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10 CFR 50.55a

NLS2005074
October 19, 2005

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

Subject: Fourth Ten-Year Interval Pump and Valve Inservice Testing Program Relief Requests
Cooper Nuclear Station, Docket No. 50-298, DPR-46

The purpose of this letter is to request that the Nuclear Regulatory Commission (NRC) grant the Nebraska Public Power District (NPPD) relief from certain inservice testing (IST) code requirements for the Cooper Nuclear Station (CNS) pursuant to 10 CFR 50.55a. The attached relief requests pertain to the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance (OM) of Nuclear Power Plants pump and valve testing requirements needed for the fourth ten-year IST interval, which commences on March 1, 2006. The applicable code for the fourth ten-year interval is the ASME OM Code 2001 Edition through the 2003 Addenda. NPPD requests approval of these relief requests by February 1, 2006, in support of the start of the fourth ten-year IST interval.

Relief requests previously approved for the third ten-year interval have been updated and are being resubmitted, as applicable, for the fourth ten-year interval code requirements, and Relief Requests RP-08 through RP-14 and RV-05 are new relief requests. Attachment 1 contains a summary listing of the changes for the fourth ten-year interval. Attachment 2 contains pump IST relief requests, and Attachment 3 contains valve IST relief requests.

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

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Attachments

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NPG Distribution w/o attachments

CNS Records w/attachments

Cooper Nuclear Station Inservice Test Program
Relief Request Summary of Changes for the Fourth Ten-Year Interval

Pumps

Third Ten-Year Interval	Fourth Ten-Year Interval	Comments – Fourth Ten-Year Interval Requests
RP-01 Core Spray (CS), Residual Heat Removal (RHR), High Pressure Coolant Injection (HPCI), Reactor Core Isolation Cooling (RCIC) Pump Suction Pressure Gauge Range Accuracy - Relief approved per Nuclear Regulatory Commission (NRC) Safety Evaluation Report (SER) dated February 19, 1997 (TAC No. M94530).	Renumbered and reformatted as **RP-01** CS, **RP-02** RHR, **RP-03** HPCI, and **RP-04** RCIC	This relief was broken into four separate requests specific to each set of pumps. The reliefs were reformatted using the Nuclear Energy Institute (NEI) guideline (Attachment A to NUREG 1482, Revision 1) and new code references. Specific gauge ranges and calibration accuracies were incorporated.
RP-02 CS, RHR, HPCI, RCIC, and Service Water Booster (SWB) Pump Loop Accuracy requirements - Relief approved per NRC SER dated February 19, 1997 (TAC No. M94530).	Renumbered and reformatted as **RP-05**	The relief was reformatted using the NEI guideline and new code references. RHR was removed from the relief request due to the installation of a more accurate flow recorder. Calibrated loop accuracies ($\leq \pm 2$ %) were added.
RP-03 Reactor Equipment Cooling (REC) Pumps flow rate gauge range. Relief approved per NRC SER dated February 19, 1997 (TAC No. M94530).	Renumbered and reformatted as **RP-06**	The relief was reformatted using the NEI guideline and new code references.
RP-04 RCIC Pump/Turbine Speed Measurement Range. Relief approved per NRC SER dated February 19, 1997 (TAC No. M94530).	This relief was deleted since the range requirements do not apply to digital instruments.	Not included in Fourth Interval Program Plan.

Cooper Nuclear Station Inservice Test Program
Relief Request Summary of Changes for the Fourth Ten-Year Interval

Pumps (Continued)

Third Ten-Year Interval	Fourth Ten-Year Interval	Comments – Fourth Ten-Year Interval Requests
RP-05 Withdrawn	N/A	N/A
RP-06 CS-P-B Increase in 1H and 5H Vibration Alert Limits - Relief approved per NRC SER dated February 25, 2004 (TAC No. MB6821).	Renumbered and reformatted as **RP-07**	The relief was reformatted using the NEI guideline and new code references. The figures were updated to include current data. The relief is requested for when vibrations are taken during a comprehensive pump test or whenever vibrations are taken to determine pump acceptability.
RP-07 Evaluation of Pump Alert and Required Action Limits/Double Test Frequency	Not submitted	Not required since the new code allows analysis for pumps in the Alert Range.
N/A	New Relief Requests **RP-08 through RP-12 and RP-14** for Comprehensive Pump Testing associated with CS, HPCI, RCIC, REC, RHR, and Service Water Booster (SWB) systems	The reliefs were formatted using the NEI guideline and new code references. These relief requests support the use of a more rigorous quarterly test in lieu of a biennial comprehensive test. A substantial flow test, utilizing permanently installed pump instrumentation, will be performed each quarter using hydraulic acceptance criteria in accordance with the comprehensive test. However, RP-14 will utilize periodic pump replacements or overhauls rather than the hydraulic alert range.

Cooper Nuclear Station Inservice Test Program
Relief Request Summary of Changes for the Fourth Ten-Year Interval

Pumps (Continued)

Third Ten-Year Interval	Fourth Ten-Year Interval	Comments – Fourth Ten-Year Interval Requests
N/A	New Relief Request **RP-13** for the Comprehensive Pump Testing for the SW pumps	This relief was formatted using the NEI guideline and new code references. This relief request supports the use of a more rigorous Group A quarterly test, performed with instrumentation that meets the comprehensive pump test accuracy requirements, in lieu of a biennial comprehensive test.

Cooper Nuclear Station Inservice Test Program
Relief Request Summary of Changes for the Fourth Ten-Year Interval

Valves

Third Ten-Year Interval	Fourth Ten-Year Interval	Comments - Fourth Ten-Year Interval Requests
RV-01 Withdrawn	N/A	N/A
RV-02 Control Rod Drive (CRD) Valve Exercising by Scram Test - Relief approved per NRC SER dated February 19, 1997 (TAC No. M94530).	This relief request is not required for this interval.	The alternative test frequency per Technical Specifications (TS) is clearly stated and documented in the Inservice Test (IST) Program Document. Reference NUREG 1482, Rev. 1, Section 4.4.6. Relief is not required.
RV-03 CRD-CV-115CV Testing to a closed position - Relief approved per NRC SER dated February 19, 1997 (TAC No. M94530).	This relief request is not required for this interval.	Valves are exercised at refueling. The refueling outage frequency is documented in the IST Program Document. Reference NUREG 1482, Rev. 1, Section 4.4.6. Relief is not required.
RV-04 CRD-CV-138CV Test Method - Relief approved per NRC SER dated February 19, 1997 (TAC No. M94530).	This relief request is not required for this interval.	The alternative test frequency per TS is clearly stated and documented in the IST Program Document. Reference NUREG 1482, Rev. 1, Section 4.4.6, Paragraph 2. Relief is not required.
RV-05 CRD Solenoid Operated Valve (SOV) Test Method - Relief approved per NRC SER dated February 19, 1997 (TAC No. M94530).	This relief request is not required for this interval.	Valves are skid mounted. This position is clearly documented in the IST Program Document. Relief is not required.
RV-06 CS Keep Fill Check Valves - Relief approved per NRC SER dated November 17, 1998 (TAC No. M98759).	This relief request is not required for this interval.	Valves are included in the Check Valve Condition Monitoring (CVCM) Program. Relief is not required.

Cooper Nuclear Station Inservice Test Program
Relief Request Summary of Changes for the Fourth Ten-Year Interval

Valves (Continued)

Third Ten-Year Interval	Fourth Ten-Year Interval	Comments - Fourth Ten-Year Interval Requests
RV-07 HPCI Keep Fill Check Valves - Relief approved per NRC SER dated November 17, 1998 (TAC No. M98759).	This relief request is not required for this interval.	Valves are included in the CVCM Program. Relief is not required.
RV-08 HPCI-SOV-SSV64 and SSV87 Stroke Timing Alternative - Relief approved per NRC SERs dated February 19, 1997 (TAC No. M94530), and November 17, 1998 (TAC No. M98759).	Renumbered and reformatted as **RV-01**	The relief was reformatted using the NEI guideline and new code references. Changed the disassembling and inspection from each refueling "outage" to each refueling "cycle" in order to support online maintenance initiatives.
RV-09 Main Steam (MS)-RV-71A(H)RV Exercising Testing Frequency - Relief approved per NRC SER dated November 17, 1998 (TAC No. M98759).	This relief request is not required for this interval.	Power Operated Relief Valve Test Frequency has been relaxed to once per refueling cycle as allowed per ISTC-3510. Relief is not required.
RV-10 Excess Flow Check Valve Testing per Technical Specifications - Relief approved per NRC SER dated October 26, 2001 (TAC No. MB1820).	Renumbered and reformatted as **RV-02**	The relief was reformatted using the NEI guideline and new code references.
RV-11 RCIC-CV-18/19 Testing to the closed position - Relief approved per NRC SER dated November 17, 1998 (TAC No. M98759).	This relief request is not required for this interval.	Valves are included in CVCM. Relief is not required.

Cooper Nuclear Station Inservice Test Program
Relief Request Summary of Changes for the Fourth Ten-Year Interval

Valves (Continued)

Third Ten-Year Interval	**Fourth Ten-Year Interval**	**Comments - Fourth Ten-Year Interval Requests**
RV-12 RHR-CV-18/19/24/25 Testing - Relief approved per NRC SER dated November 17, 1998 (TAC No. M98759).	This relief request is not required for this interval.	Valves are included in CVCM. Relief is not required.
RV-13 SW-Motor Operated Valve (MOV)-MO89A/B Exercising - Acceptable under provisions in OM-10 and, therefore, relief was not required for RV-13 per NRC SER dated November 17, 1998 (TAC No. M98759).	Renumbered and reformatted as **RV-03**	The relief was reformatted using the NEI guideline and new code references. Changed "At refueling outages, these valves will be tested under the CNS MOV Program in accordance with GL89-10. Stroke times will be one of the parameters measured" to "These valves will also be diagnostically tested periodically under the CNS MOV Program in accordance with GL96-05. Stroke times will be one of the parameters measured." This will allow the MOV Program to drive the frequency of testing these valves based on the MOV Program requirements.
RV-14 Withdrawn	N/A	N/A
RV-15 Power Operated Relief Valve Testing Alternative - Relief approved per NRC SER dated November 17, 1998 (TAC No. M98759).	Renumbered and reformatted as **RV-04**	The relief was reformatted using the NEI guideline and new code references.

Cooper Nuclear Station Inservice Test Program
Relief Request Summary of Changes for the Fourth Ten-Year Interval

Valves (Continued)

Third Ten-Year Interval	Fourth Ten-Year Interval	Comments - Fourth Ten-Year Interval Requests
N/A	New Relief Request **RV-05** for SW-CV-27CV and SW-CV-28CV non-safety closure test	The relief was formatted using the NEI guideline. To satisfy the non-safety closure test for these valves, the valves will be removed, disassembled, inspected, and full stroke exercised every three refueling outages. New valves will be installed every three refueling outages per the Cooper Nuclear Station Preventative Maintenance Program.

Pump Relief Request Index

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 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 core spray 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 % 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)

As an alternative, for the Group B quarterly test, Cooper Nuclear Station (CNS) will use the installed suction pressure gauge (30" Hg to 30.0 psig) with a nameplate accuracy of ± 0.5%, calibrated to less than ± 2 % such that the inaccuracies due to pressure will be approximately the same as that required by the code (± 0.24 psig). Use of the installed pressure gauge calibrated to ± 0.66 % is nearly equivalent in terms of measuring differential pressure. (Suction pressure is subtracted from a discharge pressure measurement of approximately 300 psig to obtain differential pressure.)

0.0066 x 45 psig = ± 0.3 psi

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 yield approximately the same accuracy results 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, 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) Nebraska Public Power District (NPPD) requests relief from the specific ISTB 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>

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 % 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)

As an alternative, for the Group A quarterly test, CNS will use the installed suction pressure gauge (30" Hg to 150.0 psig) with a nameplate accuracy of ± 0.5%, calibrated to less than ± 2 % such that the inaccuracies due to pressure will be approximately the same as that required by the code (± 0.3 psig). Use of the installed pressure gauge calibrated to ± 0.6 % at the 5 psig calibration point is nearly equivalent in terms of measuring differential pressure. (Suction pressure is subtracted from a discharge pressure measurement of approximately 170 psig or higher to obtain differential pressure.)

0.006 x 165 psig = ± 1.0 psi

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 yield approximately the same accuracy results 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.

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**

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 % 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)

As an alternative, for the Group B quarterly test, CNS will use the installed suction pressure gauge (30" Hg to 150.0 psig) with a nameplate accuracy of ± 0.5%, calibrated to less than ± 2 % such that the inaccuracies due to pressure will be approximately the same as that required by the code (± 0.9 psig). Use of the installed pressure gauge calibrated to ± 0.6 % is nearly equivalent in terms of measuring differential pressure. (Suction pressure is subtracted from a discharge pressure measurement of approximately 1200 psig to obtain differential pressure.)

0.006 x 165 psig = ± 1.0 psi

Although the permanently installed suction pressure gauge (PI-99) is above the maximum range limits of ASME OM Code ISTB-3510(b)(1), it yields approximately the same accuracy results 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.

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**

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 % 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)

As an alternative, for the Group B quarterly test, CNS will use the installed suction pressure gauge (30" Hg to 150.0 psig) with a nameplate accuracy of ± 0.5%, calibrated to less than ± 2 % such that the inaccuracies due to pressure will be approximately the same as that required by the code (± 0.9 psig). Use of the installed pressure gauge calibrated to ± 0.6 % is nearly equivalent in terms of measuring differential pressure. (Suction pressure is subtracted from a discharge pressure measurement of approximately 1250 psig to obtain differential pressure.)

0.006 x 165 psig = ± 1.0 psi

Although the permanently installed suction pressure gauge (PI-66) is above the maximum range limits of ASME OM Code ISTB-3510(b)(1), it yields approximately the same accuracy results 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.

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**

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 Satety

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. 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 exceed the requirements of Table ISTB-3500-1, "Required Instrument Accuracy."

5. <u>Proposed Alternative and Basis for Use</u>

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 during the respective Group A or Group B quarterly tests. Additionally, all calibration tolerances of the loops involved meet or exceed the code-allowed accuracies of ± 2% or better.

As an alternative for the Group A or Group B quarterly test, 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 or exceed the code tolerances.

Although the permanently installed instrument loops exceed the accuracy requirements of ASME OM Code ISTB Table ISTB-3500-1, 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.

Relief Request RP-05
Loop Accuracy Requirements
(Continued)

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**

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 RP-06
Reactor Equipment Cooling Pump Flow Rate 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**

REC-P-A	Reactor Equipment Cooling Pump A
REC-P-B	Reactor Equipment Cooling Pump B
REC-P-C	Reactor Equipment Cooling Pump C
REC-P-D	Reactor Equipment Cooling 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 flow rate instrument range of the reactor equipment cooling pumps is 0 – 4000 gpm. The reference values for flow rate during inservice testing are 1100 gpm. As a result, the instrument range exceeds the requirement of ISTB-3510(b)(1).

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

The permanent plant flow Instruments REC-FI-450A and REC-FI-450B are calibrated such that their accuracy is 1.25 % 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 with a range of 0 to 3300 gpm (3 X 1100 gpm) to bound the lowest reference value for flow.

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

Relief Request RP-06
Reactor Equipment Cooling Pump Flow Rate Range Requirements
(Continued)

As an alternative, for the reactor equipment cooling pump inservice tests, CNS will use the installed flow rate instrumentation (0 to 4000 gpm) calibrated to less than ± 2 % such that the inaccuracies due to flow will be less than or equal to that required by the code (± 66 gpm). This will ensure that the installed flow rate instrumentation is equivalent to the 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.

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

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

7. <u>Precedents</u>

This relief request was previously approved for the third ten-year interval at CNS as Relief Request RP-03 (TAC No. M94530, February 19, 1997).

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits

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-B Core Spray Pump B

2. **Applicable Code Edition and Addenda**

   ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

   ISTB Table ISTB-5100-1, "Centrifugal Pump Test Acceptance Criteria"

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-5100-1 during the biennial comprehensive pump test or any other time vibrations are taken to determine pump acceptability (i.e., post-maintenance testing, other periodic testing, etc.). The proposed alternative would provide an acceptable level of quality and safety.

   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, 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 degradation 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.

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Core Spray Pump B Vibration Alert Limits
(Continued)

5. Proposed Alternative and Basis for Use

Pump Testing Methodology

Core Spray (CS) Pump B (CS-P-B) at CNS is tested using a full flow recirculation test line back to the suppression pool each quarter. CS-P-B has a minimum flow line which is used only to protect the pump from overheating when pumping against a closed discharge valve. The mini-flow line isolation valve for CS-P-B is initially open when the pump is started, and flow is initially recirculated through the mini-flow line back to the suppression pool. Then, the full-flow test line isolation valve is throttled open to establish flow through the full-flow recirculation test line. The mini-flow line is then isolated automatically, and all flow remains through the full-flow test line for the IST test.

The B train of the CS system is operated in the same manner and under the same conditions for each test of CS-P-B, regardless of whether CNS is operating or shut down. Consequently, the pump will experience the same potential for flow-induced, low frequency vibration whenever it is tested, whether CNS is operating or shut down. As a result, this relief is requested for the comprehensive pump testing of CS-P-B when vibration measurements are required or any other time vibrations are recorded to determine pump acceptability (i.e., post-maintenance testing, other periodic testing, etc.).

CNS considers full-flow testing to be preferable to mini-flow testing due to the ability to evaluate overall pump performance at post-accident flow design conditions. Mini-flow testing would provide only limited information about the pump.

NRC Staff Document NUREG/CP-0152

NRC Staff document NUREG/CP-0152, entitled "Proceedings of the Fourth NRC/ASME Symposium on Valve and Pump Testing," dated July 15-18, 1996, included a paper entitled Nuclear Power Plant Safety Related Pump Issues, by Joseph Colaccino of the NRC staff. That paper presented four key components that should be addressed in a relief request of this type to streamline the review process. These four key components are as follows:

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

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Core Spray Pump B Vibration Alert Limits
(Continued)

II. 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.

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

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

The following is a discussion of how these four key components are addressed for this relief request.

I. Vibration History (Key Component No. 1)

A. Testing Methods and Code Requirements

Inconsistent higher vibrations on CS-P-B have been a condition that has existed since original installation of this pump in 1973. During the construction and preoperational testing, vibrations were measured in "mils" at the top and side of the motor outboard (farthest from the pump), the side of the motor inboard (nearest the pump), and pump inboard (nearest the motor). The vibration signals were tape recorded along with the dynamic pressure pulsations in the suction and discharge of the pump as the flow was varied. The intention was to see if hydraulic disturbances were responsible for the observed phenomena. Observation of the vibration signals on the oscilloscope showed conclusively that the motor was vibrating with randomly distributed bursts of energy at the natural frequency of the total system. Therefore, it was determined that the hydraulic disturbances found in the piping was the source of the energy. Pipe restraints were added that reduced the piping system vibrations.

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Core Spray Pump B Vibration Alert Limits
(Continued)

The monitoring of multiple vibration points over the years had not been a requirement of Section XI of the ASME Code until the adoption of the O&M Standards/Codes. Therefore, at CNS, the first and second ten-year interval IST code requirements did not include the monitoring of multiple vibration points. The CNS second interval IST Program was committed to the 1980 Edition, Winter 1981 Addenda of Section XI. Paragraph IWP-4510 of this code required that "at least one displacement vibration amplitude shall be read during each inservice test." This code was in effect at CNS until the start of the third ten-year interval, which began on March 1, 1996. The CNS third interval IST Program was committed to the 1989 Edition of Section XI, which required multiple vibration points to be recorded during IST pump testing in accordance with the ANSI/ASME Operations and Maintenance Standard, Part 6, 1987 Edition with the 1988 Addenda.

However, CNS proactively began monitoring vibration on pumps in the IST Program in velocity units (inches per second) at multiple vibration points in 1990 in accordance with an approved relief request. Therefore, data exists for vibration Points 1H and 5H from April 1990 to the present. This data is included in the figures provided in this attachment. In April 1990, an analog velocity meter was utilized to begin measuring five different points in units of velocity. These are the same points measured today. Further technological advances resulted in the utilization of more reliable vibration meters beginning in late 1996. For the fourth interval the 2001 Edition through 2003 Addenda of the ASME OM Code will be the code of record. Vibration measurements are required to be taken only during the comprehensive test since the CS-P-B pump is considered a Group B pump.

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Core Spray Pump B Vibration Alert Limits
(Continued)

B. Review of Vibration History Data

Beginning in April 1990, five vibration points (1V, 1H, 2H, 3H, 5H) were recorded for CS-P-B. However, the pump was tested at 4720 gpm from April 1990 to April 1992, then at 4800 gpm from April 1992 through December 1994, and finally at 5000 gpm from January 1995 to the present. The January 1995 test was also a post-maintenance test following the work that replaced the restricting orifice in the test return line. The last re-baseline occurred on November 6, 1996, due to the implementation of a new vibration meter with new instrument settings. Therefore, it would be appropriate to review the data from this date forward to track for degradation. This would be over eight and one-half years of data at the same reference points.

CS-P-B IST vibration trend graphs (Figures 2a, 3a, 4a, 5a, and 6a in this attachment), which include data from November 6, 1996, to the present, show essentially flat or slightly downward trends, indicating that CS-P-B vibrations are not increasing in magnitude. These trends also show that Points 1H and 5H occasionally exceed the alert range criteria (Figures 2a and 3a). Figure 12 illustrates the trend for CS-P-B differential pressure (D/P) readings from January 1995 (re-baselined pump at 5000 gpm) to the present. This represents nearly eleven years of data for pump differential pressure with the testing at 5000 gpm. As can be seen from Figure 12, essentially no degradation in pump D/P has occurred.

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Core Spray Pump B Vibration Alert Limits
(Continued)

Trend Graphs 2b, 3b, 4b, 5b, and 6b illustrate vibration data dating back to April 1990 for all vibration points. The data prior to 1996 represents data taken with analog, less reliable vibration instruments and, as discussed previously, at differing flows. This data should not be directly compared to data from November 1996 to the present, but it does clearly indicate that the piping-induced vibrations for vibration Points 1H and 5H were present in the early 1990s. This condition was also documented in the 1980s. In July 1985, CNS work item #85-2497 documented high vibration readings on the horizontal motor position. A pipe resonance problem was suspected at that time. Vibrational readings varied between 0.3 and 0.5 in/sec with spikes to 0.7 in/sec every few seconds. This 1985 documentation, available vibration data since 1990, along with the testing performed during the preoperational time period, substantiates that the piping-induced vibrations have been in existence since the pump was installed. These graphs indicate that the vibration point trends since April 1990 are essentially flat or slightly downward. Therefore, based on the available data at CNS, this pump has experienced essentially no degradation in vibration levels for the past fifteen years or in D/P for nearly the past eleven years.

C. Review of "Spikes" in Vibration Data

In reviewing the trend data for vibration points 1H (Figures 2a and 2b) and 5H (Figures 3a and 3b), which includes the code-required frequency ranges (one-third pump running speed to 1000 Hz.), random spikes were observed throughout the data that resulted in values above the alert range. These spikes are best described in a 2001 report by Machinery Solutions, an industry expert on vibrations, as follows:

> Most of the vibration that is measured on the motor casing 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 resonances in a non-continuous fashion.

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Core Spray Pump B Vibration Alert Limits
(Continued)

This is why the amplitude swings so dramatically on the motor case (the location of vibration points 1H and 5H). The system goes from brief periods of excitation to brief periods of no excitation.

The discharge riser is also moving side to side from the same forces. Although the discharge piping configuration is both non standard and less than optimum for this application, it poses no threat to the long-term reliability of either the pump or the motor. The only negative impact is on vibration levels relative to a generic standard.

As illustrated previously, there have been no degrading trends associated with vibration data for the past fifteen years (Figures 2b and 3b). Since June 2002, filtered data (removal of one-third pump running speed to one-half pump running speed frequencies) has been recorded in addition to the current code-required values for vibration points 1H and 5H (reference Figures 2c and 3c). In reviewing this data, the trends are lower in value, steady, and without the spikes that the code-required data contains. This further supports the fact that the spikes in the original code data are due to the piping-induced, non-detrimental vibration occurring at the one-third to one-half pump running speed.

II. Consultation - Pump Manufacturer/Vibration Expert (Key Component No. 2)

A. Pump Manufacturer Evaluation of CS-P-B Vibrations

Byron Jackson is the pump vendor for CS-P-B. The pump is a 8 x 14 x 30 DVSS, vertical mount, single stage centrifugal pump. The pump impeller is mounted on the pump motor's extended shaft. As outlined in the Core Spray System Summary of Preoperational Test, the data obtained for the B Core Spray Pump indicated high vibration. The high vibration had been recognized early in the construction testing phase, and Byron Jackson, the pump manufacturer, sent a representative to the site to investigate. In a letter dated February 16, 1973, the Byron Jackson representative indicated the following:

1. Tests indicated that the natural frequency of the pump was 940 rpm (approximately one-half pump speed) in the direction of the piping and 720 rpm (between one-third and one-half of pump speed) in the direction perpendicular to the piping.

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Core Spray Pump B Vibration Alert Limits
(Continued)

2. Observation of the test signals on the oscilloscope showed very conclusively that the motor was vibrating with randomly distributed bursts of energy, the frequency of which matched the natural frequency of the total system. This can only mean that the energy is coming from the hydraulic disturbances found in the piping.

3. Whenever large flows are carried in piping, there is usually considerable turbulence associated with the elbows, tees, etc., of the piping configuration, all of which results in piping reactions and motion. Apparently, the vibrating piping was, in turn, vibrating the pump.

4. When jacks were installed between the top of the pump and the bottom of the motor flange in an effort to stiffen the motor pump system, the motor vibrations went up due to more energy being transmitted from the pipe-pump system into the motor.

5. Testing was performed to determine any weaknesses in the pump-motor mechanical system. The vibration amplitude using the IRD instrument, with the filter set at operating speed, sampled many points vertically along the pump-motor structure. Plots of the data (along with phase angle determined by means of the strobe light) showed very clearly that the total structure was vibrating as a rigid assembly from the floor mounting. Examination of the high amplitude vibration signals showed them to be at the extremely low system natural frequencies as determined earlier.

6. Such low acceleration levels, along with the system acting as a rigid structure (between motor and pump), means that the motor and pump can operate with these levels of vibration with absolutely no impairment of operating life. This is the picture that seems very clearly described by the data obtained during these tests. There is absolutely no reason to restrict the operation of these pumps in any way.

Although the vibration was found to be acceptable, CNS took actions to install new pipe supports as an attempt to reduce these piping-induced vibrations. This action was successful as will be discussed in a later section of this relief request.

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Core Spray Pump B Vibration Alert Limits
(Continued)

B. CNS Expert Analysis of CS-P-B Vibrations

As the Vibration Monitoring Program expanded in the early 1990s, it became evident that the low frequency, piping-induced vibrations still remained in CS-P-B. Design Change (DC) 94-046 resulted in the replacement of the orifices in the test return line. A March 16, 1995, memo to the CNS IST Engineer from the CNS Lead Civil/Structural Engineer discussed the CS-P-B vibration measurements obtained during DC 94-046 acceptance testing.

The vibration data was collected using peak velocity measuring instrumentation as required for the performance of the IST test and with instrumentation that provides displacement and velocity versus frequency data. It was observed that the significant vibrations in the 1H direction were occurring around 700 cycles per minute (cpm), while the pump speed is at 1780 cpm (i.e., rpm). Given the piping movement of the system, and the knowledge that piping vibrations can commonly occur in the 700 cpm (12 Hz) range, CNS concluded that the pump vibrations were piping dependent.

The CNS Lead Civil/Structural Engineer concluded that the significant pump vibrations are occurring at less than one-half of the pump operating speed. The pumps are rigidly mounted at their bases, and any impeller-induced vibrations would occur at the pump running speed or at the vane passing frequency. Therefore, the sub-synchronous pump vibrations are clearly piping induced, non detrimental to pump/motor service or reliability, and should not be used as a basis for pump degradation. This is because the purpose of pump in-service testing is to diagnose and trend internal pump degradation.

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Core Spray Pump B Vibration Alert Limits
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The memo further states that the vibration data collection requirement specified in the IST procedure consists of peak velocity recordings, which may be masked by piping-induced vibrations, negating internal pump degradation diagnosis and trending. Based on the historical trending data for both Core Spray pumps, the vibration has remained at a consistent amplitude, trending neither upward nor downward, indicating that the induced vibrations are not impairing pump operability, nor capable of preventing the pump from fulfilling its safety function. The piping vibration is present when flow is present through the test return line. It was visually observed during DC 94-046 acceptance testing that piping vibrations were minimal when flow was directed through the minimum flow line.

Following the DC 94-046 testing, CNS noted that the deflections observed in the discharge piping were significantly reduced. Based on these results, it was determined by the Nuclear Engineering Department, Civil/Structural Group, that the CS Loop B piping vibration stresses are less than the endurance limit of the piping.

On October 17, 2002, a Plant Engineering Supervisor at CNS, knowledgeable in the area of pump vibration analysis, issued a memo to the CNS Risk & Regulatory Affairs Manager discussing the low frequency vibration issue with the "B" Core Spray Pump.

In the memo, it is stated that the pipe is vibrating as a reaction to flow turbulence, which in turn is causing the pump to vibrate. The memo documents the basis for why the low frequency vibration (less than one-half pump running speed) experienced during CS-P-B operation is not indicative of degrading pump performance and is not expected to adversely impact pump operability. To summarize, in the area of pump performance, aside from the randomness of the low frequency peaks, the spectral data shows no degrading trend in performance over several years of data. The low frequency piping-induced vibrations are not expected to adversely impact pump operability.

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Core Spray Pump B Vibration Alert Limits
(Continued)

C. Independent Industry Vibration Expert Evaluation of CS-P-B

In 2001, Machinery Solutions, Inc., was retained to perform an independent study of the CS-P-B vibrations. The following discussion was obtained from their report, issued in September of 2001. Machinery Solutions utilized seven transducers and acquired data from CS-P-B continuously while it was operating, and data was stored every 3 seconds. Orbit plots, spectrum plots, bode and polar plots, cascade/waterfall plots, overall amplitude plots, trend plots, XY graph plots, and tabular lists were utilized to analyze the data. The data obtained by Machinery Solutions indicated that the vibration amplitudes during the run were much higher at the top of the motor than they were at the bottom of the motor. The amplitudes decreased even further on the pump. The spectrum plots showed that most of the vibration was occurring below running speed. They also showed that the low frequency vibration is a different frequency in each direction. The predominant peaks occur at approximately 870 cpm (less than one-half pump running speed) in line with discharge and at approximately 630 cpm (less than one-half pump running speed) perpendicular to discharge. The amplitude of each of these peaks varied significantly from second to second. The natural frequency of the pump-motor-piping structure was determined via impact testing prior to starting the pump. The natural frequencies were determined to be approximately 830 cpm in line with discharge and 670 cpm perpendicular to discharge. Such a vibration response is typical for vertical pumps.

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Core Spray Pump B Vibration Alert Limits
(Continued)

Machinery Solutions concluded the following:

1. Most of the vibration that is measured on the motor casing 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 resonances in a non-continuous fashion. This is why the amplitude swings so dramatically on the motor case (the location of vibration points 1H and 5H). The system goes from brief periods of excitation to brief periods of no excitation. The discharge riser is also moving side to side from the same forces. Although the discharge piping configuration is both non standard and less than optimum for this application, it poses no threat to the long-term reliability of either the pump or the motor. The only negative impact is on vibration levels relative to a generic standard.

2. The balance condition of the motor and pump are acceptable with no corrective action required at this time.

3. The shaft alignment between the motor and the pump is acceptable for long-term operation.

4. There is no evidence of motor bearing wear.

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Machinery Solutions recommended the following actions:

1. Create a new IST vibration data point configuration within the data collector database to use an overall level that is generated from spectral data above 950 cpm. This will eliminate the energy from the resonances from the data set and still allow for protection from bearing degradation, impeller degradation, and motor malfunctions. The only potential failure mode that could occur within this excluded frequency range would be a fundamental train pass frequency generated by a rolling element bearing. This frequency only occurs with increased bearing clearance.

   On vertical machines, this increased bearing clearance causes increased bearing compliance and the 1X component will become larger. The 1X change will be evident in the monitored data set.

2. Continue to acquire the old data points with the low-frequency data "for information only" to verify that the system response does not change.

III. Attempts to Lower Vibration (Key Component No. 3)

CNS installed additional pipe restraints during the preoperational period in order to reduce piping-induced vibrations. Testing on October 26 and 27, 1973, following the installation of these new supports, demonstrated significantly reduced vibrations. Low-frequency piping-induced vibrations continued, but with reduced amplitude following the installation of the pipe restraints. However, the issue resurfaced in the early 1990s when additional vibration points were recorded, more strict acceptance criteria were adopted for vibrations, and new technology was incorporated into the CNS vibration program. These new points were more influenced by the low-frequency piping-induced vibrations than the one or two points recorded in the 1980s. It was evident that the piping-induced vibrations were still prevalent with the CS-P-B pump.

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Core Spray Pump B Vibration Alert Limits
(Continued)

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 piping induced. Preliminary investigation of the vibration issue concluded that cavitation at the Core Spray test return line throttle valve and/or restriction orifices was likely causing the elevated piping vibration in both Core Spray System loops. Vibration testing of the Core Spray piping confirmed this conclusion.

To reduce these flow-induced vibrations, DC 94-046 was developed to replace the existing simple, single-stage orifices on both Core Spray subsystem test return lines with multi-stage orifices. Post-installation testing with these multi-stage orifices demonstrated lower vibration levels on CS-P-A, but higher vibration levels on CS-P-B. A multi-hole single-stage orifice was fabricated and installed in the CS-P-B test return line (and later in the CS-P-A 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 one direction (location 1H in Figure 1) still demonstrated peak velocity reading in the alert range. The pump vibrations in the 1H direction were occurring at frequencies much lower than the pump operating speed.

The major vibration peaks were occurring at approximately 700 cycles per minute (cpm), while the pump speed is at 1780 cpm, indicating that the vibration was piping induced. It was also observed during acceptance testing that vibrations were minimal during operation in the minimum flow condition.

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Core Spray Pump B Vibration Alert Limits
(Continued)

IV. Spectral Analysis (Key Component No. 4)

Figures 7 through 11 in this attachment show spectrum plots for CS-P-B, as well as spectrum trends. Markers drawn on these plots show that the peak energy spikes for points 1H and 5H remain below one-half pump running speed and that the pump vibration signature remains fairly uniform. Figure 12 shows that pump differential pressure is consistently acceptable. This data validates the analysis performed by Machinery Solutions, Inc., and the earlier conclusions that the elevated vibrations are piping induced, and not indicative of degraded pump performance. No pump or motor faults and/or degradation are evident in the spectral analysis for this pump. This test data also shows that the vibrations experienced remain in the region of the CS-P-B pump-motor-piping system natural frequency, at less than half the pump's operating speed.

Vibrations occurring at these low frequencies are not expected to be detrimental to the long-term reliability of either the pump or the motor. Typical pump faults, i.e., impeller wear, bearing problems, alignment problems, shaft bow, etc., would result in measurable vibration response in frequencies equal to or greater than one-half of the pump's running speed. Such faults would also be evident in pump trends. However, the vibrations are being experienced below one-half pump operating speed, have existed since initial operation, and are not trending higher. Visual inspection by Machinery Solutions in 2001 of the pump base plate, soleplate, and grout identified no visible cracks or degradation. Further, they concluded that the balance condition and shaft alignment of the pump and motor were acceptable, and detected no evidence of motor bearing wear.

D. Maintenance History

The maintenance history for CS-P-B reflects 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. A review of maintenance history for the CS-P-B pump and motor was performed.

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Core Spray Pump B Vibration Alert Limits
(Continued)

The search consisted of a historical review of CS-P-B pump and motor maintenance in addition to a more general search of CS System vibrational issues. This search identified that the pump and motor installed in the plant today is the same combination that was installed during the construction phase of the plant. Some of the key items reviewed are summarized below:

1. 1973: Additional supports installed on "B" Core Spray System during pre-operational stage. As discussed previously, this resulted in lowering CS-P-B vibrations.

2. January 1977: Vibration eliminator on "B" Core Spray test line, CS-VE7, required tightening of wall plate bolts per Maintenance Work Request (MWR) 77-1-10. Bolts in pipe clamp were replaced and clamp was realigned. Design was determined to be adequate, but lock washers should be used to prevent recurrence of the problem. MWR 77-1-262 completed this action.

3. April 1989 (Work Item [WI] 89-0269); November 1991 (WI 91-1507), February 1993 (MWR #92-2876): CS-P-B stator end turn bracing brackets inspected for stress corrosion cracking or unusual conditions such as loose bolts or bending. No cracks, loose bolts, or other unusual conditions were observed.

4. March 1993: A magnetic particle examination of CS-P-B support attachment weld revealed an indication at Lug #5 of the pump support. The indication was ground out, repaired, and retested satisfactorily. The indication was very small and would not have affected the overall stiffness of the pump. In 2003, no recurrence of this indication was identified.

5. April 1993: Work Order #93-1631 was initiated due to mechanical seal leakage. A complete inspection of the pump/motor was also completed. The pump was found with the keyway not properly aligned with the mechanical seal, causing the leakage. The impeller was found to have minor pitting at the base of the wear ring area. The pump casing and cover had minor erosion and pitting. No significant problems with the pump or motor were noted.

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Core Spray Pump B Vibration Alert Limits
(Continued)

6. July 1994: Bolt torque checked for lower end bell and lower bearing housing on CS-P-B motor due to a loose bolt found on the "A" RHR pump motor. No movement on lower bearing housing bolts. Movement of lower end bell bolts were as follows: 1/16 flat on #1, 3, 4, and 5 and no movement on #2, 6, 7, and 8. These were very minor adjustments.

7. Late 1994: DC 94-046 installs new orifices in CS-P-B test line. As previously discussed, this reduced piping deflections in the test line.

8. Oil Samples (Dates: 09-22-95, 10-22-95, 11-24-95, 02-28-97, 03-26-98, 04-05-99, 01-24-00, 12-26-00, 10-28-02): Periodic Oil Sample Analysis of the upper and lower motor bearings in accordance with Preventive Maintenance Program. Results of CS-P-B Motor oil analysis were satisfactory with no corrective actions required.

9. Numerous Visual Motor Inspections completed satisfactory (i.e., January of 2002): Visual motor inspection satisfactory per Work Order #4199724.

10. February 2003: Notification #10225272 identified an indication approximately 3/8" on a CS-P-B integral attachment (CS-PB-A1). The indication is at the top of one of the small gusset supports where the gusset is welded to the cast pump bowl extension (different spot than the 1993 indication). Within Engineering Evaluation 03-030, the indication was determined to be on the gusset side of the weld and appears to be an incomplete fusion of the weld and not a service load-induced flaw. Poor accessibility was the most likely cause. Calculation NEDC 03-007 demonstrated that, even if the five minor gusset plates were ignored, the pump support is still qualified under the most severe design loads.

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Core Spray Pump B Vibration Alert Limits
(Continued)

This search of the maintenance history, covering a time period of approximately thirty years, identified no significant maintenance or corrective actions that had to be implemented for the "B" Core Spray pump and motor due to the piping-induced vibrations. Only minor indications were noted on the pump impeller and casing during the last significant motor/pump disassembly in 1993.

No other documentation of pump/motor disassembly inspection results was found during this review. Oil analyses of the CS-P-B lower and upper motor bearing housings were found to be satisfactory for all the results documented since 1995 to the present. Wear metals, contaminants, additives, etc., were all at acceptable levels. The addition of pipe supports in 1973 and new orifices in the test lines were necessary modifications and were previously discussed. Other than these modifications, only minor corrections have been made with pipe and/or pump supports (tightening bolts, minor indication, etc.), none of which were found to be significant. Therefore, the maintenance history supports the basis of this relief request in that the piping-induced vibrations occurring on CS-P-B have not degraded the pump or motor in any way.

E. Basis for Code Alternative Alert Values for Points 1H and 5H

By this relief request 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 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.

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Core Spray Pump B Vibration Alert Limits
(Continued)

These new values are reasonable as they represent an alternative method that still meets the intended function of monitoring the pump for degradation over time while keeping the required action level unchanged. The proposed values encompass the majority of the historical values, but not all of them (reference Figures 2a, 2b, 3a, 3b). With these new values, a reading above 0.400 in/s would require NPPD to place the pump on an increased testing frequency and to evaluate the pump performance to determine the cause of the reading. It is expected that a small amount of degradation occurring in the pump or a slight increase in the piping-induced vibration would be quickly identified with these new parameters.

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 code value of 0.700 in/s. Therefore, the intent of the code will be maintained.

<u>Conclusions</u>

Several expert evaluations have documented that no internal pump or motor degradation is occurring due to the piping-induced vibration, which has been present since the pre-operational testing time period. The available vibration data over the past fifteen years and differential pressure data over nearly the past eleven years supports this fact as essentially no degradation has been indicated. A maintenance history review and review of oil analyses results further supports these conclusions.

Based on this information, CNS concludes that doubling the test frequency for CS-P-B does not provide additional information nor does it provide additional assurance as to the condition of the pump and its ability to perform its safety function. Testing of this pump on an increased frequency places an unnecessary burden on CNS resources.

All four key components discussed in NUREG/CP-0152 have been addressed in detail, supporting the alternative testing recommended in this relief request.

CNS concludes that CS-P-B is operating acceptably and will perform its safety function as required during normal and accident conditions. The increased alert limits proposed for vibration points 1H and 5H in this relief request will continue to assure long-term reliability of CS-P-B.

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

During the performance of CS-P-B inservice comprehensive pump testing, or any other time vibrations are recorded to determine pump acceptability (i.e., post-maintenance testing, other periodic testing, etc.), pump vibration shall be monitored in accordance with ISTB-3510(e) and ISTB-3540(a). The acceptance criteria for vibration points 2H, 3H, and 1V will follow the criteria specified in ISTB Table ISTB-5100-1. The acceptance criteria of vibration points 1H and 5H will have increased absolute alert limit values of 0.400 in/s. The absolute required action limits for all points will continue to be 0.700 in/s in accordance with ISTB Table ISTB-5100-1. The absolute alert and required action limits for all vibration points associated with CS-P-B are summarized in the table below.

Absolute Vibration Acceptance Criteria for CS-P-B:

Vibration Parameter	Acceptable Range	Alert Range	Required Action Range
1H	≤ 0.400 in./sec.	>0.400 in./sec.	>0.700 in./sec.
5H	≤ 0.400 in./sec.	>0.400 in./sec.	>0.700 in./sec.
1V	≤ 0.325 in./sec.	>0.325 in./sec.	>0.700 in./sec.
2H	≤ 0.325 in./sec.	>0.325 in./sec.	>0.700 in./sec.
3H	≤ 0.325 in./sec.	>0.325 in./sec.	>0.700 in./sec.

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

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

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

This relief request was previously approved for the third ten-year interval at CNS as Relief Request RP-06 (TAC No. MB6821, February 25, 2004).

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

CS-P-B Figures

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

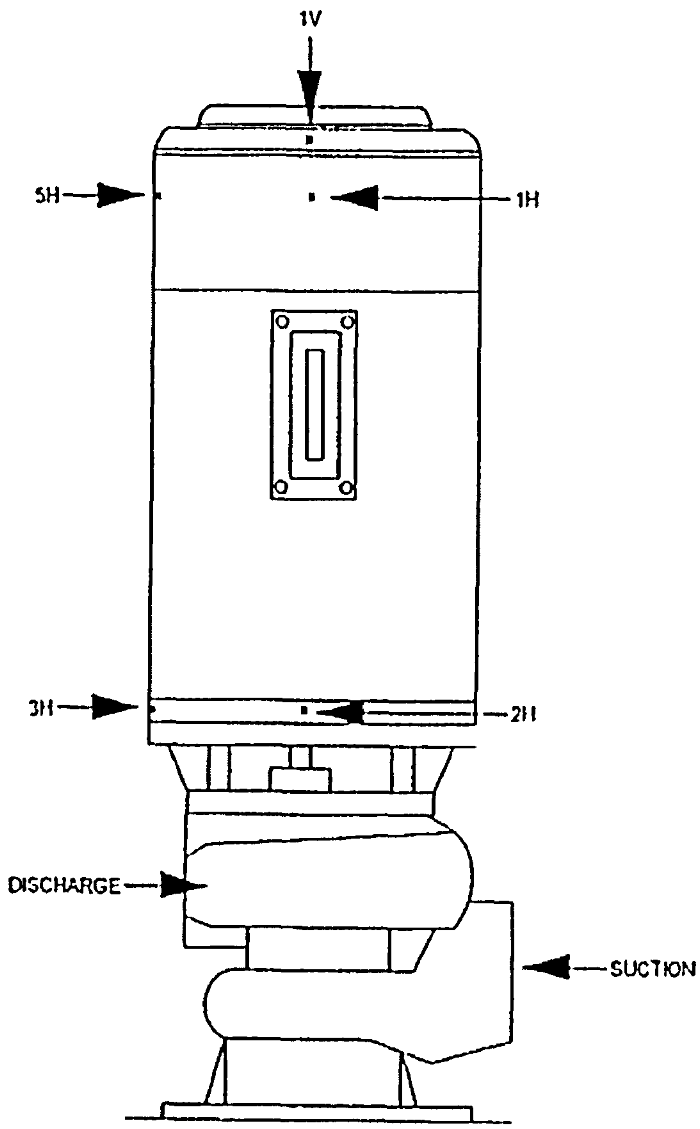


Figure 1
CS-P-B Vibration Monitoring Points

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

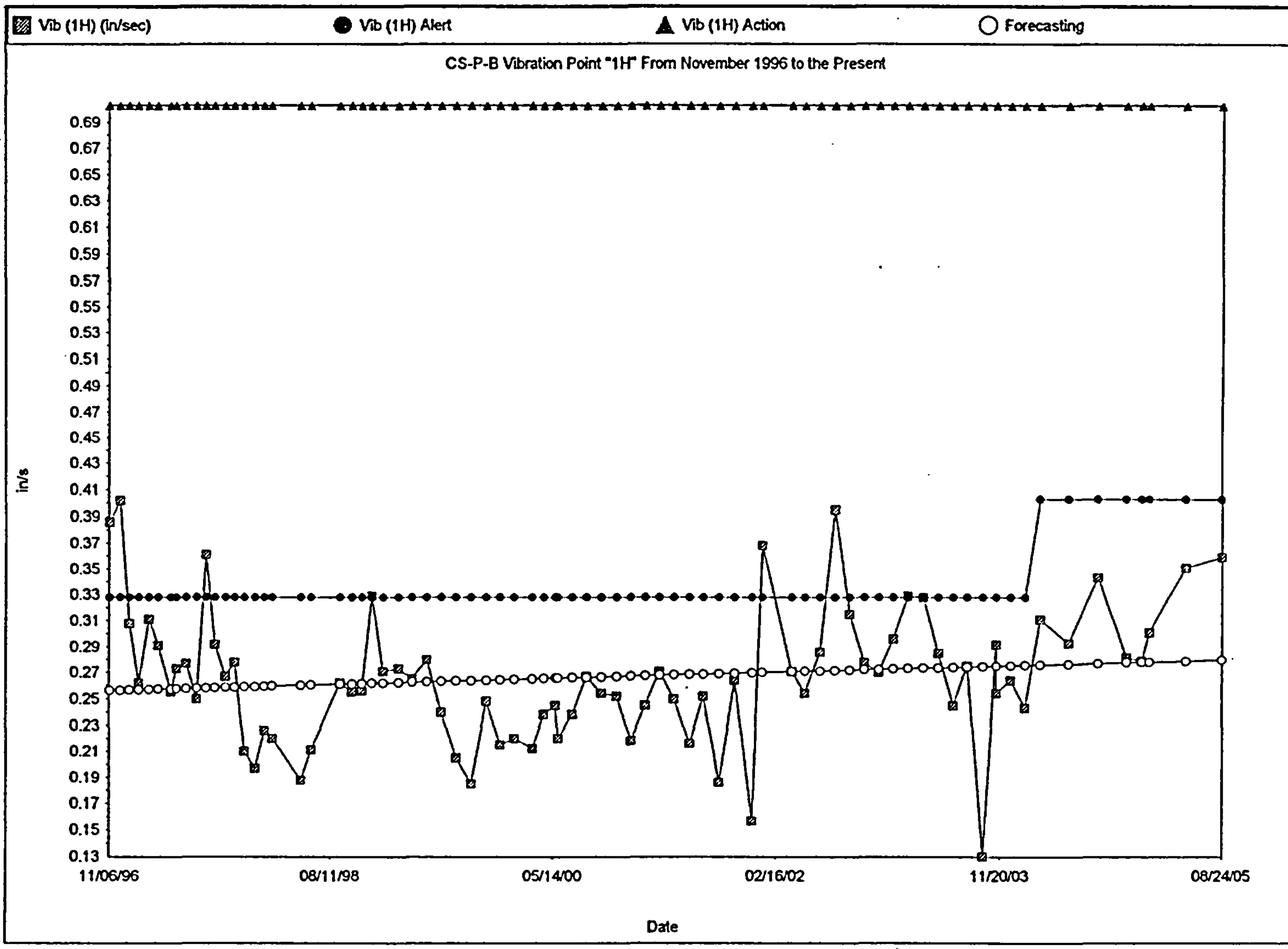


Figure 2a
CS-P-B Vibration Point 1H from November 1996 to the Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

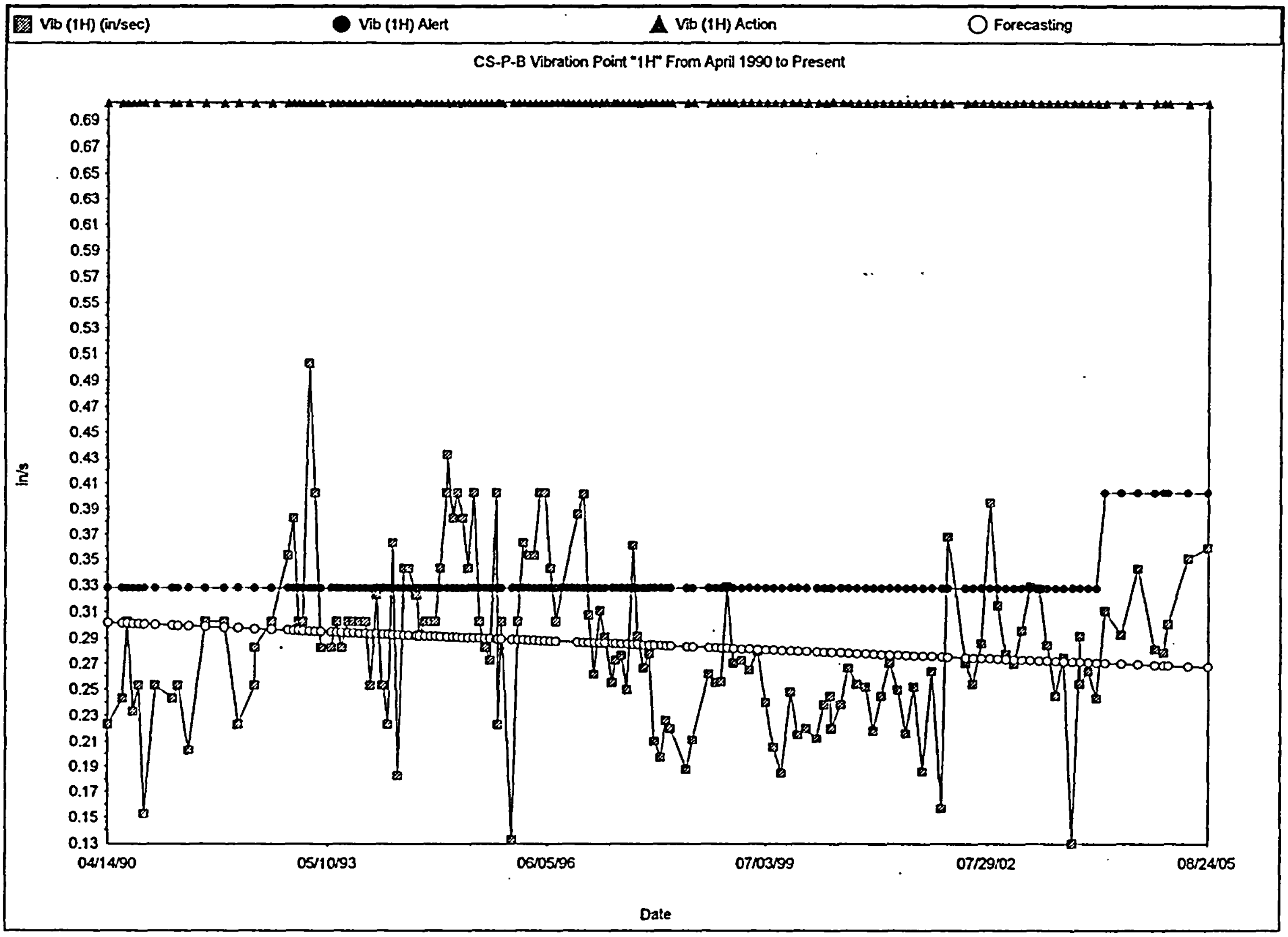
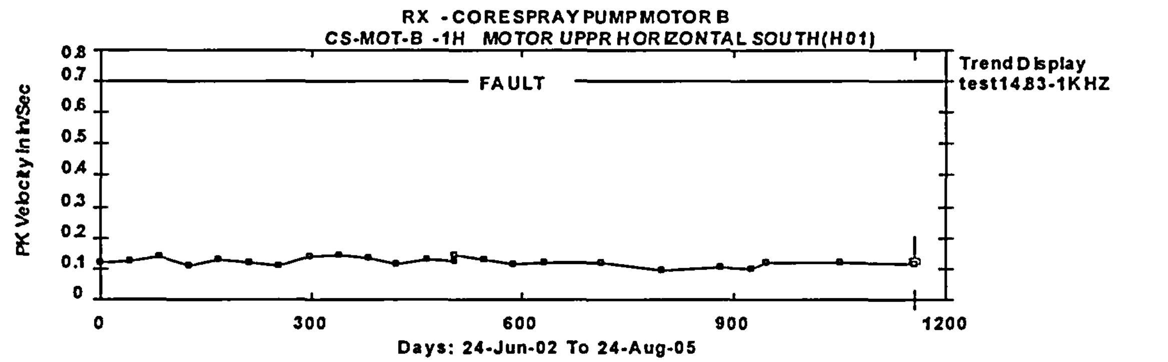
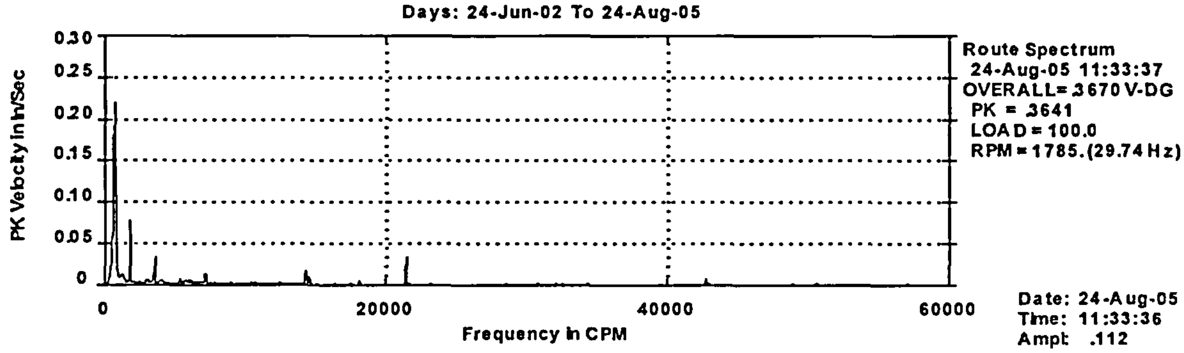


Figure 2b
CS-P-B Vibration Point 1H from April 1990 to the Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)





List of Trend Points
****

Station: RX --> REACTOR BUILDING
Machine: CS-MOT-B --> CORE SPRAY PUMP MOTOR B
Meas Point: 1H --> MOTOR UPPR HORIZONTAL SOUTH(H01)
Parameter: test14.83-1KHZ (PK Velocity in In/Sec)

DATE	TIME	VALUE	ALARM	DATE	TIME	VALUE	ALARM
24-Jun-02	12:45	.1194		02-Feb-04	11:31	.1153	
05-Aug-02	13:06	.1257		17-Mar-04	15:29	.1194	
17-Sep-02	02:11	.1374		07-Jun-04	12:18	.1188	
28-Oct-02	10:18	.1105		30-Aug-04	16:28	.0932	
09-Dec-02	12:54	.1298		22-Nov-04	15:22	.1056	
20-Jan-03	15:52	.1201		05-Jan-05	15:32	.0987	
04-Mar-03	12:37	.1091		27-Jan-05	23:05	.1194	
17-Apr-03	13:35	.1367		11-May-05	22:12	.1194	
28-May-03	13:16	.1450		24-Aug-05	11:33	.1118	
10-Jul-03	11:57	.1326					
18-Aug-03	12:24	.1146					
02-Oct-03	14:19	.1270					
10-Nov-03	12:18	.1250					
10-Nov-03	14:40	.1429					
22-Dec-03	14:34	.1305					

ALARMS:	WARNING	ALERT	FAULT
	.1692	.3000	.7000

Figure 2c
Trend of Vibration Point 1H with Data Below One-Half Pump Running Speed Filtered from June 2002 to Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

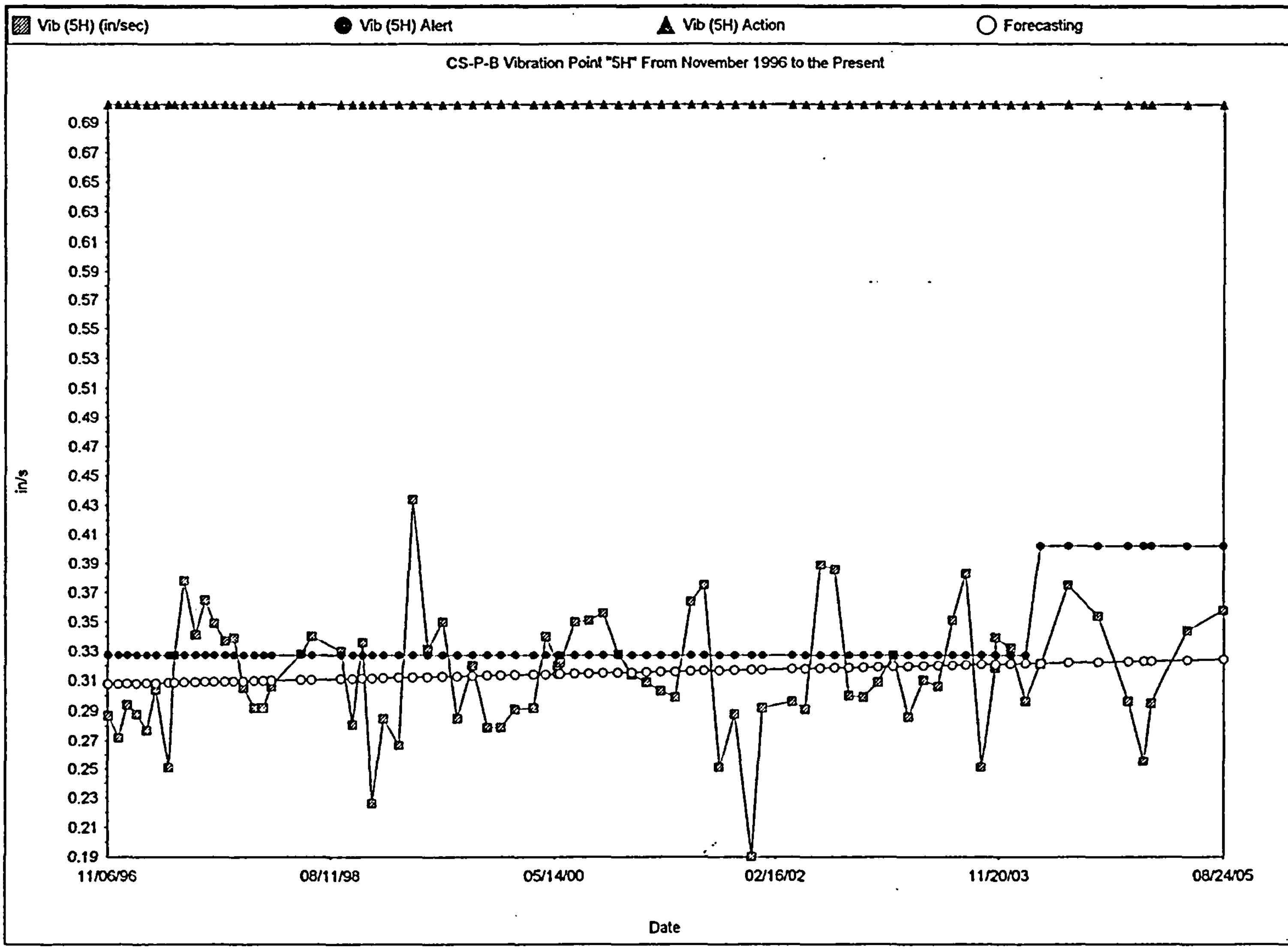


Figure 3a
CS-P-B Vibration Point 5H from November 1996 to the Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

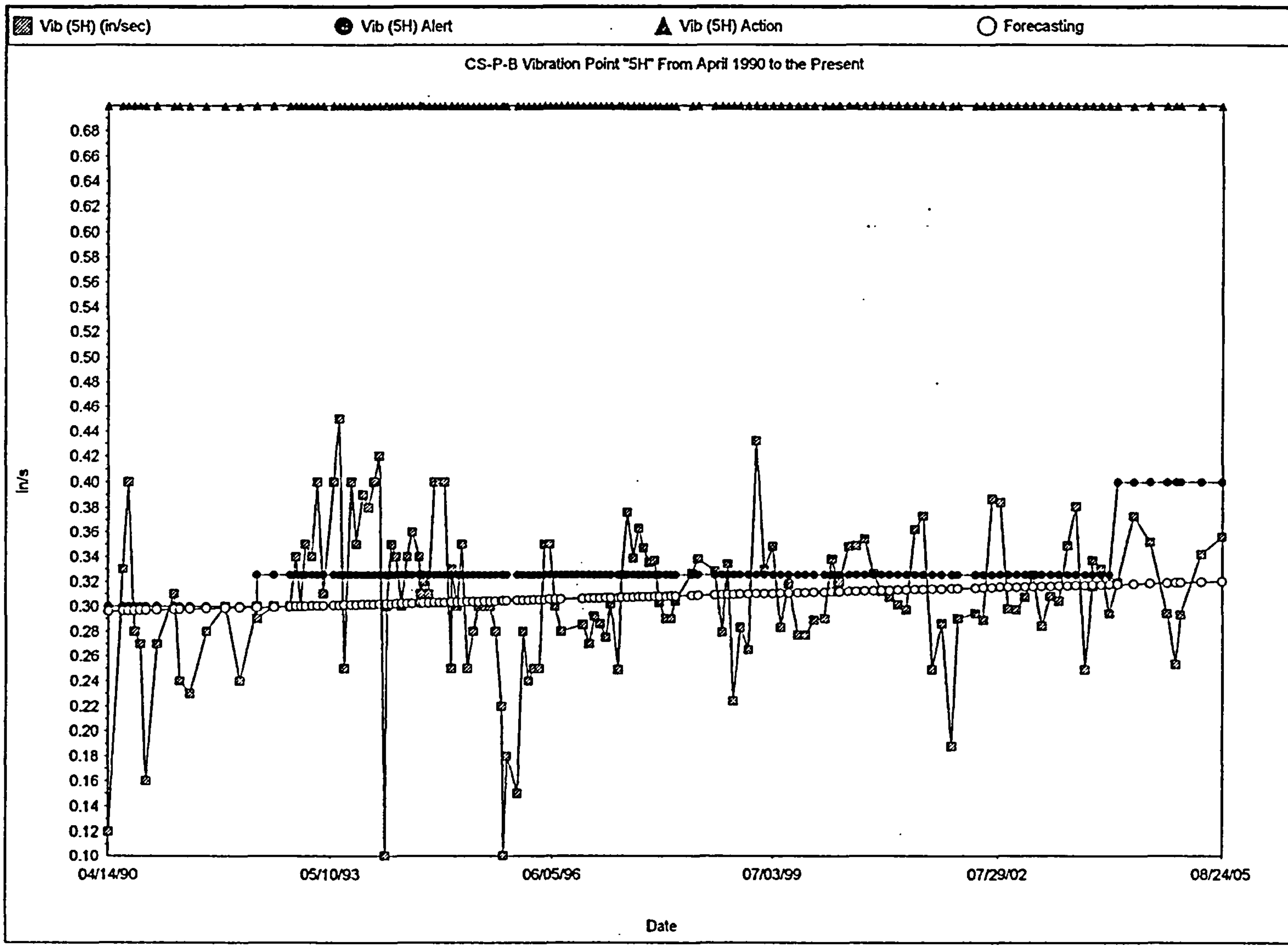
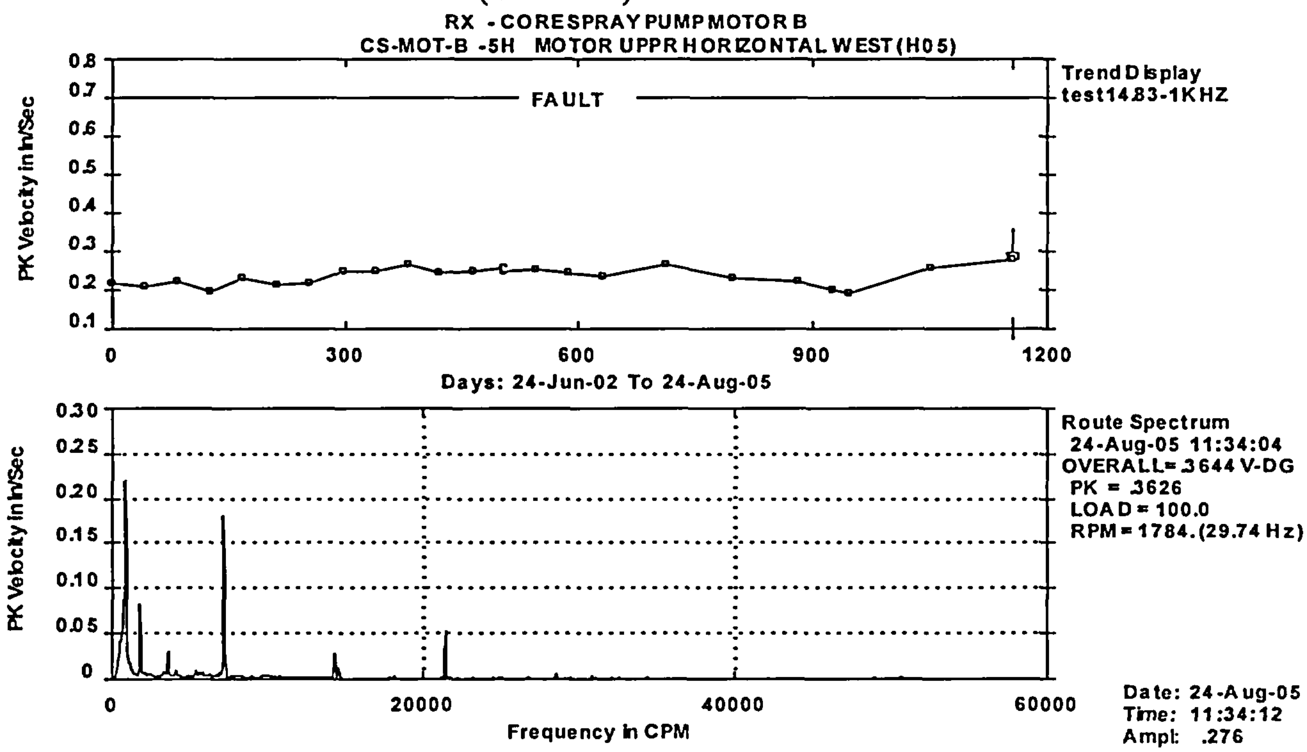


Figure 3b
CS-P-B Vibration Point 5H from April 1990 to the Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)



List of Trend Points
****

Station: RX --> REACTOR BUILDING
Machine: CS-MOT-B --> CORE SPRAY PUMP MOTOR B
Meas Point: 5H --> MOTOR UPPR HORIZONTAL WEST (H05)
Parameter: test14.83-1KHZ (PK Velocity in In/Sec)

DATE	TIME	VALUE	ALARM	DATE	TIME	VALUE	ALARM
24-Jun-02	12:47	.2168		02-Feb-04	11:31	.2417	
05-Aug-02	13:07	.2099		17-Mar-04	15:29	.2334	
17-Sep-02	02:12	.2237		07-Jun-04	12:19	.2637	
28-Oct-02	10:19	.1947		30-Aug-04	16:28	.2306	
09-Dec-02	12:54	.2320		22-Nov-04	15:22	.2223	
20-Jan-03	15:53	.2140		05-Jan-05	15:32	.2002	
04-Mar-03	12:38	.2196		27-Jan-05	23:05	.1892	
17-Apr-03	13:35	.2472		11-May-05	22:13	.2555	
28-May-03	13:17	.2486		24-Aug-05	11:34	.2762	
10-Jul-03	11:59	.2665					
18-Aug-03	12:24	.2417					
02-Oct-03	14:20	.2486					
10-Nov-03	12:19	.2582					
10-Nov-03	14:41	.2499					
22-Dec-03	14:34	.2527					

ALARMS:	WARNING	ALERT	FAULT
	.3087	.3000	.7000

Figure 3c

Trend of Vibration Point 5H with Data Below One-Half Pump Running Speed Filtered from June 2002 to Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

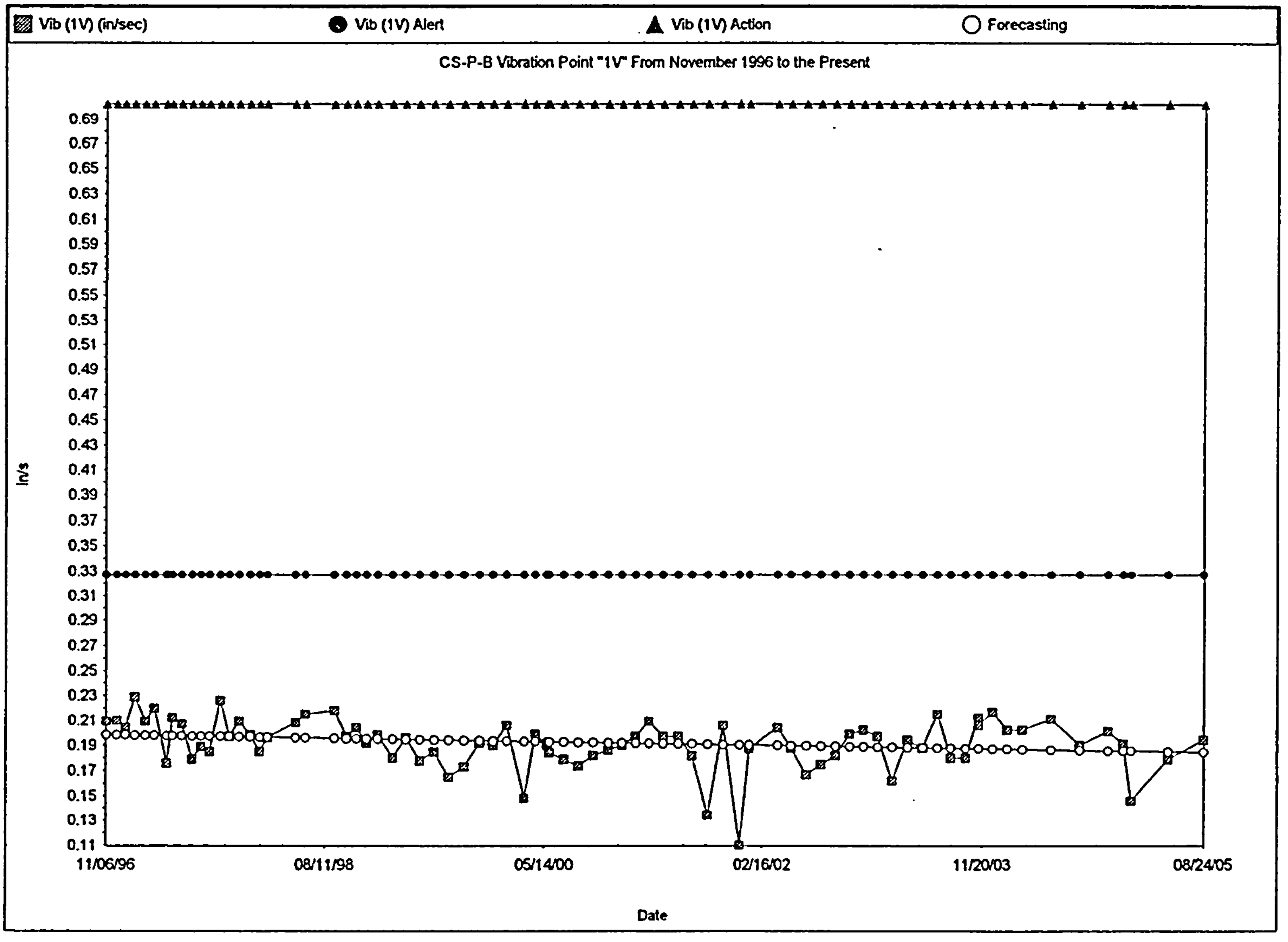


Figure 4a
CS-P-B Vibration Point 1V from November 1996 to the Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

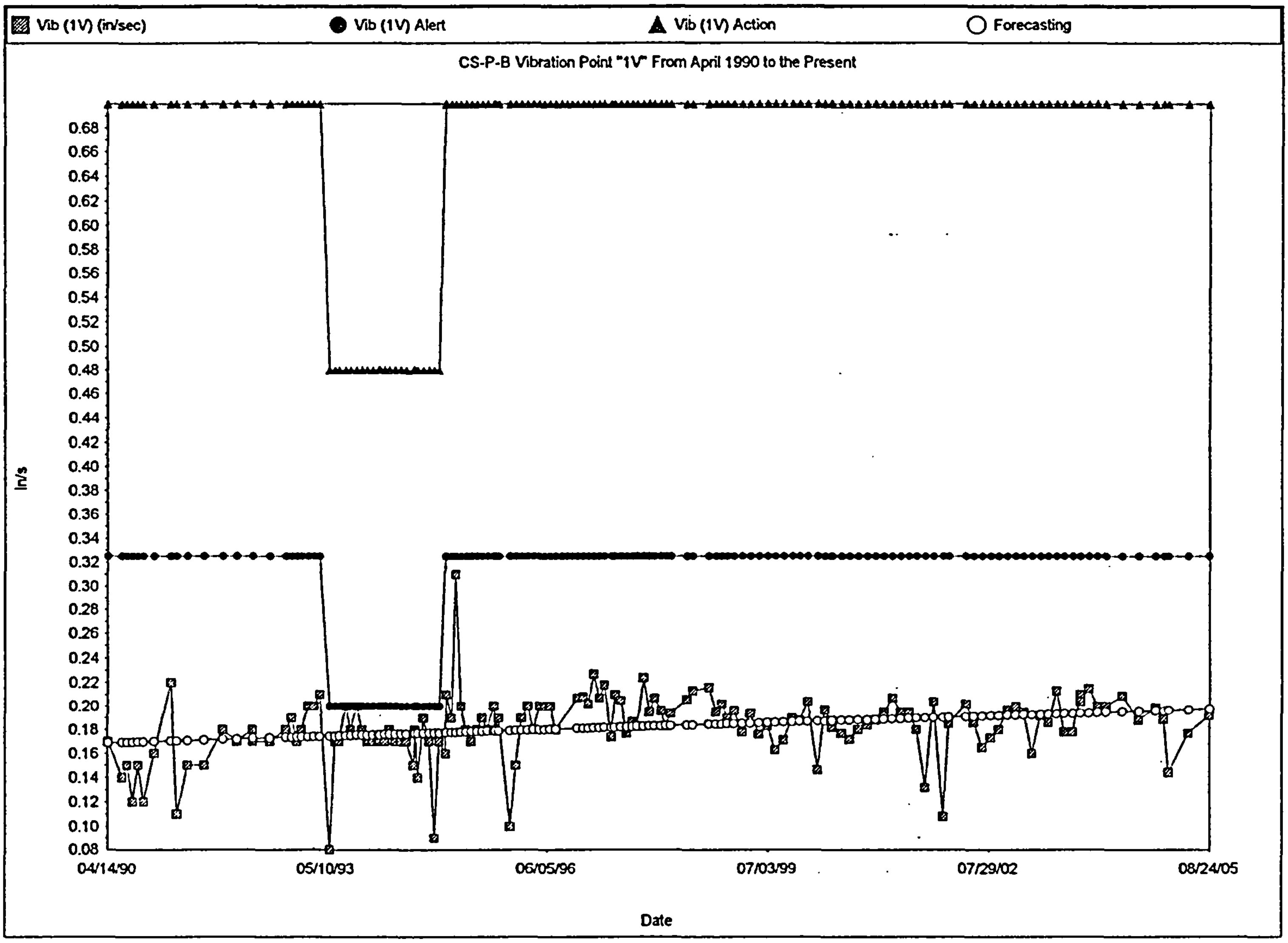


Figure 4b
CS-P-B Vibration Point 1V from April 1990 to the Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

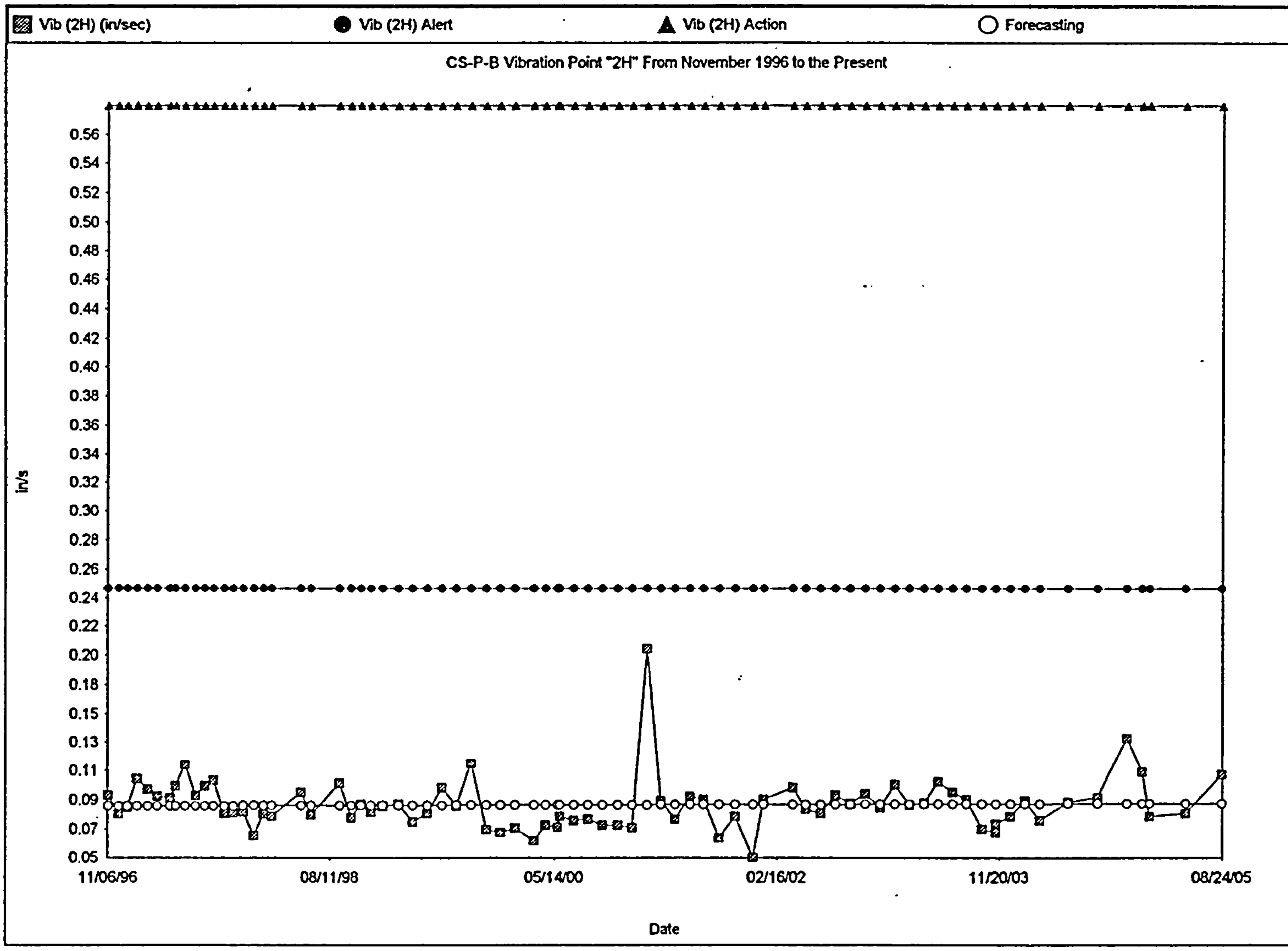


Figure 5a
CS-P-B Vibration Point 2H from November 1996 to the Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

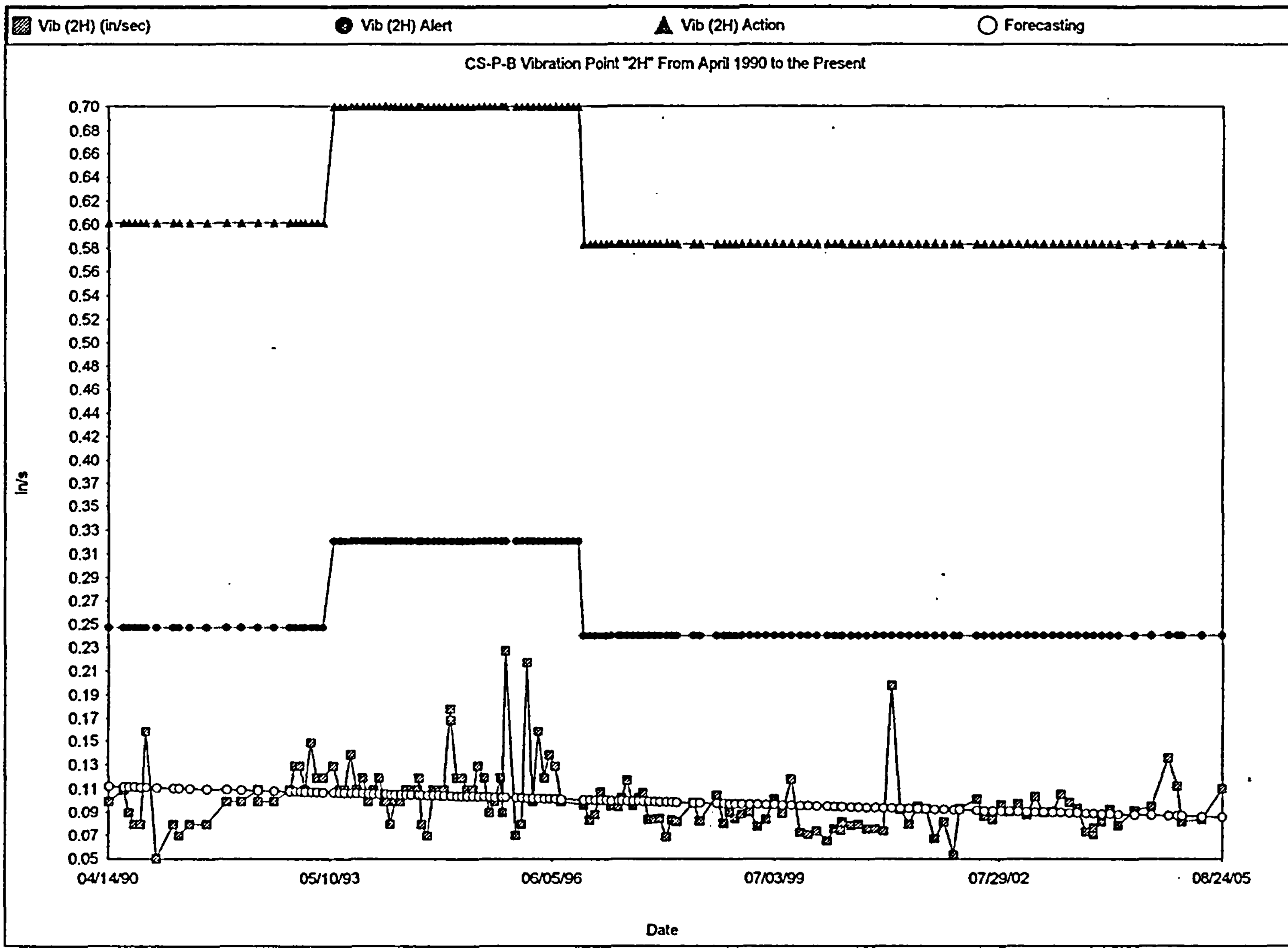


Figure 5b
CS-P-B Vibration Point 2H from April 1990 to the Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

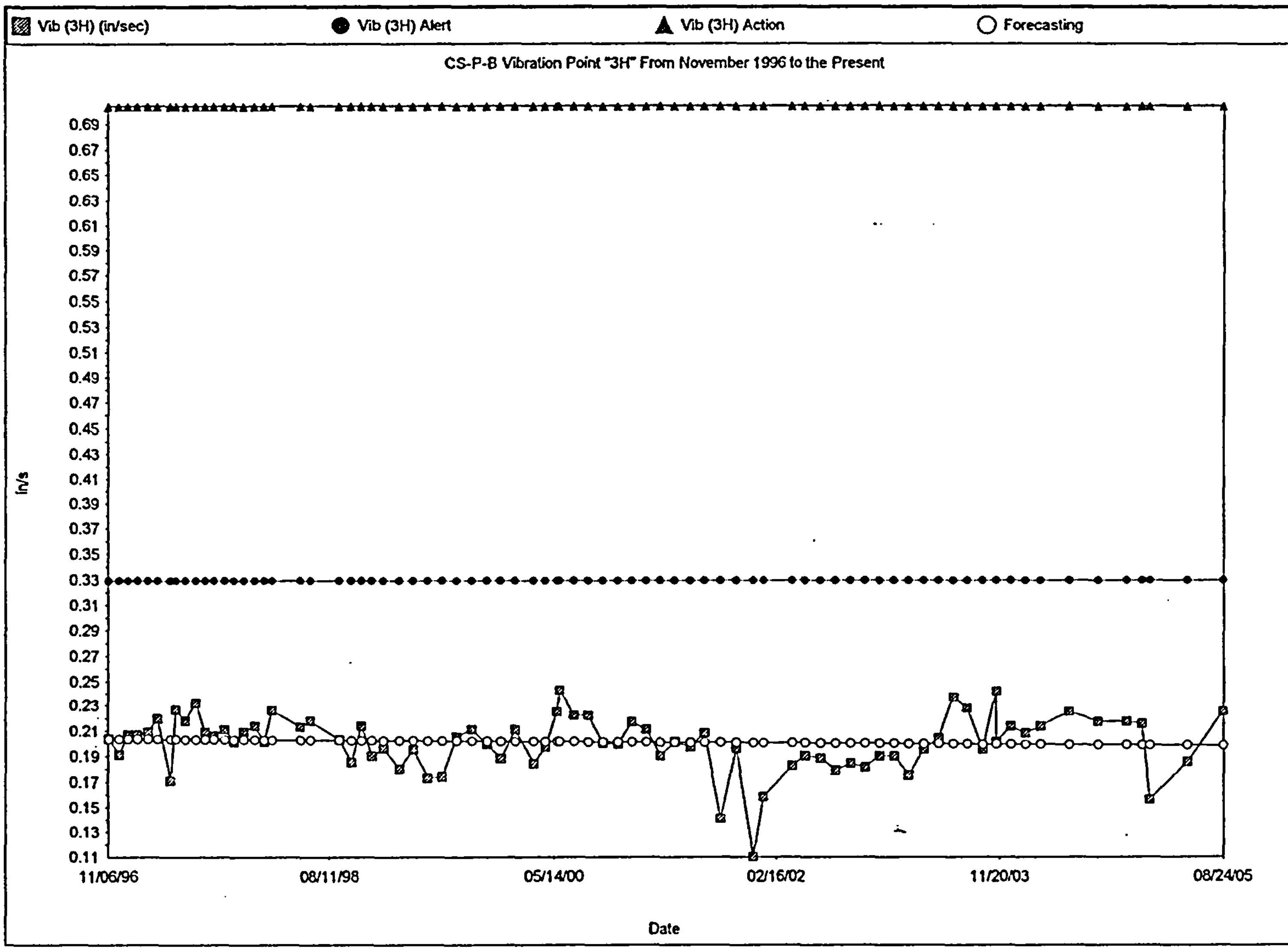


Figure 6a
CS-P-B Vibration Point 3H from November 1996 to the Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

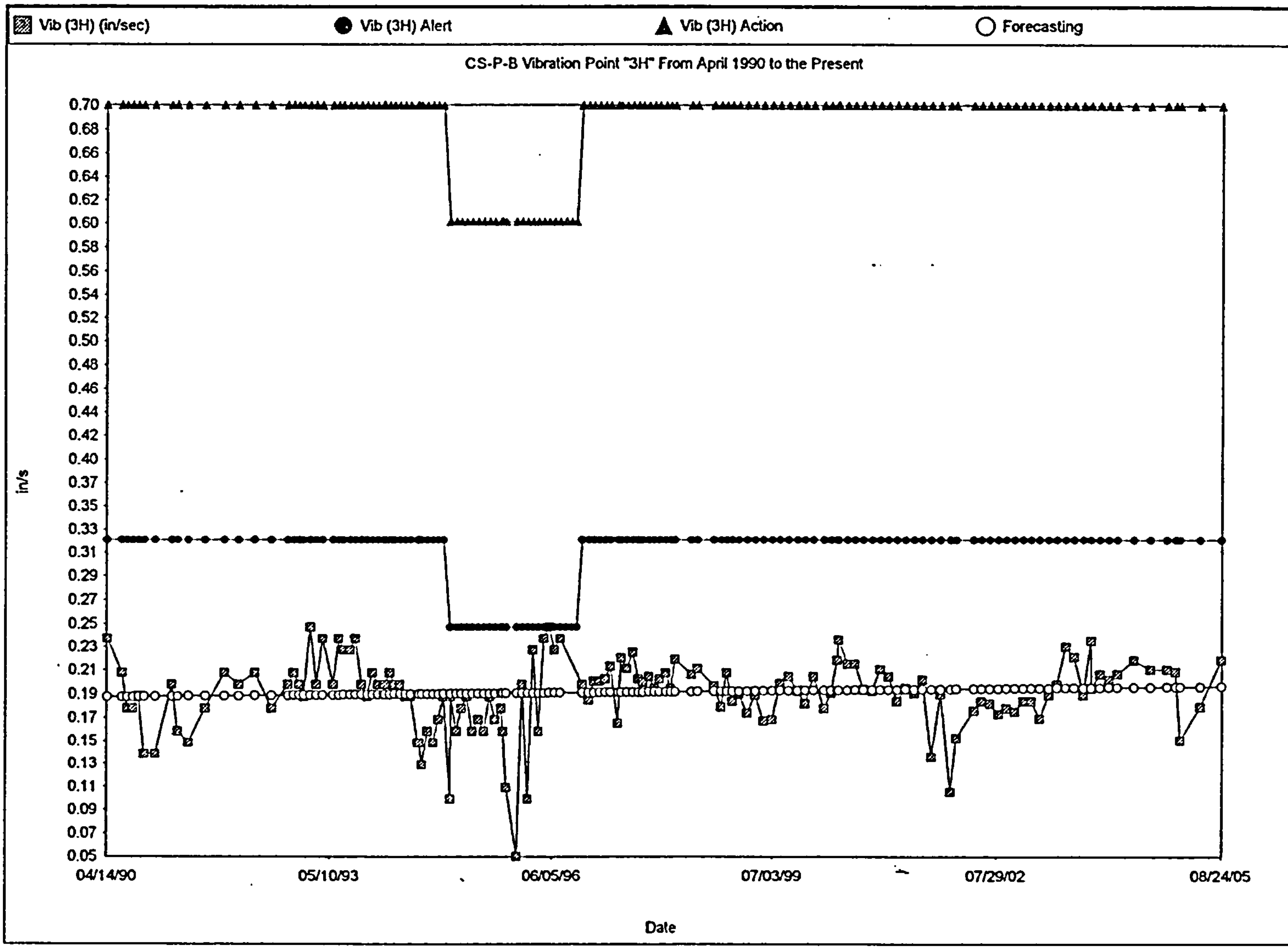
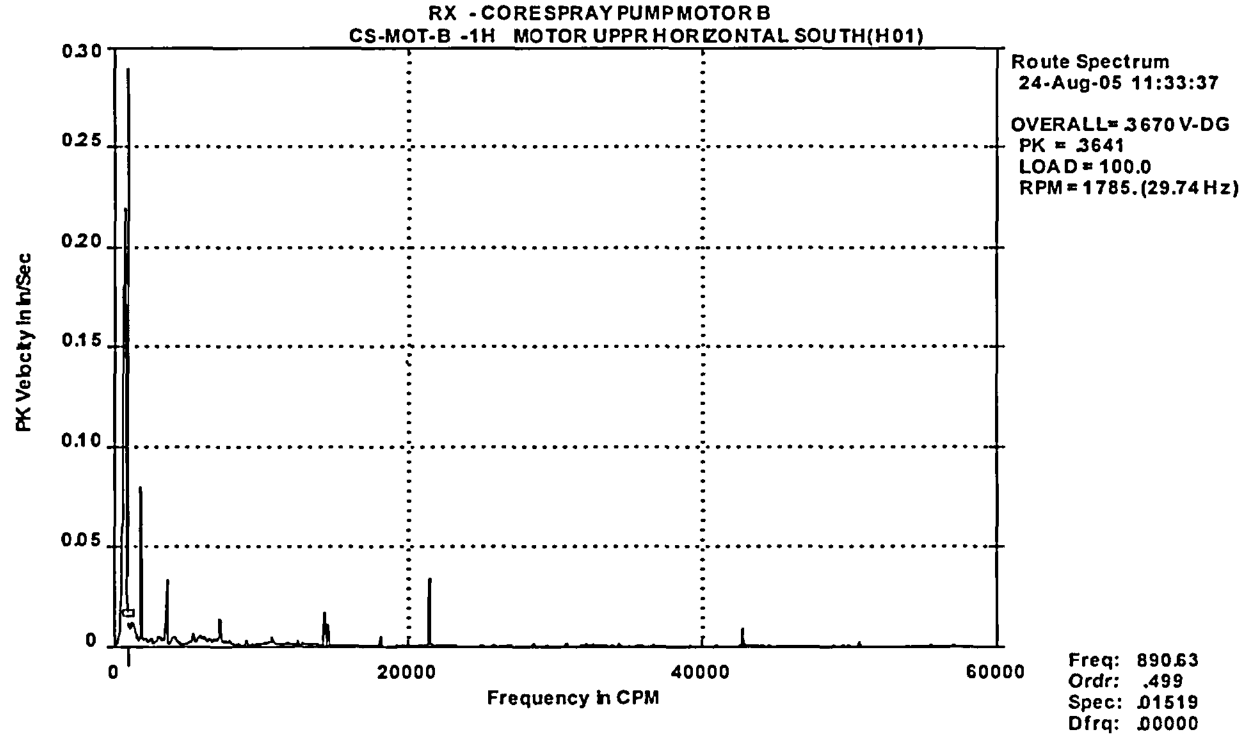


Figure 6b
CS-P-B Vibration Point 3H from April 1990 to the Present

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)



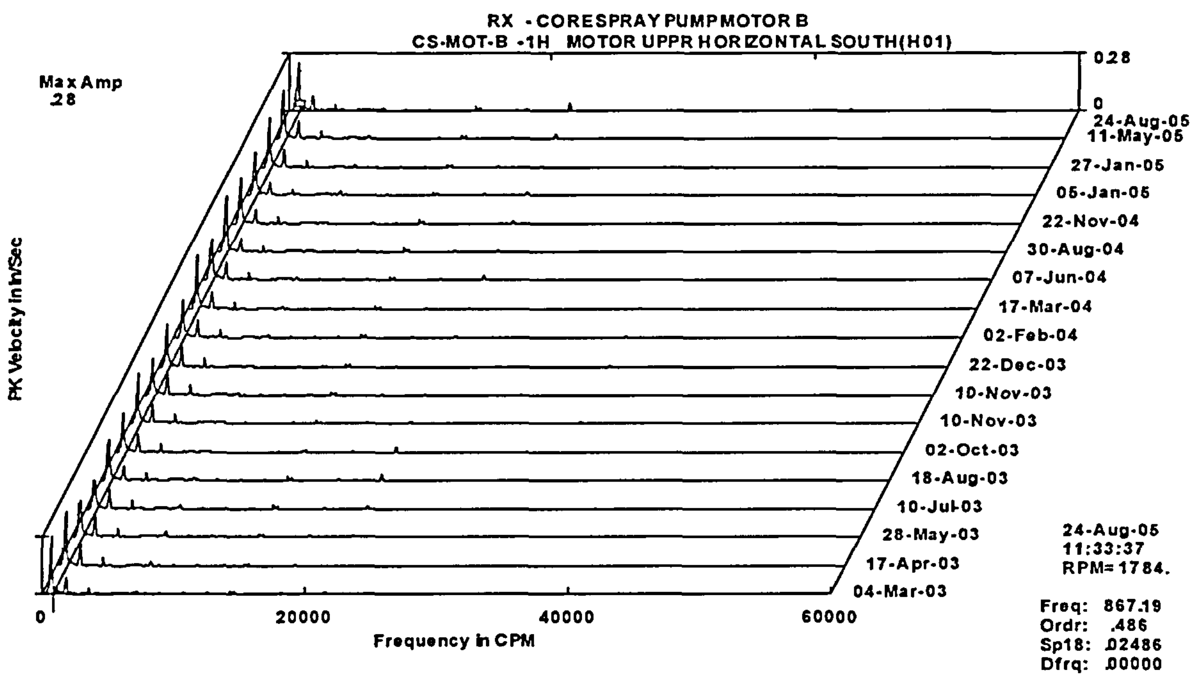


Figure 7
Spectral Trend for Vibration Point 1H

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

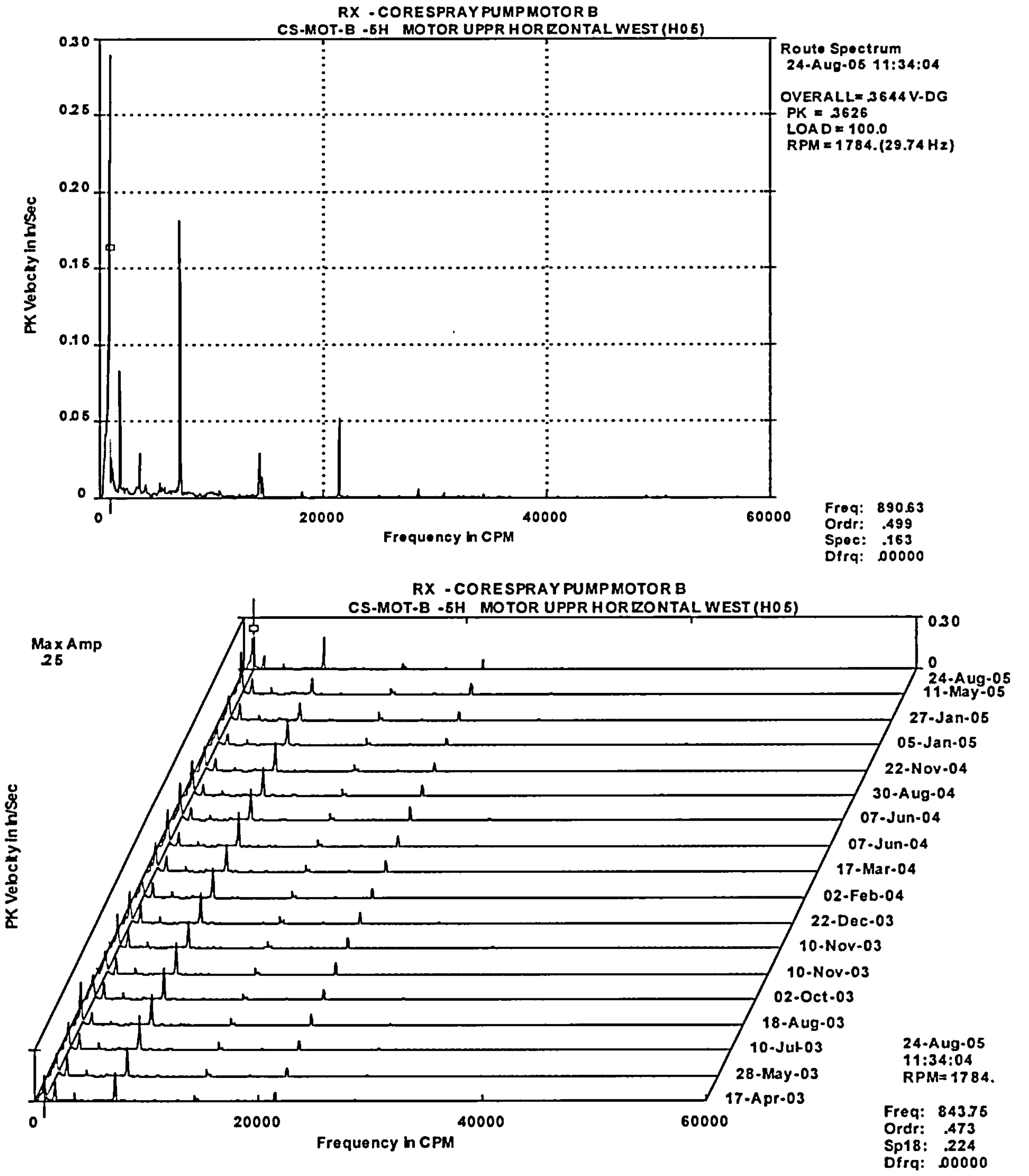
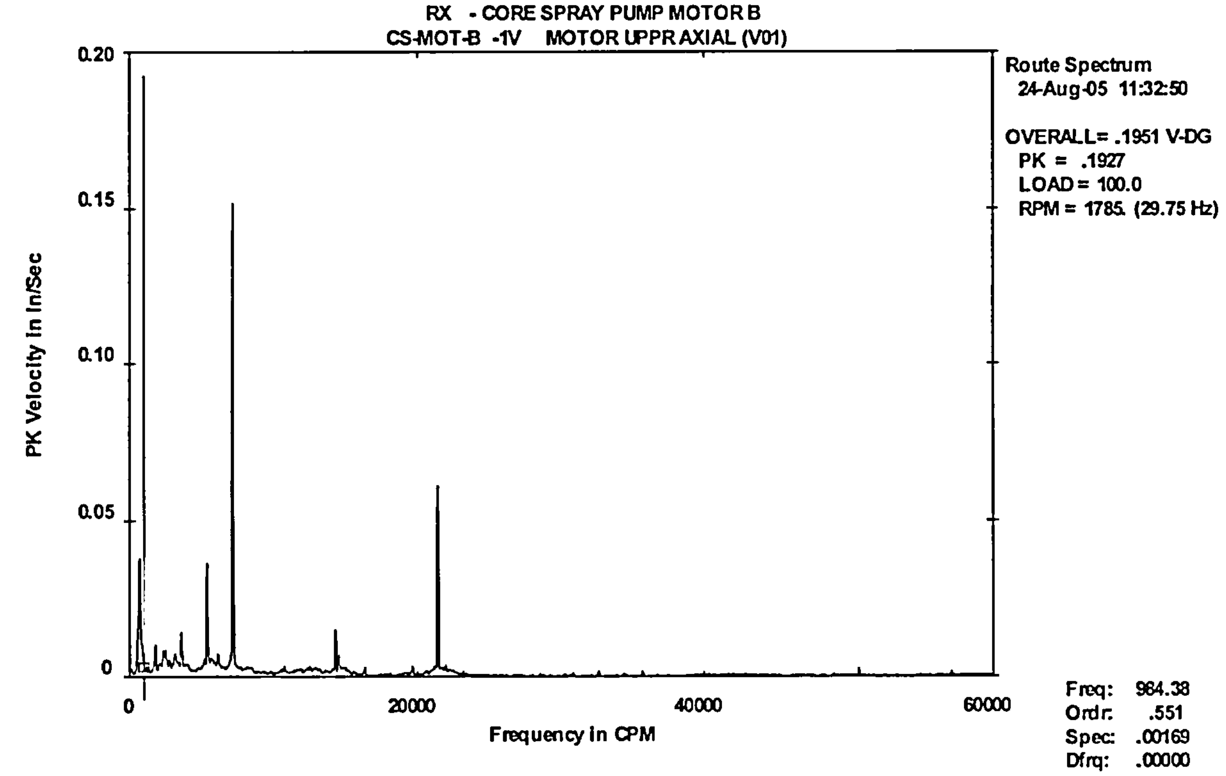


Figure 8
Spectral Trend for Vibration Point 5H

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)



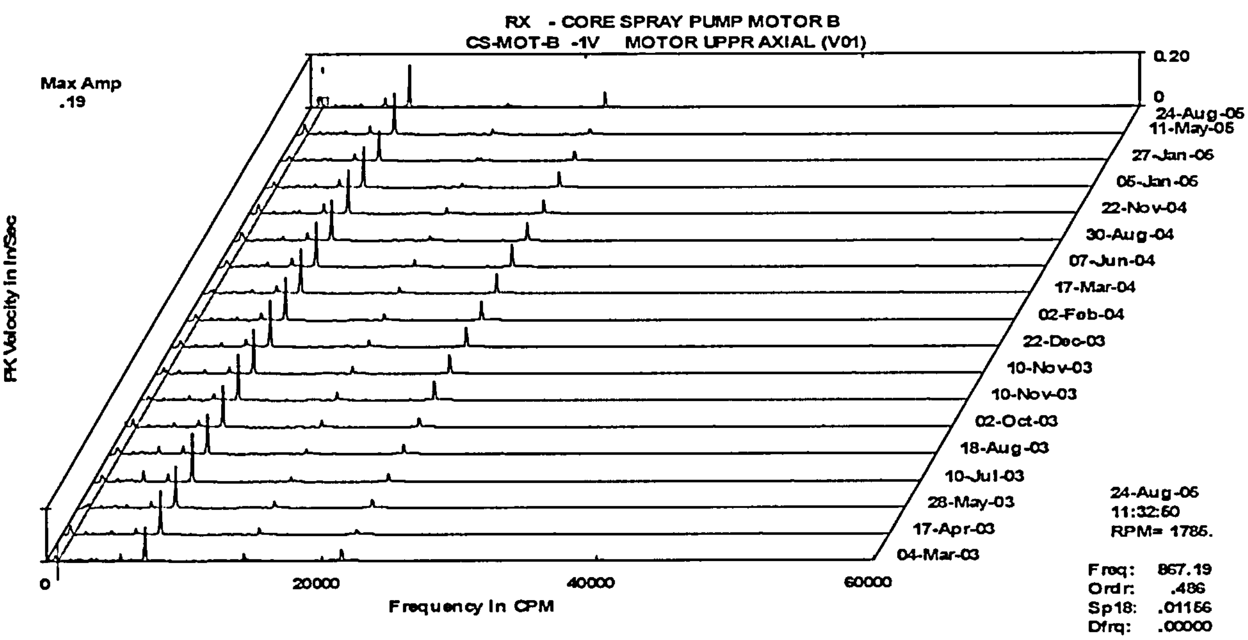
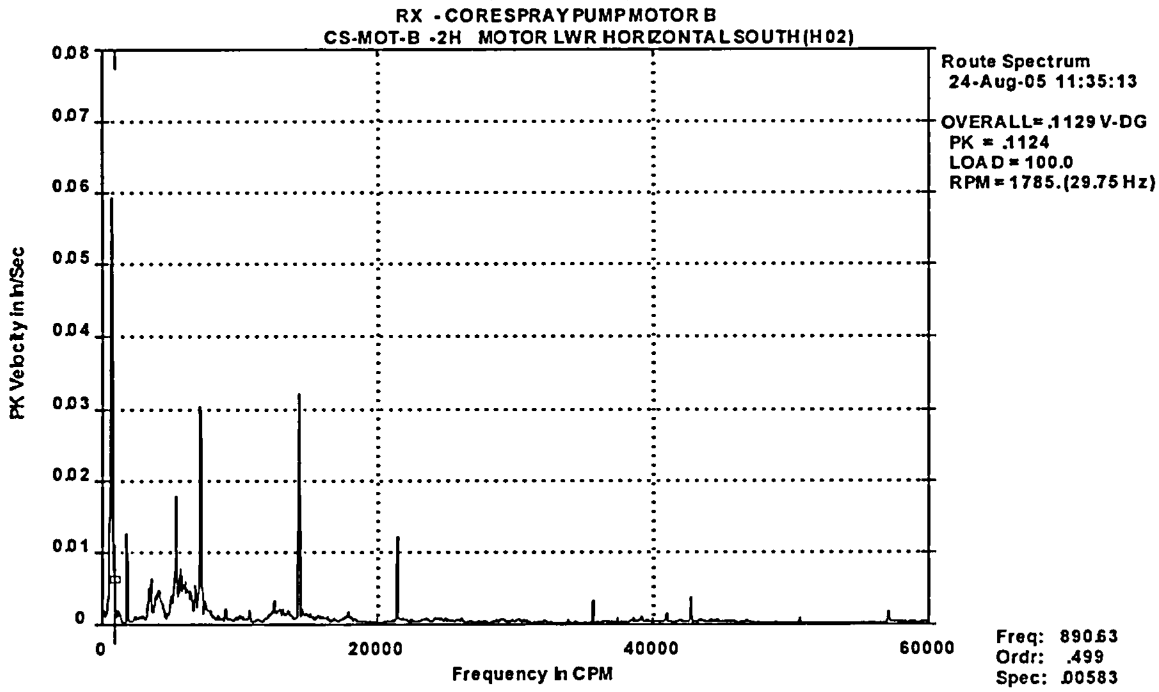


Figure 9
Spectral Trend for Vibration Point 1V

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)



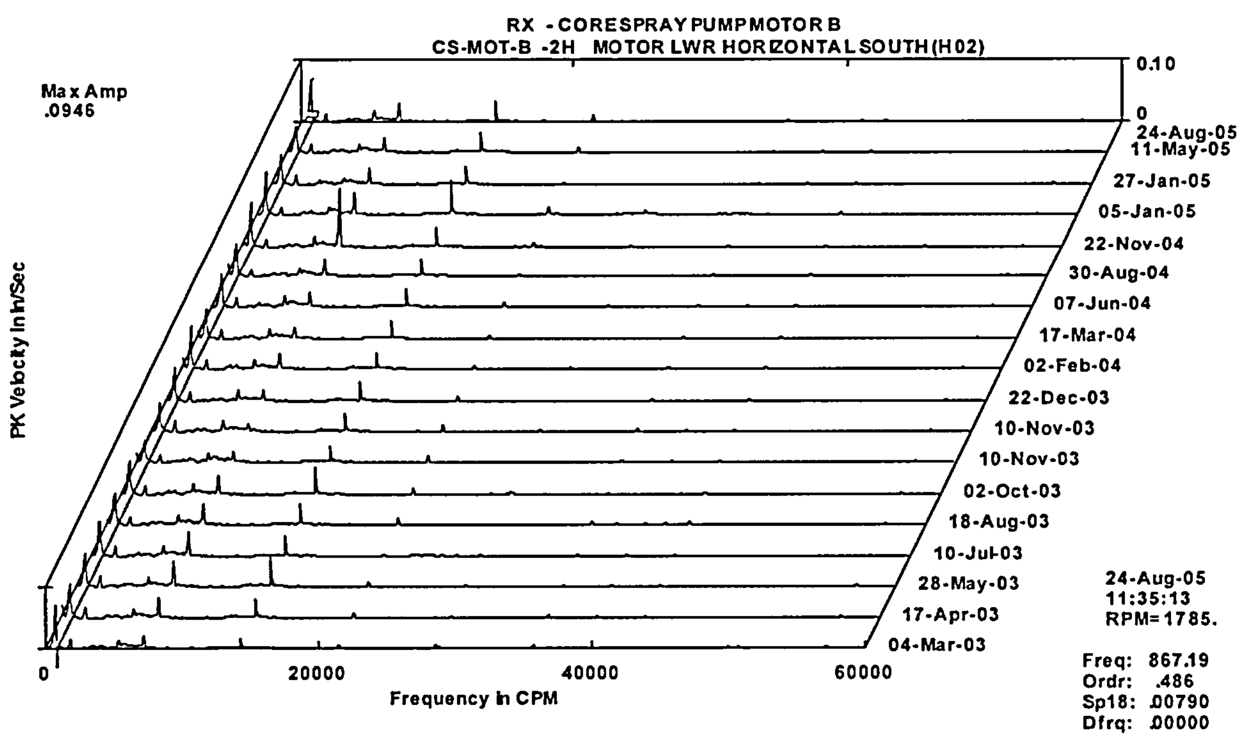
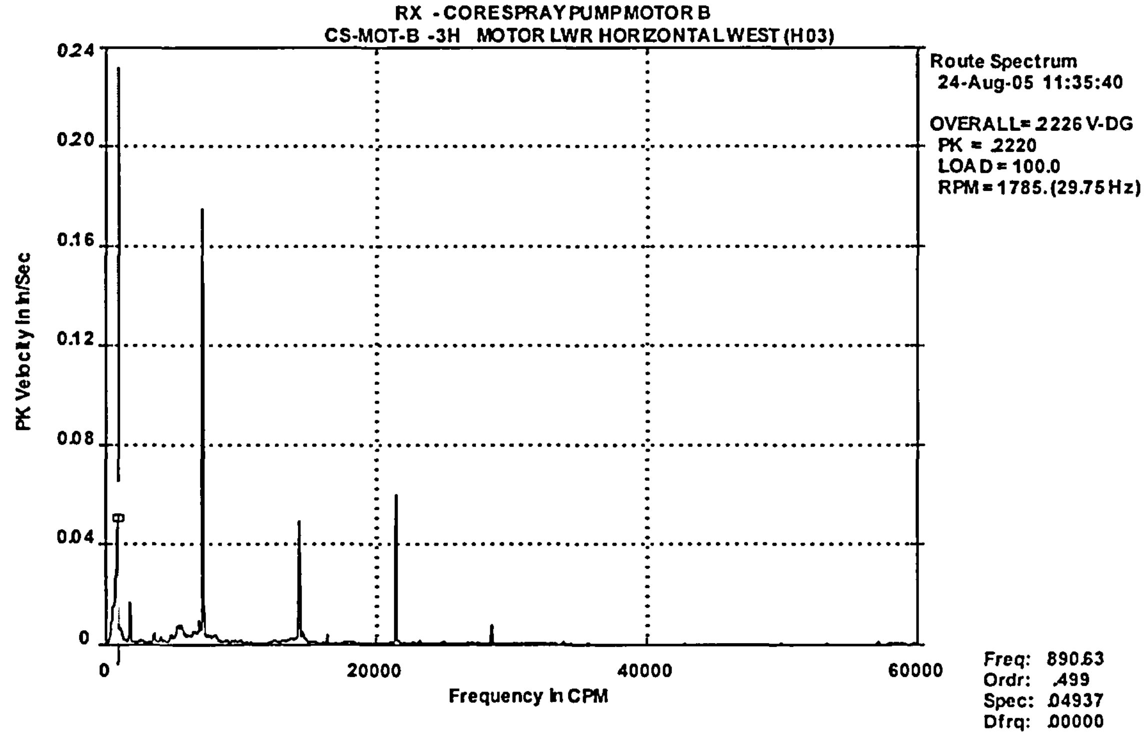


Figure 10
Spectral Trend for Vibration Point 2H

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)



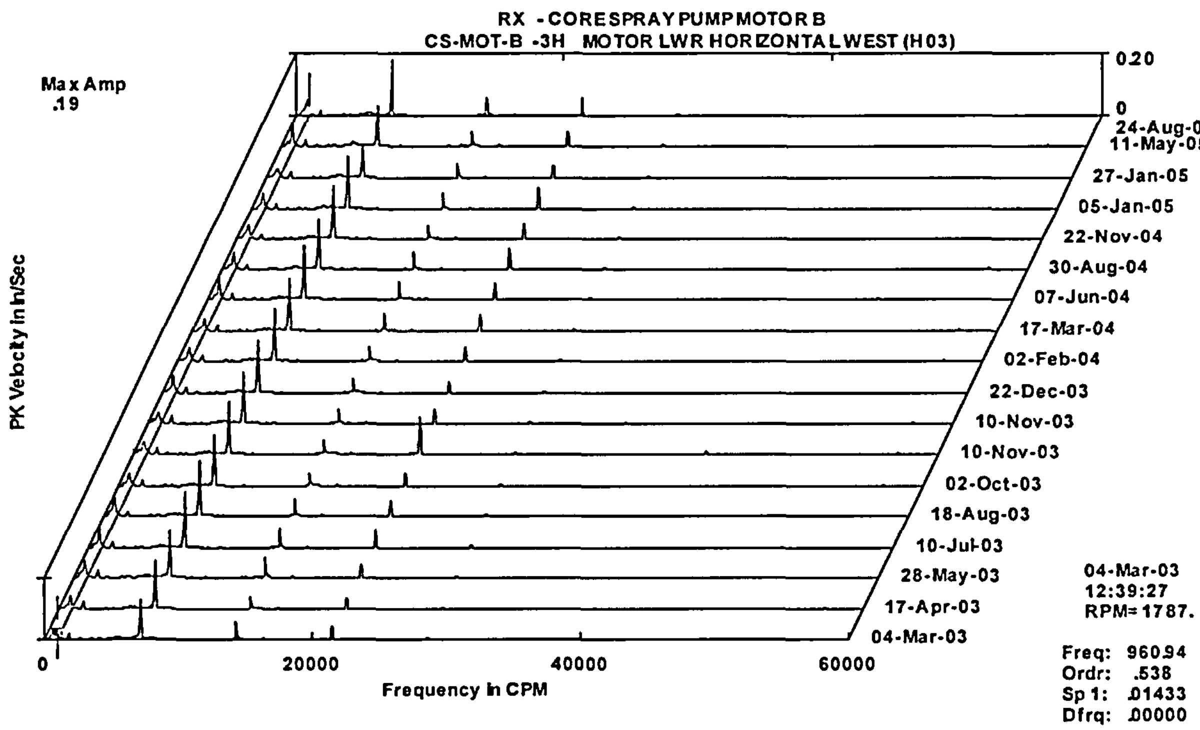


Figure 11
Spectral Trend for Vibration Point 3H

Relief Request RP-07
Core Spray Pump B Vibration Alert Limits
(Continued)

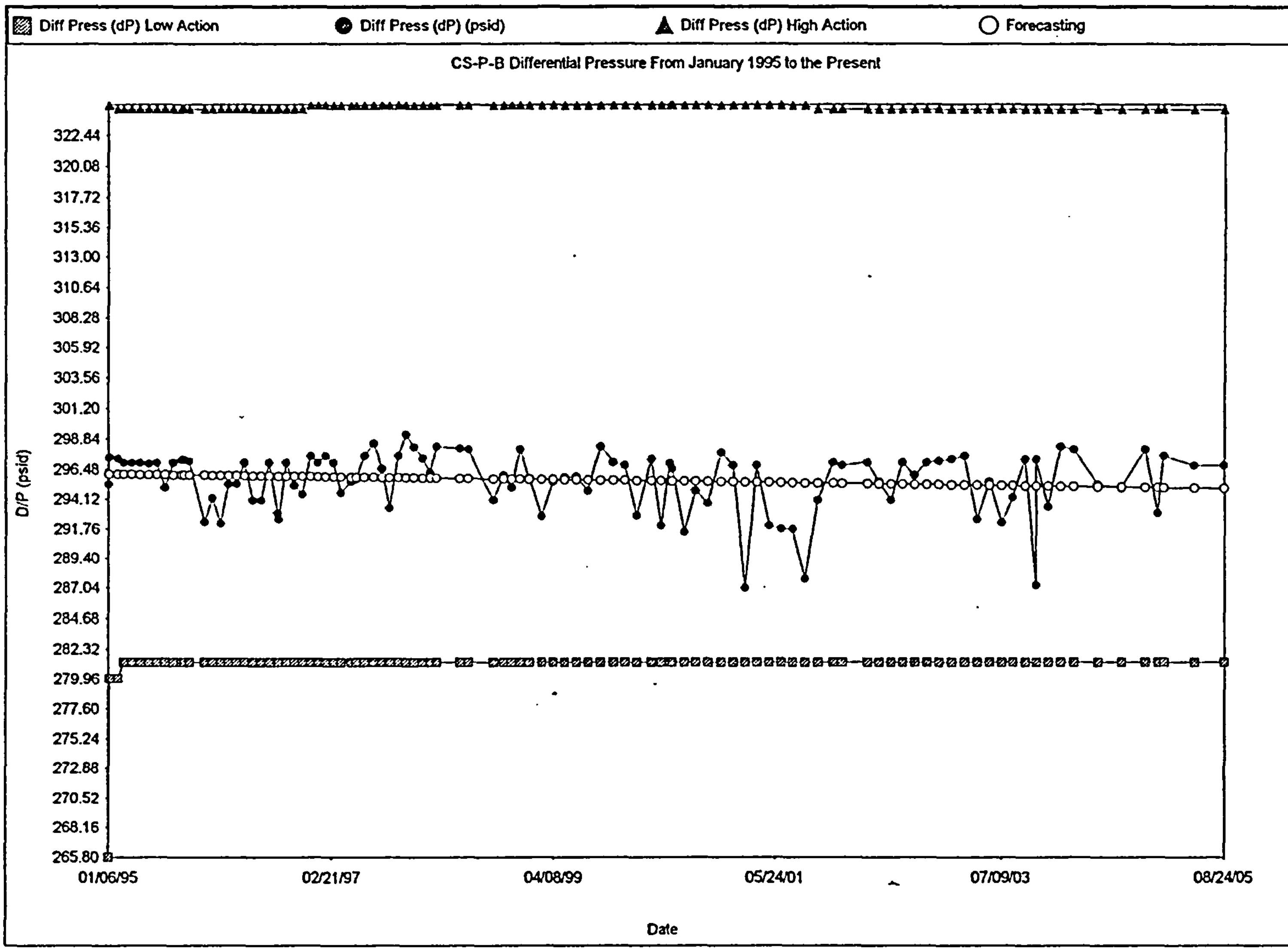


Figure 12
CS-P-B Differential Pressure Since January 1995 to the Present

Relief Request RP-08
Core Spray Pump Comprehensive Test

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**

ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

ISTB-3400, "Frequency of Inservice Tests"

ISTB-5123, "Comprehensive Test Procedure"

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the ASME OM Code ISTB requirements for performing a comprehensive pump test. The proposed alternative would provide an acceptable level of quality and safety.

Specifically, this request would allow CNS to perform a more rigorous quarterly test in lieu of a biennial comprehensive test. A substantial flow test, utilizing permanently installed pump instrumentation, will be performed each quarter using hydraulic acceptance criteria in accordance with the comprehensive test requirements. A biennial comprehensive test will not be performed.

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

The Core Spray pumps have a safety function to provide cooling spray water to the reactor vessel upon receipt of the reactor low water level or high drywell pressure actuation signal to mitigate the consequences of a LOCA. The Core Spray pumps deliver water from the suppression pool to the spray spargers above the fuel rods to cool the core and limit cladding temperature.

Relief Request RP-08
Core Spray Pump Comprehensive Test
(Continued)

Each 100% capacity pump must deliver a minimum of 4720 gpm against a system head corresponding to a reactor pressure of $\geq$ 113 psig to meet its safety function. The Core Spray water is delivered only after the pressure in the reactor vessel drops to a preselected value, which allows the valves in the pump discharge lines to open. The pumps are normally in the standby mode and both are started automatically (after a time delay) from either normal or standby power after receipt of low reactor water level or high drywell pressure actuation signal. The pumps can also be started remotely by switches in the control room.

The pumps are manufactured by Byron Jackson and are vertically-mounted centrifugal design.

The Core Spray pumps are categorized as Group B pumps since they are standby emergency pumps and only operated for testing.

As an alternative to the code requirement for performing a comprehensive pump test, each of these pumps will have a modified Group A test performed each quarter. The pumps will be operated at a reference flow point of 5000 gpm with pump differential pressure measured and compared to its reference value. Deviations from the reference value will be compared to the range requirements of Table ISTB-5100-1 (or tighter based on design requirements) for the comprehensive test (0.93 to 1.03). In addition, mechanical vibration measurements will be recorded every 6 months (every other quarter). The vibration measurements will be compared to their reference values. Any deviations will be compared to the range requirements of Table ISTB-5100-1 for the comprehensive test. Corrective actions will be taken in accordance with ISTB-6200.

Permanently installed plant instrumentation will be used to determine flow rates and differential pressure. Portable vibration instruments will be used to determine mechanical vibration measurements. All instrumentation will meet the accuracy requirements of a Group A test unless specific relief is requested.

One of the requirements of the comprehensive test is to perform the test at substantial flow (± 20% of design flow). CNS will meet this requirement each quarter by performing the test at a condition above the design flow point:

Design Flow Point	4720 gpm
Test Flow Point	5000 gpm

Relief Request RP-08
Core Spray Pump Comprehensive Test
(Continued)

Although these pumps are Category B, the OM Code allows the substitution of a Group A or comprehensive test. CNS will perform a modified Group A test as stated above such that the acceptance criteria for hydraulic performance will meet or exceed the code requirement for a comprehensive test. Additionally, CNS will perform vibration monitoring on these Group B pumps on a frequency of once every 6 months. During the vibration monitoring, full spectrum analysis will be performed above the code requirements.

The Core Spray pumps are tested at a set flow of 5000 gpm. Per Table ISTB-5100-1 the requirement for hydraulic performance is ±10 % for both the Group A and Group B tests. No alert range is required. CNS will continue to test these pumps at the above conditions each quarter; however, the comprehensive test range requirements will be applied, including the Alert Range as follows:

Acceptable Range	0.93 to 1.03 ΔPr
Alert Range	0.90 to <0.93 ΔPr
Required Action	<0.90 ΔPr or > 1.03 ΔPr

CNS will evaluate all ranges against the design conditions to ensure that all procedure lower limits bound the more conservative of the design or ASME OM Code ranges delineated above.

The Core Spray pumps are included in the station Preventive Maintenance Program which requires vibration full spectral analysis performed when vibration measurements are taken and periodic oil analysis to be performed.

Performance of a substantial flow test each quarter would result in eight sets of data over a two-year period instead of the required one comprehensive test. Monitoring of vibration on these pumps every six months will result in four sets of mechanical data versus the required one every two years. CNS believes this testing regime provides an overall better assessment of pump mechanical and hydraulic health and will determine operational readiness on a quarterly frequency.

Relief Request RP-08
Core Spray Pump Comprehensive Test
(Continued)

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5123, 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**

None

Relief Request RP-09
High Pressure Coolant Injection Pump Comprehensive Test

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 Pump

2. **Applicable Code Edition and Addenda**

   ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

   ISTB-3400, "Frequency of Inservice Tests"

   ISTB-5123, "Comprehensive Test Procedure"

4. **Reason for Request**

   Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the ASME OM Code ISTB requirements for performing a comprehensive pump test. The proposed alternative would provide an acceptable level of quality and safety.

   Specifically, this request would allow CNS to perform a more rigorous quarterly test in lieu of a biennial comprehensive test. A substantial flow test, utilizing permanently installed pump instrumentation, will be performed each quarter using hydraulic acceptance criteria in accordance with the comprehensive test requirements. A biennial comprehensive test will not be performed.

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

   The High Pressure Coolant Injection (HPCI) pump provides high pressure emergency core cooling during the unlikely event of a small line break occurring in the reactor coolant pressure boundary. If the break is small, the HPCI System will maintain coolant inventory as well as vessel level while the Reactor Coolant System (RCS) is still pressurized.

Relief Request RP-09
High Pressure Coolant Injection Pump Comprehensive Test
(Continued)

Two initiating functions are used for HPCI system actuation:

- Low Reactor Water Level ≥ -42" Indicated Level
- High Drywell Pressure ≤ 1.84 psig

The HPCI pump is required, along with the booster pump and turbine driver, to provide a constant flow of 4250 gpm against a varying back pressure in the reactor vessel over a range of 150 to 1120 psig. Pump suction supply is initially taken from the emergency condensate storage tanks and injected via the feedwater lines. However, when the low level set point is reached in these tanks, the control scheme provides for automatic realignment to the torus which is considered the backup supply source.

The HPCI pump is a turbine driven variable speed centrifugal pump manufactured by Byron Jackson.

The HPCI pump is categorized as Group B pumps since it is a standby emergency pump and only operated for testing.

As an alternative to the code requirement for performing a comprehensive pump test, the HPCI pump will have a modified Group A test performed each quarter. The pump will be operated at a reference flow point of 4250 gpm with pump differential pressure measured and compared to its reference value. Deviations from the reference value will be compared to the range requirements of Table ISTB-5100-1 (or tighter based on design requirements) for the comprehensive test (0.93 to 1.03). In addition mechanical vibration measurements will be recorded every 6 months (every other quarter). The vibration measurements will be compared to their reference values. Any deviations will be compared to the range requirements of Table ISTB-5100-1 for the comprehensive test. Corrective actions will be taken in accordance with ISTB-6200.

Relief Request RP-09
High Pressure Coolant Injection Pump Comprehensive Test
(Continued)

Permanently installed plant instrumentation will be used to determine flow rates and differential pressure. Portable vibration instruments will be used to determine mechanical vibration measurements. All instrumentation will meet the accuracy requirements of a Group A test unless specific relief is requested. It should be noted, however, that the permanently installed suction and discharge pressure gauges are calibrated to ≤ 1% of full scale.

One of the requirements of the comprehensive test is to perform the test at substantial flow (± 20% of design flow). CNS will meet this requirement each quarter by performing the test at conditions which meet the design flow point:

Design Flow Point	4250 gpm
Test Flow Point	4250 gpm

Although this pump is Category B, the OM Code allows the substitution of a Group A or comprehensive test. CNS will perform a modified Group A test, as stated above, such that the acceptance criteria for hydraulic performance will meet or exceed the code requirement for a comprehensive test. Additionally, CNS will perform vibration monitoring on this Group B pump on a frequency of once every 6 months. During the vibration monitoring, full spectrum analysis will be performed above the code requirements.

The HPCI pump is tested at a set flow of 4250 gpm with a speed of approximately 4000 rpm. Per Table ISTB-5100-1 the requirement for hydraulic performance is ± 10 % for both the Group A and Group B tests. No alert range is required. CNS will continue to test this pump at the above conditions each quarter, however; the comprehensive test range requirements will be applied, including the Alert Range as follows:

Acceptable Range	0.93 to 1.03 ΔPr
Alert Range	0.90 to <0.93 ΔPr
Required Action	<0.90 ΔPr or > 1.03 ΔPr

CNS will evaluate all ranges against the design conditions to ensure that all procedure lower limits bound the more conservative of the design or ASME OM Code ranges delineated above.

The HPCI pump is included in the station Preventive Maintenance Program which requires vibration full spectral analysis performed when vibration measurements are taken and periodic oil analysis to be performed.

Relief Request RP-09
High Pressure Coolant Injection Pump Comprehensive Test
(Continued)

Performance of a substantial flow test each quarter would result in eight sets of data over a two-year period instead of the required one comprehensive test. Monitoring of vibration on this pump every six months will result in four sets of mechanical data versus the required one every two years. CNS believes this testing regime provides an overall better assessment of pump mechanical and hydraulic health and will determine operational readiness on a quarterly frequency.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5123, 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**

None

Relief Request RP-10
Reactor Core Isolation Cooling Pump Comprehensive Test

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 Pump

2. **Applicable Code Edition and Addenda**

ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

ISTB-3400, "Frequency of Inservice Tests"

ISTB-5123, "Comprehensive Test Procedure"

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the ASME OM Code ISTB requirements for performing a comprehensive pump test. The proposed alternative would provide an acceptable level of quality and safety.

Specifically, this request would allow CNS to perform a more rigorous quarterly test in lieu of a biennial comprehensive test. A substantial flow test, utilizing permanently installed pump instrumentation, will be performed each quarter using hydraulic acceptance criteria in accordance with the comprehensive test requirements. A biennial comprehensive test will not be performed.

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

The RCIC pump operates automatically to maintain sufficient coolant in the reactor vessel to cool the core when feedwater is lost so that the integrity of the radioactive material barrier is not compromised. The pump normally takes suction from the emergency condensate storage tanks. The supply is backed up from the suppression pool. The pump discharges to the feedwater line and is distributed within the reactor vessel through the feedwater sparger.

Relief Request RP-10
Reactor Core Isolation Cooling Pump Comprehensive Test
(Continued)

The design flow rate of the RCIC pump is 416 gpm, and the pump design pressure is 1500 psig. The design pump head is 525 ft. at 165 psia reactor pressure and 2800 ft. at 1135 psia reactor pressure with a minimum NPSH of 20 ft. With suction provided by the suppression pool, adequate NPSH is available with a suppression pool temperature up to 140°F with no containment back pressure. The RCIC system makeup capacity is sufficient to prevent the reactor vessel water level from decreasing to the level where the core would be uncovered, during an isolation condition, without the use of core standby cooling systems. Each of the two emergency condensate storage tanks has a 50,000 gallon reserve for the RCIC and HPCI systems. The backup supply of cooling water for RCIC is the suppression pool. The RCIC system is designed for startup and short-term operation without AC power. Adequate water supply is assured by the two 50,000 gallon emergency condensate storage tanks and by the suppression pool.

The system is designed to provide a high degree of assurance that the RCIC system will operate when necessary and in time to prevent inadequate core cooling. Upon loss of feedwater flow, reactor water level decreases rapidly causing a reactor low water level scram. Following the scram, reactor water level continues to drop until it reaches the level where the RCIC and HPCI systems initiate to maintain reactor water level.

The RCIC pump is a turbine-driven, variable speed centrifugal pump manufactured by Bingham.

The RCIC pump is categorized as Group B pumps since it is a standby emergency pump and only operated for testing.

As an alternative to the code requirement for performing a comprehensive pump test, the RCIC pump will have a modified Group A test performed each quarter. The pump will be operated at a reference flow point of 400 gpm with pump differential pressure measured and compared to its reference value. Deviations from the reference value will be compared to the range requirements of Table ISTB-5100-1 (or tighter based on design requirements) for the comprehensive test (0.93 to 1.03). In addition, mechanical vibration measurements will be recorded every 6 months (every other quarter). The vibration measurements will be compared to their reference values. Any deviations will be compared to the range requirements of Table ISTB-5100-1 for the comprehensive test. Corrective actions will be taken in accordance with ISTB-6200.

Relief Request RP-10
Reactor Core Isolation Cooling Pump Comprehensive Test
(Continued)

Permanently installed plant instrumentation will be used to determine flow rates and differential pressure. Portable vibration instruments will be used to determine mechanical vibration measurements. All instrumentation will meet the accuracy requirements of a Group A test unless specific relief is requested. It should be noted, however, that the permanently installed suction and discharge pressure gauges are calibrated to ≤ 1% of full scale.

One of the requirements of the comprehensive test is to perform the test at substantial flow (± 20% of design flow). CNS will meet this requirement each quarter by performing the test at conditions which meet 20% of the design flow point:

Design Flow Point	416 gpm (400 gpm injection flow +16 gpm cooling water flow)
Test Flow Point	400 gpm (injection flow)

Although this pump is Category B, the OM Code allows the substitution of a Group A or comprehensive test. CNS will perform a modified Group A test as stated above such that the acceptance criteria for hydraulic performance will meet or exceed the code requirement for a comprehensive test. Additionally, CNS will perform vibration monitoring on this Group B pump on a frequency of once every 6 months. During the vibration monitoring, full spectrum analysis will be performed above the code requirements.

The Reactor Core Isolation Cooling pump is tested at a set flow of 400 gpm with a speed of approximately 4500 rpm. Per Table ISTB-5100-1 the requirement for hydraulic performance is ± 10 % for both the Group A and Group B tests. No alert range is required. CNS will continue to test this pump at the above conditions each quarter, however; the comprehensive test range requirements will be applied, including the Alert Range as follows:

Acceptable Range	0.93 to 1.03 ΔPr
Alert Range	0.90 to <0.93 ΔPr
Required Action	<0.90 ΔPr or > 1.03 ΔPr

CNS will evaluate all ranges against the design conditions to ensure that all procedure lower limits bound the more conservative of the design or ASME OM Code ranges delineated above.

Relief Request RP-10
Reactor Core Isolation Cooling Pump Comprehensive Test
(Continued)

The Reactor Core Isolation Cooling pump is included in the station Preventive Maintenance Program which requires vibration full spectral analysis performed when vibration measurements are taken and periodic oil analysis to be performed.

Performance of a substantial flow test each quarter would result in eight sets of data over a two-year period instead of the required one comprehensive test. Monitoring of vibration on this pump every six months will result in four sets of mechanical data versus the required one every two years. CNS believes this testing regime provides an overall better assessment of pump mechanical and hydraulic health and will determine operational readiness on a quarterly frequency.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5123, 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

None

Relief Request RP-11
Reactor Equipment Cooling Pump Comprehensive Test

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**

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

2. **Applicable Code Edition and Addenda**

ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

ISTB-3400, "Frequency of Inservice Tests"

ISTB-5123, "Comprehensive Test Procedure"

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the ASME OM Code ISTB requirements for performing a comprehensive pump test. The proposed alternative would provide an acceptable level of quality and safety.

Specifically, this request would allow CNS to perform a more rigorous quarterly test in lieu of a biennial comprehensive test. A substantial flow test, utilizing permanently installed pump instrumentation, will be performed each quarter using hydraulic acceptance criteria in accordance with the comprehensive test requirements. A biennial comprehensive test will not be performed.

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

The Reactor Equipment Cooling (REC) pumps have a safety function to provide cooling water flow to the RHR pump seal water coolers, the HPCI area cooling coil, the RHR pump area cooling coils, and the Core Spray area cooling coils during transient and accident conditions.

Relief Request RP-11
Reactor Equipment Cooling Pump Comprehensive Test
(Continued)

The design flow rate of each REC pump is 1350 gpm at 150 ft TDH. The design accident requirement for an individual REC pump is 1175 gpm at a differential pressure of 65.0 psid. During normal power operation, all four pumps and both heat exchangers may be placed into operation depending upon river water temperature. However, the critical cooling water loads are normally isolated. Either of the redundant REC cooling loops with one operating REC pump is sufficient to meet cooling demands during transient and accident conditions.

The REC pumps are horizontally-mounted, motor driven constant speed centrifugal pumps manufactured by Colt Industries and Fairbanks Morse Pump Division.

The REC pumps are categorized as Group A pumps since they operate continuously or routinely during normal plant operations.

As an alternative to the code requirement for performing a comprehensive pump test, the REC pumps will have a modified Group A test performed each quarter. The pump will be operated at a reference flow point of 1100 gpm with pump differential pressure measured and compared to its reference value. Deviations from the reference value will be compared to the range requirements of Table ISTB-5100-1 (or tighter based on design requirements) for the comprehensive test (0.93 to 1.03). Mechanical vibration measurements will be recorded every quarter. The vibration measurements will be compared to their reference values. Any deviations will be compared to the range requirements of Table ISTB-5100-1 for the comprehensive test. Corrective actions will be taken in accordance with ISTB-6200.

Permanently installed plant instrumentation will be used to determine flow rates and differential pressure. Portable vibration instruments will be used to determine mechanical vibration measurements. All instrumentation will meet the accuracy requirements of a Group A test unless specific relief is requested. It should be noted, however, that the permanently installed suction and discharge pressure gauges are calibrated to ≤ 1% of full scale.

Relief Request RP-11
Reactor Equipment Cooling Pump Comprehensive Test
(Continued)

One of the requirements of the comprehensive test is to perform the test at substantial flow (± 20% of design flow). CNS will meet this requirement each quarter by performing the test at conditions which meet 20% of the design flow point:

Design Flow Point	1175 gpm
Test Flow Point	1100 gpm

CNS will perform a modified Group A test, as stated above, such that the acceptance criteria for hydraulic performance will meet or exceed the code requirement for a comprehensive test. CNS will perform the required vibration monitoring on this Group A pump each quarter. In addition to the code-required vibration monitoring, full spectrum analysis will be performed above the code requirements.

The reactor equipment cooling pumps are tested at a set flow of 1100 gpm at constant speed. Per Table ISTB-5100-1, the requirement for hydraulic performance is ± 10 % for the Group A test. No alert range is required. CNS will continue to test these pumps at the above conditions each quarter; however, the comprehensive test range requirements will be applied, including the Alert Range as follows:

Acceptable Range	0.93 to 1.03 ΔPr
Alert Range	0.90 to <0.93 ΔPr
Required Action	<0.90 ΔPr or > 1.03 ΔPr

CNS will evaluate all ranges against the design conditions to ensure that all procedure lower limits bound the more conservative of the design or ASME OM Code ranges delineated above.

The Reactor Equipment Cooling pumps are included in the station Preventive Maintenance Program which requires vibration full spectral analysis performed when vibration measurements are taken and periodic oil analysis to be performed.

Performance of a substantial flow test each quarter would result in eight sets of data over a two-year period instead of the required one comprehensive test. NPPD believes this testing regime provides an overall better assessment of pump mechanical and hydraulic health and will determine operational readiness on a quarterly frequency.

Relief Request RP-11
Reactor Equipment Cooling Pump Comprehensive Test
(Continued)

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5123, 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**

None

Relief Request RP-12
Residual Heat Removal Pump Comprehensive Test

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-3400, "Frequency of Inservice Tests"

ISTB-5123, "Comprehensive Test Procedure"

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the ASME OM Code ISTB requirements for performing a comprehensive pump test. The proposed alternative would provide an acceptable level of quality and safety.

Specifically, this request would allow Cooper Nuclear Station (CNS) to perform a more rigorous quarterly test in lieu of a biennial comprehensive test. A substantial flow test, utilizing permanently installed pump instrumentation, will be performed each quarter using hydraulic acceptance criteria in accordance with the comprehensive test requirements. A biennial comprehensive test will not be performed.

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

The Residual Heat Removal (RHR) pumps have a safety function to provide cooling water to the reactor vessel or containment upon receipt of the reactor low water level or high drywell pressure actuation signal to mitigate the consequences of a design basis LOCA.

Relief Request RP-12
Residual Heat Removal Pump Comprehensive Test
(Continued)

The design safety functions of the RHR/LPCI system are to provide LPCI, suppression pool cooling, and containment cooling. The RHR/LPCI pumps deliver water from the suppression pool to the reactor vessel, injecting through the recirculation lines, to flood and cool the core during LPCI operation. After LPCI requirements have been met, the pumps can deliver system flow to spray nozzles in the drywell or suppression chamber for containment cooling purposes and pressure reduction, or the pumps can deliver flow directly to the suppression pool for cooling purposes. The RHR heat exchangers are required for suppression pool or containment cooling.

The RHR/LPCI system must be capable of delivering 7700 gpm at 20 psig (reactor vessel) and 413 ft TDH for one RHR pump operating per loop, and 15,000 gpm at 20 psig (reactor vessel) and 435 ft TDH for two RHR pumps per loop.

The RHR pumps are vertically-mounted, motor-driven constant speed centrifugal pumps manufactured by Bingham Pump Company.

The RHR pumps are categorized as Group A pumps since they operate continuously or routinely during normal plant operations.

As an alternative to the code requirement for performing a comprehensive pump test, the RHR pumps will have a modified Group A test performed each quarter. The pumps will be operated at a reference flow point of 7800 gpm with pump differential pressure measured and compared to its reference value. Deviations from the reference value will be compared to the range requirements of Table ISTB-5100-1 (or tighter based on design requirements) for the comprehensive test (0.93 to 1.03). Mechanical vibration measurements will be recorded every quarter. The vibration measurements will be compared to their reference values. Any deviations will be compared to the range requirements of Table ISTB-5100-1 for the comprehensive test. Corrective actions will be taken in accordance with ISTB-6200.

Permanently installed plant instrumentation will be used to determine flow rates and differential pressure. Portable vibration instruments will be used to determine mechanical vibration measurements. All instrumentation will meet the accuracy requirements of a Group A test unless specific relief is requested. It should be noted, however, that the permanently installed suction and discharge pressure gauges are calibrated to $\leq$ 1.25% of full scale.

Relief Request RP-12
Residual Heat Removal Pump Comprehensive Test
(Continued)

One of the requirements of the comprehensive test is to perform the test at substantial flow (± 20% of design flow). CNS will meet this requirement each quarter by performing the test at conditions which meet 20% of the design flow point:

Design Flow Point	7700 gpm
Test Flow Point	7800 gpm

CNS will perform a modified Group A test as stated above such that the acceptance criteria for hydraulic performance will meet or exceed the code requirement for a comprehensive test. CNS will perform the required vibration monitoring on these Group A pumps each quarter. In addition to the code-required vibration monitoring, full spectrum analysis will be performed above the code requirements.

The residual heat removal pumps are tested at a set flow of 7800 gpm at constant speed. Per Table ISTB-5100-1, the requirement for hydraulic performance is ± 10 % for the Group A test. No alert range is required. CNS will continue to test these pumps at the above conditions each quarter; however, the comprehensive test range requirements will be applied, including the Alert Range as follows:

Acceptable Range	0.93 to 1.03 ΔPr
Alert Range	0.90 to <0.93 ΔPr
Required Action	<0.90 ΔPr or > 1.03 ΔPr

CNS will evaluate all ranges against the design conditions to ensure that all procedure lower limits bound the more conservative of the design or ASME OM Code ranges delineated above.

The Residual Heat Removal pumps are included in the station Preventive Maintenance Program which requires vibration full spectral analysis performed when vibration measurements are taken and periodic oil analysis to be performed.

Performance of a substantial flow test each quarter would result in eight sets of data over a two-year period instead of the required one comprehensive test. NPPD believes this testing regime provides an overall better assessment of pump mechanical and hydraulic health and will determine operational readiness on a quarterly frequency.

Relief Request RP-12
Residual Heat Removal Pump Comprehensive Test
(Continued)

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5123, 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**

None

Relief Request RP-13
Service Water Pump Comprehensive Test

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**

SW-P-A	Service Water Pump A
SW-P-B	Service Water Pump B
SW-P-C	Service Water Pump C
SW-P-D	Service Water Pump D

2. **Applicable Code Edition and Addenda**

ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

ISTB-3400, "Frequency of Inservice Tests"

ISTB-5223, "Comprehensive Test Procedure"

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the ASME OM Code ISTB requirements for performing a comprehensive pump test. The proposed alternative would provide an acceptable level of quality and safety.

Specifically, this request would allow CNS to perform a more rigorous Group A quarterly test in lieu of a biennial comprehensive test. A substantial flow test will be performed each quarter using permanently installed plant instrumentation which meets the comprehensive test accuracy requirements. The acceptance criteria utilized will be in accordance with the Group A test requirements. A biennial comprehensive test will not be performed.

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

The Service Water pumps have a safety function to provide cooling water flow for essential components in the REC system, the RHR system, and the emergency diesel generator cooling systems under transient and accident conditions.

Relief Request RP-13
Service Water Pump Comprehensive Test
(Continued)

The design flow rate of each SW pump is 8,000 gpm at 125 ft TDH. SW Pumps are used in combination of up to four pumps to support normal plant operation. However, the essential cooling loads can be supplied during transient or accident conditions with only one SW pump. Each pump is required to deliver 6,000 gpm at 125 ft. TDH during accident conditions. The SW minimum flow rate requirements following a postulated LOCA are as follows:

Cooling Load	Flow Rate (gpm) 0-10 Minutes Post-LOCA	Flow Rate (gpm) >10 Minutes Post-LOCA
RHRSW Booster Pumps	0	4000
REC Heat Exchanger	400	400
Control Room Air Conditioning	70	70
SW Strainer Backwash	370	370
Emergency Diesel Engine Cooling	2004	1002
SW Gland Water	3	3
RHRSW Booster Pump Gland Water	1	1
Total	2848	5846

The Service Water pumps are deep draft (vertical line shaft) pumps manufactured by Byron Jackson.

The SW pumps are categorized as Group A pumps since they operate continuously or routinely during normal plant operations.

Relief Request RP-13
Service Water Pump Comprehensive Test
(Continued)

As an alternative to the code requirement for performing a biennial comprehensive pump test, the SW pumps will have a modified Group A test performed each quarter. The pumps will be operated at a reference flow point of 5500 gpm with pump differential pressure measured and compared to its reference value. Deviations from the reference value will be compared to the range requirements of Table ISTB-5200-1 (or tighter based on design requirements) for the Group A test (0.95 to 1.10). Mechanical vibration measurements will be recorded every quarter. The vibration measurements will be compared to their reference values. Any deviations will be compared to the range requirements of Table ISTB-5200-1 for the Group A test. Corrective actions will be taken in accordance with ISTB-6200.

Permanently installed plant instrumentation will be used to determine flow rates and differential pressure. Portable vibration instruments will be used to determine mechanical vibration measurements. All instrumentation will meet the accuracy requirements of a comprehensive pump test.

One of the requirements of the comprehensive test is to perform the test at substantial flow (± 20% of design flow). CNS will meet this requirement each quarter by performing the test at conditions which meet 20% of the design flow point:

Design Flow Point	5846 gpm
Test Flow Point	5500 gpm

Another requirement of the comprehensive pump test that differs from the Group A test is that pressure instrumentation must meet a required instrument accuracy of ± 0.5% of full scale rather than ± 2.0% per Table ISTB-3500-1. CNS will meet the instrumentation requirements of the comprehensive pump test each quarter. CNS will perform the required vibration monitoring (which is the same for either a Group A test or comprehensive pump test) on these Group A pumps each quarter. In addition to the code-required vibration monitoring, full spectrum analysis will be performed above the code requirements.

Relief Request RP-13
Service Water Pump Comprehensive Test
(Continued)

The service water pumps are tested at a set flow of 5500 gpm at constant speed. CNS will continue to test these pumps at the above conditions each quarter. The Group A test range requirements will be applied, including the Alert Range as follows:

Acceptable Range	0.95 to 1.10 ΔPr
Alert Range	0.93 to <0.95 ΔPr
Required Action	<0.93 ΔPr or > 1.10 ΔPr

CNS will evaluate all ranges against the design conditions to ensure that all procedure lower limits bound the more conservative of the design or ASME OM Code ranges delineated above.

The Service Water pumps are included in the station Preventive Maintenance Program which requires vibration full spectral analysis performed when vibration measurements are taken and periodic oil analysis to be performed.

For these pumps, the test method for a Group A test and comprehensive pump test is identical. The test flow rate and installed instrumentation utilized for both tests would be identical. The only variation between the two tests is the acceptance criteria for the hydraulic required action range. For this reason, NPPD believes that the performance of this more rigorous quarterly Group A test each quarter, utilizing the Group A acceptance criteria, would ensure that these pumps would be in a state of operational readiness. There would be no value added in performing a comprehensive pump test with different acceptance criteria on a biennial basis.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5223, 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**

None

Relief Request RP-14
Residual Heat Removal Service Water Booster Pump Comprehensive Test

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

Alternative Provides Acceptable Level of Quality and Safety

1. <u>ASME Code Component(s) Affected</u>

SW-P-BPA	Residual Heat Removal Service Water Booster Pump A
SW-P-BPB	Residual Heat Removal Service Water Booster Pump B
SW-P-BPC	Residual Heat Removal Service Water Booster Pump C
SW-P-BPD	Residual Heat Removal Service Water Booster Pump D

2. <u>Applicable Code Edition and Addenda</u>

ASME OM Code 2001 Edition through 2003 Addenda

3. <u>Applicable Code Requirement</u>

ISTB-3400, "Frequency of Inservice Tests"

ISTB-5123, "Comprehensive Test Procedure"

4. <u>Reason for Request</u>

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (a)(3), relief is requested from the ASME OM Code ISTB requirements for performing a comprehensive pump test. The proposed alternative would provide an acceptable level of quality and safety.

Specifically, this request would allow CNS to perform a more rigorous quarterly test in lieu of a biennial comprehensive test. A modified Group A substantial flow test, utilizing permanently installed pump instrumentation, will be performed each quarter. A biennial comprehensive test will not be performed.

5. <u>Proposed Alternative and Basis for Use</u>

The RHRSW booster pumps have a safety function to provide cooling water flow to the RHR system heat exchangers under transient and accident conditions.

Relief Request RP-14
Residual Heat Removal Service Water Booster Pump Comprehensive Test
(Continued)

The design flow rate of each RHRSW booster pump is 4,000 gpm at 840 ft TDH. One RHRSW booster pump is capable of supplying the required flow rate during transient and accident conditions. The SW pumps alone are capable of supplying the necessary cooling water to the RHR heat exchangers; however, the RHRSW booster pumps are required to maintain SW system pressure greater than RHR system pressure to prevent out-leakage of highly contaminated RHR water following an accident.

The RHRSW booster pumps are normally idle and receive no automatic start signals. They must be manually started using remote manual switches following a LOCA to initiate suppression pool cooling.

The pumps are manufactured by Byron Jackson and are horizontally mounted motor driven constant speed centrifugal pumps.

The RHRSW pumps are categorized as Group A pumps since they operate continuously or routinely during normal plant operations.

As an alternative to the code requirement for performing a comprehensive pump test, the RHRSW pumps will have a modified Group A test performed each quarter. The pumps will be operated at a reference flow point of 4000 gpm with pump differential pressure measured and compared to its reference value. Deviations from the reference value will be compared to the range requirements of Table ISTB-5100-1 (or tighter based on design requirements) for the comprehensive test upper limit (1.03) and Group A test lower limit (0.90). Mechanical vibration measurements will be recorded every quarter. The vibration measurements will be compared to their reference values. Any deviations will be compared to the range requirements of Table ISTB-5100-1 for the comprehensive test. Corrective actions will be taken in accordance with ISTB-6200.

Permanently installed plant instrumentation will be used to determine flow rates and differential pressure. Portable vibration instruments will be used to determine mechanical vibration measurements. All instrumentation will meet the accuracy requirements of a Group A test unless specific relief is requested. It should be noted, however, that the permanently installed suction and discharge pressure gauges are calibrated to $\leq$ 1% of full scale.

Relief Request RP-14
Residual Heat Removal Service Water Booster Pump Comprehensive Test
(Continued)

One of the requirements of the comprehensive test is to perform the test at substantial flow (± 20% of design flow). CNS will meet this requirement each quarter by performing the test at conditions which meet 20% of the design flow point:

Design Flow Point	4000 gpm
Test Flow Point	4000 gpm

CNS will perform a modified Group A test as stated above such that the acceptance criteria for hydraulic performance will meet comprehensive test upper limit (1.03) and the Group A lower limit (0.90). CNS will perform the required vibration monitoring on these Group A pumps each quarter. In addition to the code-required vibration monitoring, full spectrum analysis will be performed above the code requirements along with a rotating replacement schedule due to the service conditions.

The residual heat removal service water booster pumps are tested at a set flow of 4000 gpm at constant speed. Per Table ISTB-5100-1, the requirement for hydraulic performance is ± 10 % for the Group A test. No alert range is required. CNS will continue to test these pumps at the above conditions each quarter; however, the comprehensive test range limits will be applied as follows:

Required Action	$<0.90 \Delta Pr$ or $> 1.03 \Delta Pr$

CNS will evaluate all ranges against the design conditions to ensure that all procedure lower limits bound the more conservative of the design or ASME OM Code ranges delineated above.

The Residual Heat Removal Service Water Booster pumps are included in the station Preventive Maintenance Program which requires vibration full spectral analysis performed when vibration measurements are taken and periodic oil analysis to be performed. Additionally, CNS periodically replaces or overhauls these pumps as time-based preventive maintenance items prior to reaching the required action range low for differential pressure.

Relief Request RP-14
Residual Heat Removal Service Water Booster Pump Comprehensive Test
(Continued)

Performance of a substantial flow test each quarter would result in eight sets of data over a two-year period instead of the required one comprehensive test. NPPD believes this testing regime provides an overall better assessment of pump mechanical and hydraulic health and will determine operational readiness on a quarterly frequency.

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-5123, 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**

None

Valve Relief Request Index

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-SSV-64	2	B	HPCI
HPCI-SOV-SSV-87	2	B	HPCI

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**

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

Function(s):

The HPCI turbine and exhaust steam drip leg drain to gland condenser (HPCI-SOV-SSV-64) and HPCI turbine and exhaust steam drip leg drain to equipment drain isolation valve (HPCI-SOV-SSV-87) 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 operability 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 once each refueling cycle by disassembling and inspecting each solenoid valve to monitor for degradation.

6. Duration of Proposed Alternative

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

7. Precedents

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

Relief Request RV-02
Excess Flow Check 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**

   Category A/C Excess Flow Check Valves

2. **Applicable Code Edition and Addenda**

   ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

   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.

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-3510. The proposed alternative would provide an acceptable level of quality and safety.

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

   Uninterrupted function of these valves is essential for the safe operation of the plant. Quarterly testing in accordance with the ASME OM Code would interrupt instruments required for safety-system actuation, reactor shutdown, or sensing accident conditions. In addition, these valves cannot be exercised during cold shutdown because removal of multiple instruments from service could prevent or interrupt the operation of systems required for decay heat removal. Testing this frequently could jeopardize the safety of the reactor. Excess Flow Check Valves (EFCVs) are reliable devices. The major components consist of a poppet and spring. The spring holds the poppet open only under static conditions. The valve will close upon sufficient differential pressure across the poppet.

Relief Request RV-02
Excess Flow Check Valve Testing
(Continued)

EFCVs have been proven to be highly reliable at CNS and throughout the industry. CNS testing results of EFCVs from the ten-year period of 1991 through 2000 were evaluated and revealed zero closure failures out of 476 tests. General Electric (GE) Nuclear Energy Topical Report B21-00658-01, "Excess Flow Check Valve Testing Relaxation," dated November 1998 (SER to BWR Owners Group from NRC, dated March 14, 2000, subject: Safety Evaluation of General Electric Nuclear Energy Topical Report B21-00658-01, "Excess Flow Check Valve Testing Relaxation" [TAC NOS. MA7884 And M84809]), also provides evidence of EFCV reliability. The Topical Report evaluated EFCV testing history from 12 BWR plants and reported a low failure rate (i.e., 11 failures in 12,424.5 valve-years of service or one failure in 1129 valve-years of service).

The proposed alternate test involves testing in accordance with CNS Technical Specification (TS) Surveillance Requirement (SR) 3.6.1.3.8. A representative sample of EFCVs will be functionally tested every 18 months. The SR 3.6.1.3.8 test frequency is adequate to maintain a high degree of reliability and availability, and provides an acceptable level of quality and safety. Justification for the adequacy of this test frequency is contained in license amendment request letter NLS2001022, Attachment 2, and is based on information contained in the above referenced SER.

In lieu of the specified ASME OM Code quarterly functional testing, a representative sample of EFCVs will be functionally tested every 18 months such that each EFCV will be tested at least once each ten-year interval.

6. **Duration of Proposed Alternative**

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

7. **Precedents**

This relief request was previously approved for the third ten-year interval at CNS as Relief Request RV-10 (TAC No. MB1820, October 26, 2001).

Relief Request RV-03
Service Water Isolation 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
SW-MOV-MO89A	3	B	SW
SW-MOV-MO89B	3	B	SW

2. **Applicable Code Edition and Addenda**

ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

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.

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-3510. The proposed alternative would provide an acceptable level of quality and safety.

Relief Request RV-03
Service Water Isolation Valve Testing
(Continued)

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

These valves are exercised during quarterly Service Water Booster Pump flow testing to a throttled position required to satisfy Technical Specification flow requirements. Valve stroke timing to the fully opened position is impracticable. Full opening will cause RHR Service Water Booster Pump run out. These valves cannot be accurately stroke timed because they are controlled with a thumb wheel type controller. After a pump associated with either valve has started, valve movement is subject to considerable variation. This type of controller provides an output signal that is dependent upon the speed with which the controller is operated.

Stroke time measurements of these valves would be very difficult to repeat due to the absence of normal valve control switches and would not contribute meaningful data to utilize in monitoring valve degradation.

These valves will be exercised to their safety-related throttled positions quarterly, but stroke times will not be measured. These valves will also be diagnostically tested periodically under the CNS MOV Program in accordance with GL96-05. Stroke times will be one of the parameters measured.

6. **Duration of Proposed Alternative**

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

7. **Precedents**

This relief request was previously approved for the third ten-year interval at CNS as Relief Request RV-13 (TAC No. M98759, November 17, 1998).

Relief Request RV-04
Main Steam Power Operated Relief 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
MS-RV-71ARV	1	B/C	MS
MS-RV-71BRV	1	B/C	MS
MS-RV-71CRV	1	B/C	MS
MS-RV-71DRV	1	B/C	MS
MS-RV-71ERV	1	B/C	MS
MS-RV-71FRV	1	B/C	MS
MS-RV-71GRV	1	B/C	MS
MS-RV-71HRV	1	B/C	MS

2. Applicable Code Edition and Addenda

ASME OM Code 2001 Edition through 2003 Addenda

Relief Request RV-04
Main Steam Power Operated Relief Valve Testing
(Continued)

3. Applicable Code Requirement

ASME OM Code Appendix I, I-3310 Class 1 Main Steam Pressure Relief Valves with Auxiliary Actuation Devices – Tests before maintenance or set-pressure adjustment, or both, shall be for I-3310(a), (b) and (c) in sequence. The remaining shall be performed after maintenance or set-pressure adjustments:

(a) visual examination;

(b) seat tightness determination, if practicable;

(c) set-pressure determination;

(d) determination of electrical characteristics and pressure integrity of solenoid valve(s);

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

(f) determination of operation and electrical characteristics of position indicators;

(g) determination of operation and electrical characteristics of bellows arm switch;

(h) determination of actuating pressure of auxiliary actuating device sensing element, where applicable, and electrical continuity;

(i) determination of compliance with the Owner's seat tightness criteria.

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 Appendix I, I-3310. The proposed alternative would provide an acceptable level of quality and safety.

Relief Request RV-04
Main Steam Power Operated Relief Valve Testing
(Continued)

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

These valves are power actuated safety relief valves (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 (set point, reseat, and pilot stage seat tightness). The test facility has a main body slave for this purpose. During refueling 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.

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).

6. **Duration of Proposed Alternative**

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

7. **Precedents**

This relief request was previously approved for the third ten-year interval at CNS as Relief Request RV-15 (TAC No. M98759, November 17, 1998).

Relief Request RV-05
REC Heat Exchanger Cooling Water Supply Check Valve Test Frequency

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
SW-CV-27CV	3	C	SW
SW-CV-28CV	3	C	SW

2. **Applicable Code Edition and Addenda**

ASME OM Code 2001 Edition through 2003 Addenda

3. **Applicable Code Requirement**

ISTC-5221(c)(3) – At least one valve from each group shall be disassembled and examined at each refueling outage.

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-5221(c)(3). The proposed alternative would provide an acceptable level of quality and safety.

These check valves perform a safety function in only the open direction. The open safety function of these valves is verified using full flow every quarter during the inservice test of the Service Water pumps. The non-safety closed position cannot be verified without disassembly and examination of the valve. A reverse flow test is not possible due to the system alignment and cooling water load requirements. CNS has evaluated non-intrusive techniques to verify the closed position; however, due to the valve design (dual disk), valve closure cannot be verified. CNS replaces these valves on the basis of each valve every three refueling outages at which time the valves are disassembled and examined and manually full stroke exercised. As a result, the frequency of disassembly and examination exceeds the overall requirement of ISTC-5221(c)(3) for disassembly and examination of all valves in the group at least once every 8 years.

Relief Request RV-05
REC Heat Exchanger Cooling Water Supply Check Valve Test Frequency
(Continued)

5. Proposed Alternative and Basis for Use

These check valves have an active safety function in the open position to provide a flow path for cooling water flow to the Reactor Building Closed Cooling Water Heat Exchanger during transient and accident conditions. The required post-LOCA flow rate for a single heat exchanger is 400 gpm. Therefore, each of these valves must be capable of passing at least 400 gpm in order to perform their safety function in the open position.

These check valves have no safety function in the closed position. They were installed to prevent back flow through an idle SW loop if operating with the critical SW supply headers to the heat exchangers cross-connected. However, the heat exchanger supply cross-tie valve, SW-V-122, is locked in the closed position to maintain separation between the headers to meet the single failure criterion.

These check valves are 14" dual disk design and currently manufactured by the Atwood & Morrill Company, Inc. (See the figure at the end of this relief request.) During the previous three Inservice Testing Intervals these valves were only required to be tested in the open direction since they do not have a safety function in the closed direction. The open test has been performed every quarter during the previous intervals using full design accident flow in accordance with Surveillance Procedure 6.1/2SW.101, "Service Water Surveillance Operation." No failures of the open safety-related test have ever been identified. Additionally, these valves are in their open safety function during normal power operation to support reactor building closed cooling water operations. As a result, the valves are continuously monitored to be in their safety position by ensuring cooling water temperature requirements are met.

As a result of industry issues related to check valves in the late 1980s and early 1990s, CNS had identified these valves as susceptible to wear and corrosion due to their service application and environment (untreated river water). In 1989 both of these valves were disassembled and inspected as part of the station's Check Valve Monitoring Program. Both valves were found to be corroded and worn. The valves were replaced at this time with the same design valve. A repetitive Preventive Maintenance (PM) task was generated to disassemble and inspect the valves again in 3 refueling cycles. In 1993 the valves were again disassembled and inspected and found to be corroded and worn. The valves were again replaced with new valves of the same design.

Relief Request RV-05
REC Heat Exchanger Cooling Water Supply Check Valve Test Frequency
(Continued)

Since 1989, this PM task to replace the valves on a 3 refueling cycle frequency has resulted in the replacement of these valves four times. The dates of the disassembly and replacements are as follows:

SW-CV-27CV	SW-CV-28CV
March 2003	March 2003
October 1998	October 1998
March 1993	April 1993
June 1989	May 1989

In all cases the valves were capable of performing their intended design safety function to open. No instances of missing or failed internal parts have been identified during these previous inspections.

CNS is committed to the 2001 Edition through 2003 Addenda of the ASME OM Code for the fourth ten-year interval. This code requires bi-directional testing of all check valves regardless of safety function. As mentioned earlier, the closed non-safety function of these valves can only be verified by manually full stroke exercising the valve when the valves are disassembled.

As an alternative to the code requirement for disassembly of one valve in the group each refueling outage, CNS will disassemble and examine, along with manual exercising of the valves on the basis of both valves every third refueling cycle to verify the non-safety function. The valves will continue to be replaced on a 3 refueling outage frequency. The newly installed valves will be manually full-stroke exercised prior to installation in the system. The quarterly full-flow test of these valves, along with continuous cooling water temperature monitoring that the valves are open, will supplement the disassembly/examination activity. It should also be noted that CNS will meet ISTC-5221(c)(3) for all valves in the group to be disassembled and examined at least once every 8 years.

It should be noted that CNS has implemented a Condition Monitoring Program in accordance with Appendix II of the 2001 Edition through 2003 Addenda of the OM Code. The subject valves have been evaluated as potential candidates for this program due to the difficulty in performing a closed verification test. However, based on the previous disassembly results and lack of trend data since the valves are replaced, it was determined that these valves do not meet the requirements for performance improvement activities of Appendix II.

Relief Request RV-05
REC Heat Exchanger Cooling Water Supply Check Valve Test Frequency
(Continued)

Although the disassembly/examination frequency proposed in this request does not meet the ISTC-5221(c)(3) frequency requirement, the safety function of the valves is verified every quarter using full flow. Therefore, this testing and examination regime exceeds the intent of the code.

Using the provisions of this relief request as an alternative to the specific requirements of ISTC-5221(c)(3) will provide adequate indication of valve health and 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 ISTC requirements identified in this request.

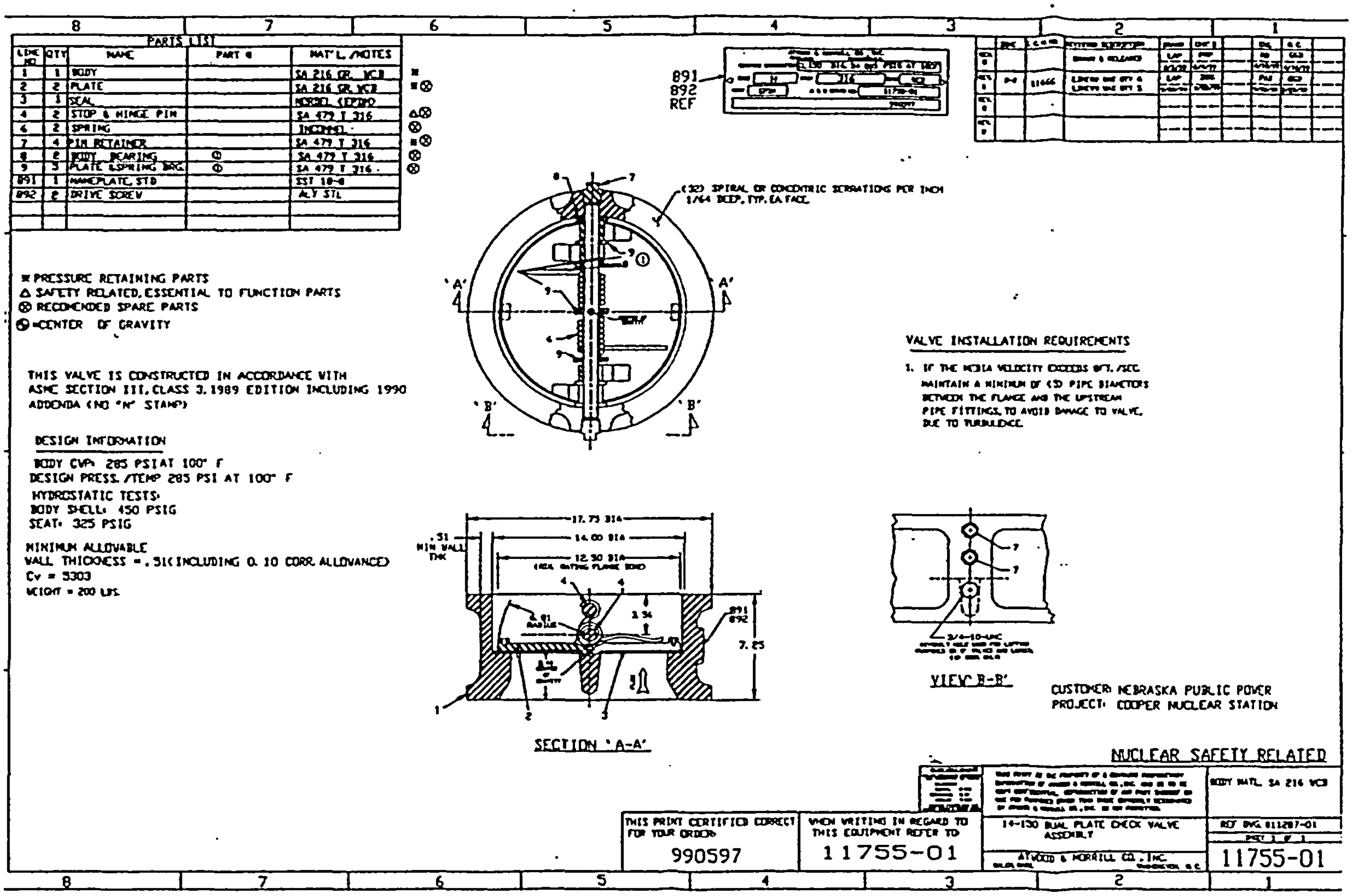
6. **Duration of Proposed Alternative**

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

7. **Precedents**

None

Relief Request RV-05
REC Heat Exchanger Cooling Water Supply Check Valve Test Frequency
(Continued)



REC Heat Exchanger Cooling Water Supply Check Valve

Correspondence Number: NLS2005074

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		