI Solenoid Operated Drain Valve Testing

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

Alternative Provides Acceptable Level of Quality and Safety

1. **ASME Code Component(s) Affected**

Valve	Class	Category	System
HPCI-SOV-SSV64	2	B	HPCI
HPCI-SOV-SSV87	2	B	HPCI

2. **Applicable Code Edition and Addenda**

ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

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

ISTC-3510 Exercising Test Frequency – Active Category A, Category B, and Category C check valves shall be exercised nominally every 3 months except as provided by ISTC-3520, ISTC-3540, ISTC-3550, ISTC-3560, ISTC-5221, and ISTC-5222.

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

4. **Reason for Request**

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

Relief Request RV-01
HPCI Solenoid Operated Drain Valve Testing
(Continued)

5. Proposed Alternative and Basis for Use

The HPCI turbine and exhaust steam drip leg drain to gland condenser valve (HPCI-SOV-SSV64) and HPCI turbine and exhaust steam drip leg drain to equipment drain isolation valve (HPCI-SOV-SSV87) 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.

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

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 solenoid 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. HPCI-SOV-SSV64 and HPCI-SOV-SSV87 are located on the HPCI turbine exhaust line. 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).

Relief Request RV-01
HPCI Solenoid Operated Drain Valve Testing
(Continued)

Assuming one shift of unavailability for HPCI, Risk Engineering was asked to determine the risk implications for removing HPCI from service. Risk Engineering concluded that CNS would follow the existing 10CFR50.65 (a)(4) process to perform work on these HPCI valves and that the HPCI unavailability time of one shift would not be considered risk significant.

Additionally, CNS routinely removes HPCI from service to perform other maintenance activities, which may take longer than a 12-hour duration. The CNS 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. Therefore, the overall impact to HPCI unavailability and risk impact would be negligible.

Using the quarterly exercise testing and the 18-month frequency for enhanced maintenance as an alternative to the specific requirements of ISTC 3500, 3510, and 3560, identified above, will provide an adequate indication of valve performance and will 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 ISTC requirements identified in this request.

6. <u>**Duration of Proposed Alternative**</u>

This proposed alternative will be utilized for the entire fourth ten-year interval.

7. <u>**Precedents**</u>

A version of this relief request was previously approved for the third ten-year interval at CNS as Relief Request RV-08 (TAC No. M94530, February 19, 1997 [one year], and TAC No. M98759, November 17, 1998 [extended]).

Correspondence Number: NLS2006014

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITMENT NUMBER	COMMITTED DATE OR OUTAGE
NONE		