Nebraska Public Power District
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NLS2016012
March 9, 2016

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

Subject: Fifth Ten-Year Interval Inservice Testing Program
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this correspondence is to provide Nebraska Public Power District's Inservice Testing (IST) Program Plan for the Fifth Ten-Year Interval. Submittal of the plan is in accordance with the requirements of the American Society of Mechanical Engineers Code for Operations and Maintenance of Nuclear Power Plants, Subsection ISTA-3200(a), "Administrative Requirements." As documented within the IST Program, the relief requests included in the IST Program have been previously submitted to the Nuclear Regulatory Commission and approved for use. The Fifth Ten-Year Interval for Cooper Nuclear Station began on March 1, 2016 and concludes on February 28, 2026.

Enclosure 1 to this letter contains the "Cooper Nuclear Station Fifth Interval Inservice Testing Program for Pumps and Valves." Enclosure 2 contains the "Cooper Nuclear Station Fifth Interval Inservice Examination and Testing Program for Snubbers."

There are no regulatory commitments contained in this letter.

Should you have any questions regarding the information contained in this submittal, please contact me at (402) 825-2788.

Sincerely,

James R. Flaherty
for Jim Shaw
Licensing Manager

/dv

A047
NRR

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

Enclosures:
1. Cooper Nuclear Station Fifth Interval Inservice Testing Program for Pumps and Valves
2. Cooper Nuclear Station Fifth Interval Inservice Examination and Testing Program for Snubbers

cc: Regional Administrator w/enclosures
USNRC - Region IV

Cooper Project Manager w/enclosures
USNRC - NRR Plant Licensing Branch IV-2

Senior Resident Inspector w/enclosures

NPG Distribution w/o enclosures

CNS Records w/enclosures

ATTACHMENT 9.4 **REGULATORY SUBMITTAL REVIEW**

Sheet 1 of 2

Letter #: NLS2016012 **Response Due:** 3/1/2016

Subject: Fifth Ten-Year Interval IST Program Submittal to NRC

Date Issued for Review: 2/22/2016

Correspondence Preparer / Phone #: David Van Der Kamp / x2904

Section I **Letter Concurrence and Agreement to Perform Actions**

POSITION / NAME	Action (concurrence, certification, etc.)	Signature/Date (sign, interoffice memo, e-mail, or telecom)
EP&C Eng - Tom Robinson	Validation	Thomas V. Robinson 2-22-16
LIC Spec - David Van Der Kamp	Validation	[signature] 2/22/16
EP&C Supv - Stan Domikaitis	Concurrence	[signature] 2/26/16
EP&C Mgr - Troy Barker	Concurrence	[signature] 2/29/16
DOE - Dan Buman	Concurrence	[signature] 2/29/16
COMMENTS		

Section II **Correspondence Screening**

Does this letter contain commitments? **If "yes," identify the commitments with due dates in the submittal and in Section III.**	Yes No	☐ ☒
If "yes," and the due date is > 3 months, is tracking of interim milestones required?	Yes No	☐ ☐
Does this letter contain any information or analyses of new safety issues performed at NRC request or to satisfy a regulatory requirement? **If "yes," reflect requirement to update the USAR in Section III.**	Yes No	☐ ☒
Does this letter require any document changes (e.g., procedures, DBDs, USAR, TS Bases, etc.), if approved? **If "yes," indicate in Section III an action for the responsible department to revise the affected documents. (The Correspondence Preparer may indicate the specific documents requiring revision, if known or may initiate an action for review.)**	Yes No	☐ ☒
Does this letter contain information certified accurate? **If "yes," identify the information and document certification in an attachment. (Attachment 9.5 must be used.)**	Yes No	☐ ☒

ATTACHMENT 9.4 REGULATORY SUBMITTAL REVIEW

Sheet 2 of 2

Does this letter require posting per 10CFR19? **If "yes," ensure posting after submittal.**	Yes No	☐ ☒
Does this letter contain Safeguards Information? **If "yes," do not scan to CNS intranet and ensure handling per Procedure 1.2.**	Yes No	☐ ☒
Does this letter contain information to be withheld from public disclosure (e.g., Proprietary or Non-Safeguards Security-Related Information)? **If "yes," do not scan to CNS intranet and ensure appropriate marking and handling.**	Yes No	☐ ☒

Section III **Actions and Commitments**

Required Actions/Tracking Numbers *Note: Actions needed upon approval should be captured in the appropriate action tracking system*	**Due Date**	**Responsible Dept.**
None		
Commitments/Commitment Numbers *Note: Enter the commitments into the commitment management system.*	**Due Date**	**Responsible Dept.**
None		

Section IV **Final Document Signoff for Submittal**

Correspondence Preparer	David Van Der Kamp [signature]
Final Submittal Review *(optional)*	See F&F
Responsible Department Head	See Letter
Director of Nuclear Safety Assurance *(as applicable)*	N/A

ATTACHMENT 9.4 **REGULATORY SUBMITTAL REVIEW**

Sheet 1 of 2

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Sheet 2 of 2

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None		
Commitments/Commitment Numbers *Note: Enter the commitments into the commitment management system.*	**Due Date**	**Responsible Dept.**
None		

Section IV **Final Document Signoff for Submittal**

Correspondence Preparer	David Van Der Kamp [signature]
Final Submittal Review *(optional)*	See F&F
Responsible Department Head	See Letter
Director of Nuclear Safety Assurance *(as applicable)*	N/A

Enclosure 1

Cooper Nuclear Station Fifth Interval Inservice Testing Program for Pumps and Valves

Nebraska Public Power District

Cooper Nuclear Station
Fifth Interval
Inservice Testing Program for Pumps and Valves

Revision 0

Cooper Nuclear Station
P.O. Box 98
Brownville, NE 68321-0098

Commercial Operation Date: July 1, 1974

IST Engineer:	Thomas V. Robinson	**Date:**	2-24-16
Program Backup / Supervisor:	[signature]	**Date:**	2-26-16
EP & C Manager:	[signature]	**Date:**	2/29/16

TABLE OF CONTENTS

SECTION

1.0 INTRODUCTION

1.1 Purpose

This document establishes the Cooper Nuclear Station (CNS) Fifth 120-Month Interval Inservice Testing (IST) Program requirements for the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 pumps and valves whose specific functions are required to either:

- Shutdown the reactor to the safe shutdown condition,
- Maintain the safe shutdown condition, and/or
- To mitigate the consequences of an accident.

This document will also establish the CNS Augmented Inservice Testing Program requirements for ASME non-Code Class pumps and valves whose specific functions will meet one or more of those listed above. Other pumps and valves may be included in the augmented scope at the discretion of CNS.

The CNS Fifth 120-Month Interval Pump and Valve Inservice Testing Program Plan will be applicable during the following time period.

Begin: 03/01/2016 **End:** 02/28/2026

1.2 Scope

Per 10CFR 50.55a(f)(4), pumps and valves that are classified as ASME Code Class 1, Class 2, and Class 3 must meet the inservice test requirements set forth in the ASME OM Code and Addenda. Therefore, the regulatory IST Program scope for pumps and valves applies to the Class 1, 2, and 3 pumps and valves that meet the scope statements outlined in the ASME OM Code of record. The CNS Code of record for the Fifth 120-Month Interval is the 2004 Edition through the 2006 addenda of the ASME OM Code.

This document is based on the following Subsections and Appendices of the 2004 Edition through the 2006 Addenda of the ASME OM Code:

- Subsection ISTA, "*General Requirements*"

  ISTA-1100 states that "These requirements apply to (a) pumps and valves that are required to perform a specific function in shutting down a reactor to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequences of an accident."

  Cooper Nuclear Station was designed and licensed to operate with the Hot Shutdown condition defined as the "safe" shutdown condition.

- Subsection ISTB, *"Inservice Testing of Pumps in Light-Water Reactor Nuclear Power Plants"*

- Subsection ISTC, *"Inservice Testing of Valves in Light-Water Reactor Nuclear Power Plants"*

- Mandatory Appendix I, *"Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants"*

- Mandatory Appendix II, *"Check Valve Condition Monitoring Program"*

Those pumps and valves that are ASME non-Code Class 1, 2, or 3, that meet the scope of the ASME OM Code, will be identified as augmented components within this document. Other pumps and valves may be included in the augmented scope at the discretion of CNS. NRC approval for any deviation from the ASME OM Code, for the augmented components, is not required.

The Cooper Nuclear Station Inservice Testing Program Basis Document includes the justification for inclusion of pumps and valves that are in the IST or Augmented IST Program scope and also many justifications for pumps and valves excluded from the IST and/or Augmented IST Program scope.

The IST Check Valve Condition Monitoring (CVCM) Program Document contains the details on the check valves selected for this program and all the necessary requirements for implementation of this Program.

The CNS IST Program Basis Document, IST CVCM Program Document, administrative procedures, surveillance testing procedures, and other records required to define and execute the Inservice Testing Program are all retained and available at Cooper Nuclear Station.

2.0 INSERVICE TESTING PLAN FOR PUMPS

2.1 Pump Inservice Testing Plan Description

The CNS testing program for pumps meets the requirements of the ASME OM Code 2004 Edition through 2006 addenda, Subsection ISTB, *"Inservice Testing of Pumps in Light-Water Reactor Nuclear Power Plants"*. Where these requirements have been determined to be impractical, specific requests for relief were written and are included in Attachment 2 (Pump Relief Requests) and Attachment 3 (Augmented Pump Relief Requests). NUREG 1482, Revision 2 has been used as guidance in the development of the IST Program Plan for pumps.

2.2 Pump Plan Table Description

The pumps included in the Cooper Nuclear Station IST Plan are listed in Attachment 10. The information contained within these tables identifies those pumps which are to be tested to the requirements of Subsection ISTB of the ASME OM Code, 2004 Edition through 2006 Addenda, the testing parameters and frequencies, and associated relief requests. The headings for the pump tables are delineated below.

<u>System:</u> The plant system in which the pump is located.

<u>Pump CIC:</u> The pump component identification code.

<u>ISI Class:</u> The ASME Inservice Inspection (ISI) classification of the component. Augmented components are classified "A".

<u>P&ID:</u> The associated piping and instrumentation drawing number.

<u>P&ID Coor:</u> The P&ID coordinate location of the pump.

<u>IST Group</u> The Pump group as defined in ISTB-2000

Group A	Continuous or routinely operated pumps
Group B	Standby pumps not operated routinely

<u>Parameters:</u> The pump test quantities to be measured or observed. The test designators are as follows:

DP	Differential Pressure
N	Speed
Pd	Discharge Pressure
Q	Flow Rate
V	Vibration

<u>Frequency:</u> The frequency of testing each pump. The following test designators are used:

Q	Once every 92 days (Quarterly)
6M	Once every 6 months
2Y	Once every 2 years

2.2 Pump Plan Table Description (continued)

Notes: This column contains a brief component description, reference to any applicable relief request(s), and contains any other component-related information. Relief Requests are designated RP-XX for pumps or RG-XX for general Program Requirements. Augmented Relief Requests are designated ARP-XX. Station Technical Positions are designated TP-XX.

2.3 Measurement of Test Quantities

Speed (N) Per ASME OM Code ISTB-3530, rotational speed measurement of variable speed pumps shall be taken by a method which meets the requirements of paragraph ISTB-3510.

Pressure (DP, Pd) Differential pressure across a pump will be calculated from inlet and discharge pressure measurements or by direct differential pressure measurement. Discharge pressure will be by direct measurement of discharge pressure. Per NUREG 1482, revision 2, section 5.5.3, suction pressure may be calculated based on inlet tank or bay level.

Flow Rate (Q) Flow rate of the pump will be measured using a rate or quantity meter installed in the pump test circuit.

Vibration (V) Pump vibration will be measured with a digital vibration meter in accordance with the applicable section of ASME OM Code ISTB-3540.

2.4 Allowable Ranges of Test Quantities

The applicable allowable ranges specified in ASME OM Code ISTB, Tables ISTB-5121-1, ISTB-5221-1, and ISTB-5321-1 will be used for differential pressure, flow and vibration measurements except where specific relief is requested and/or approved or design/licensing acceptance criteria is more restrictive than that prescribed in the tables. Should a measured test quantity fall outside the allowable range, corrective action per ASME OM Code ISTB-6200 shall be followed. Records shall be maintained in accordance with ASME OM Code ISTB-9000.

2.5 Instrument Accuracy and Range Requirements

Allowable instrument (and loop, where applicable) accuracy's for pressure, flow rate, speed, vibration, and differential pressure are provided in ASME OM Code ISTB Table ISTB-3510-1 and paragraph ISTB-3510(a). If the accuracies of the station's instruments do not meet the requirements of this table/section, temporary instruments meeting those requirements in ASME OM Code ISTB Table ISTB-3510-1 will be used or approved relief shall be received.

In determining instrument accuracy, the Code does not explicitly require the Licensee to consider physical attributes (such as orifice plate tolerances), tap locations, environmental effects (such as temperature, radiation or humidity), vibration effects (such as seismic), or process effects (such as temperature). This position is documented in NUREG 1482, revision 2, paragraph 5.5.4.

Additionally, ASME OM Code ISTB-3510(b) requires that the full-scale range of analog instruments be no more than 3 times the reference value. Digital instruments shall be selected such that the reference value does not exceed 90% of the calibrated range of the instrument.

3.0 INSERVICE TESTING PLAN FOR VALVES

3.1 Valve Inservice Testing Plan Description

The CNS testing program for valves meets the requirements of the ASME OM Code 2004 Edition through 2006 addenda, Subsection ISTC *"Inservice Testing of Valves in Light-Water Reactor Nuclear Power Plants*"; Mandatory Appendix I *"Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants"*; and Mandatory Appendix II "*Check Valve Condition Monitoring Program."* Where these requirements are determined to be impractical, specific requests for relief have been written and are included in Attachment 4 (Valve Relief Requests) and Attachment 5 (Augmented Valve Relief Requests).

3.2 Valve Plan Table Description

The table in Attachment 11 lists all ASME Class 1, 2, 3, and Augmented (A) Valves that have been scoped to be within this Program Plan, and have been assigned Valve Categories. In general, valves exempt per ASME OM Code ISTC-1200 are not listed. The following information is included for each valve.

System: The plant system in which the valve is located.

Valve CIC: The valve component identification code.

P&ID: The associated piping and instrumentation drawing number.

P&ID Coor: The drawing coordinates location on the P&ID for the valve.

ISI Class: The ASME Inservice Inspection (ISI) classification of the component. Augmented components are classified "A".

IST Cat: The category(s) assigned to the valve based on the definitions per ASME OM Code ISTC-1300. The following categories are defined in the Code:

Category A – Valves for which seat leakage is limited to a specific maximum amount in the closed position for fulfillment of their required function(s), as specified in ISTA-1100.

Category B – Valves for which seat leakage in the closed position is inconsequential for fulfillment of the required function(s), as specified in ISTA-1100.

Category C – Valves that are self-actuating in response to some system characteristic, such as pressure (relief valves) or flow direction (check valves) for fulfillment of the required function(s), as specified in ISTA-1100.

Category D – Valves that are actuated by an energy source capable of only one operation, such as rupture disks or explosively actuated valves.

Valve Size: The nominal size of the valve in inches

3.2 Valve Plan Table Description (continued)

Valve Type: The Valve Body Design as indicated by the following abbreviations:

ANGLE	ANG
BALL	BAL
BUTTERFLY	BTF
BALL CHECK	CK-B
DUAL DISK CHECK	CK-D
LIFT CHECK	CK-L
PISTON CHECK	CK-P
SWING CHECK	CK-S
DIAPHRAGM	DIA
FLOAT VALVE	FOV
GATE	GT
GLOBE	GL
PLUG	PLG
PRESSURE REGULATING	PRV
RUPTURE DISK	RD
RELIEF/SAFETY	RV
SOLENOID VALVE	SOV
STOP VALVE	STOP
STOP CHECK	S-CK
TILTING DISK CHECK	CK-T
SQUIB	SHR

ACT Type: The type of Valve Actuator as indicated by the following abbreviations:

AIR OPERATOR	AO
EXPLOSIVE CHARGE	EX
HYDRAULIC OPERATED	HO
MANUAL	MA
MOTOR OPERATION	MO
SELF ACTUATED	SA
SOLENOID OPERATOR	SO
PILOT ACTUATED	PA

NORMAL POS: The normal position of the valve during regular plant operation, specified as follows:

O	OPEN
C	CLOSED
T	THROTTLED

TEST RQMT The test(s) that will be performed to fulfill the requirements of ASME OM Code ISTC. The definitions and abbreviations are identified below:

3.2 Valve Plan Table Description (continued)

LJ-1	Containment Isolation Type C Valve Seat Leakage Test in accordance with the CNS 10CFR50 Appendix J Program (ISTC-3620).
LT-1	Accumulator Check Valve Leakage Test
LT-2	Category A Leak tests other than those already specified
COD	Check Valve Condition Monitoring open test per Disassembly and Examination
CCD	Check Valve Condition Monitoring closure test per Disassembly and Examination
COF	Check Valve Condition Monitoring open test per flow indication measurement
CCF	Check Valve Condition Monitoring backflow / closure test
CCL	Check Valve Condition Monitoring closure test per Leakage method of testing
CCR	Check Valve Condition Monitoring closure test per radiography method of testing
FSO	Full stroke exercise test to the open position (includes stroke time measurement except for check valves and manual valves)
FSC	Full stroke exercise test to the closed position (includes stroke time measurement except for check valves and manual valves)
PSO	Partial stroke exercise to the open position
PSC	Partial stroke exercise to the closed position
FST	Fail safe position test (includes stroke time measurement unless otherwise noted)
PIT	Position indication test
RD	Rupture Disc test
RVT	Test of safety/relief valves
EX	Explosive valve test

3.2 Valve Plan Table Description (continued)

VBT	Vacuum breaker testing
SKID	Component integral to or that supports operation of major component and is adequately tested as part of the major component.

TEST FREQ: The frequency at which the applicable test will be performed. The definitions and abbreviations are identified below:

Test Frequency	Frequency of Testing
Q	At least once per 92 days
CS	Cold Shutdown
RF	Refueling Cycle
6M	At least once every 6 months
2Y	At least once every 2 years
5Y	At least once every 5 years
10Y	At least once per 10 years
App I	Relief Valve Frequency (OM Code Appendix I)
CVCM	IST CVCM Frequency (Appendix II). Refer to the IST CVCM Program Document for details.
OPB	10CFR50 Appendix J Option B Leakage Rate Frequency
PB	Performance based frequency other than Option B
TS	In accordance with Technical Specifications
SD	Sample Disassembly and Examination

NOTES: This column contains a brief component description and references to any applicable cold shutdown justifications(s), refueling outage justification(s), relief request(s), and any other component related information. All valves are considered "active" unless otherwise noted in this column. Cold shutdown justifications are designated CSJ-XX; Refueling Outage Justifications are designated ROJ-XX; Relief Requests are designated RV-XX for valves or RG-XX for general Program Requirements; Augmented Relief Requests are designated ARV-XX; station Technical Positions are designated TP-XX; and the Check Valve Condition Monitoring Plan Bases are designated in the IST CVCM Program Document.

4.0 ATTACHMENTS:

Attachment 1	System and P&ID Listing
Attachment 2	Pump Relief Requests
Attachment 3	Augmented Pump Relief Requests
Attachment 4	Valve Relief Requests
Attachment 5	Augmented Valve Relief Requests
Attachment 6	General Relief Requests
Attachment 7	Cold Shutdown Justifications
Attachment 8	Refuel Outage Justifications
Attachment 9	Technical Positions
Attachment 10	Inservice Testing Pump Table
Attachment 11	Inservice Testing Valve Table

ATTACHMENT 1

SYSTEM AND P&ID LISTING

System	System Name	P&ID
CRD	Control Rod Drive	2039
CS	Core Spray	2045
DW	Demineralized Water	2029
DGDO	Diesel Generator Diesel Oil	2011, 2077
DGSA	Diesel Generator Starting Air	2077, 117.10-IC.09
HPCI	High Pressure Coolant Injection	2041, 2044
HV	Heating and Ventilation	2019, 2020
IA	Instrument Air	2010, 2027, 2028
MS	Main Steam	2028, 2041
NMT	Neutron Monitoring Traversing Incore Probe	2083
NBI	Nuclear Boiler Instrumentation	2026, 2027, 2028, 2041, 2045
PC	Primary Containment	2022, 2027, 2028, 2084
RW	Radioactive Waste	2005, 2037, 2038
RCIC	Reactor Core Isolation Cooling	2041, 2043
REC	Reactor Equipment Cooling	2031
RF	Reactor Feedwater	2043. 2044
RR	Reactor Recirculation	2027
RWCU	Reactor Water Cleanup	2042
RHR	Residual Heat Removal	2040, 2041
SW	Service Water	2006, 2036, 2077
SGT	Standby Gas Treatment	2037
SLC	Standby Liquid Control	2045
SA	Station Air	2010

ATTACHMENT 2

PUMP RELEIEF REQUESTS

PUMP RELIEF REQUEST INDEX		
Relief Request No.	**Description**	**NRC Approval Date**
RP-01	Core Spray Pumps Suction Gauge Range	2-12-16[1]
RP-02	Residual Heat Removal Pumps Suction Gauge Range	2-12-16[1]
RP-03	High Pressure Coolant Injection Pumps Suction Gauge Range	2-12-16[1]
RP-04	Reactor Core Isolation Cooling Pump Suction Gauge Range	2-12-16[1]
RP-05	Pump Loop Accuracy Requirements	2-12-16[1]
RP-06	Reactor Equipment Cooling Flow Gauge Range	2-12-16[1]
RP-07	Core Spray Pump B Vibration Alert Limits	2-12-16[1]
RP-08	Comprehensive Pump Test Upper Limit	2-12-16[1]
RP-09	Variance Around the Reference Values	2-12-16[1]

(1) Approved by NRC letter, dated 2-12-16, from Meena K. Khanna, NRC, to Mr. Oscar A. Limpias, Vice President of Nuclear and CNO for CNS

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

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

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) 2004 Edition through 2006 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 (z)(1), 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 (inches Mercury) to 30.0 pounds per square inch (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% of full scale (± 6% of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 0.24 psig (0.02 X 12 psig).

Pump discharge pressure actual values for the core spray pumps during inservice testing are approximately 300 psig. Based on ISTB-3510(b)(1), this would require, as a maximum, a gauge with a range of 0 to 900 psig (3 X 300.0 psig) to bound the actual value for discharge pressure. Applying the accuracy requirement of ± 2% of full scale (± 6% of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 18 psig (0.02 X

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

900 psig). Therefore, the maximum inaccuracies due to the suction and discharge pressure indications allowed by the code would be approximately ± 18.24 psig.

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

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

Although the permanently installed suction pressure gauges (PI-36A/B) are above the maximum range limits of ASME OM Code ISTB-3510(b)(1), they, in conjunction with the permanently installed discharge pressure gauges (PI-48A/B), yield a better accuracy for differential pressure than the minimum requirements dictated by the code and are, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6% of the differential pressure reference value. Reference NUREG 1482, Revision 2, Section 5.5.1.

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

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3510(b)(1), identified above, will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

Therefore, pursuant to 10 CFR 50.55a(z)(1), 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 fifth ten-year interval.

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

7. Precedents

This relief request was previously approved for the fourth ten-year interval at CNS as Relief Request RP-01 (TAC Nos. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, and MC8992, June 14, 2006).

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

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternative Provides Acceptable Level of Quality and Safety

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

RHR-P-A	Residual Heat Removal (RHR) 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 2004 Edition through 2006 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 (z)(1), 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 to 150.0 psig. The actual values for suction pressure during inservice testing are approximately 5.0 psig. As a result, the instrument range exceeds the requirement of ISTB-3510(b)(1).

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

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

Pump discharge pressure actual values for the RHR pumps during inservice testing are approximately 170 to 195 psig. Conservatively basing it on the lowest of these discharge pressure readings, ISTB-3510(b)(1) would require, as a maximum, a gauge with a range of 0 to 510 psig (3 X 170.0 psig) to bound the actual value for discharge pressure.

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

Applying the accuracy requirement of ± 2% of full scale (± 6% of reference) for the quarterly Group A pump test, the resulting inaccuracies due to pressure effects would be ± 10.2 psig (0.02 X 510 psig). Therefore, the maximum inaccuracies due to the suction and discharge pressure indications allowed by the code would be approximately ± 10.5 psig.

The CNS-installed suction pressure gauges (PI-106A/B/C/D), which were designed to have an accuracy of ± 0.5% of full scale, have a range of approximately 165 psig. The 165 psig gauge range is derived from the 30" Hg portion of the gauge range that is in a vacuum, which converts to approximately 15 psig, added to the 150 psig positive portion of the gauge. The ± 1.0 psig current calibration tolerance at the 5 psig suction pressure point is essentially a tolerance of approximately 0.6% of full scale (0.006 X 165 psig = ~ ± 1.0 psig). Currently, the installed discharge pressure indicators (PI-107A/B/C/D) are 0 to 400 psig indicators. The discharge indicators are being calibrated to ± 5 psig, or ± 1.25% of full scale (0.0125 X 400 psig = ± 5.0 psig).

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

Although the permanently installed suction pressure gauges (PI-106A/B/C/D) are above the maximum range limits of ASME OM Code ISTB-3510(b)(1), they, in conjunction with the permanently installed discharge pressure gauges (PI-107A/B/C/D), yield a better accuracy for differential pressure than the minimum requirements dictated by the code and are, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6% of the differential pressure reference value. Reference NUREG 1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 2, Section 5.5.1.

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

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3510(b)(1), identified above, will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

Therefore, pursuant to 10 CFR 50.55a(z)(1), NPPD requests relief from the specific ISTB requirements identified in this request.

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

6. Duration of Proposed Alternative

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

7. Precedents

This relief request was previously approved for the fourth 10-year interval at CNS as Relief Request RP-02 (TAC Nos. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, and MC8992, June 14, 2006).

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

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternative Provides Acceptable Level of Quality and Safety

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

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

2. **Applicable Code Edition and Addenda**

ASME OM Code 2004 Edition through 2006 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 (z)(1), 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 to 150.0 psig. The actual value for suction pressure during inservice testing is approximately 15.0 psig. As a result, the instrument range exceeds the requirement of ISTB-3510(b)(1).

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

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

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

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

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

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

Although the permanently installed suction pressure gauge (PI-99) is above the maximum range limits of ASME OM Code ISTB-3510(b)(1), it, in conjunction with the permanently installed discharge pressure gauge (PI-81), yields a better accuracy for differential pressure than the minimum requirements dictated by the code and is, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6% of the differential pressure reference value. Reference NUREG 1482, Revision 2, Section 5.5.1.

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

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3510(b)(1), identified above, will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

Therefore, pursuant to 10 CFR 50.55a(z)(1), 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 fifth 10-year interval.

7. **Precedents**

This relief request was previously approved for the fourth 10-year interval at CNS as Relief Request RP-03 (TAC Nos. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, and MC8992, June 14, 2006).

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

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternative Provides Acceptable Level of Quality and Safety

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

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

2. **Applicable Code Edition and Addenda**

ASME OM Code 2004 Edition through 2006 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 (z)(1), 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 to 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 reactor core isolation cooling pump during inservice testing is approximately 15.0 psig. Based on ISTB-3510(b)(1) this would require, as a maximum, a gauge with a range of 0 to 45.0 psig (3 X 15.0 psig) to bound the lowest actual value for suction pressure. Applying the accuracy requirement of ± 2% of full scale (± 6% of reference) for the quarterly Group B pump test, the resulting inaccuracies due to pressure effects would be ± 0.9 psig (0.02 X 45.0 psig).

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

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

The CNS-installed suction pressure gauge (PI-66), which was designed to have an accuracy of ± 0.5% of full scale, has a range of approximately 165 psig. The 165 psig gauge range is derived from the 30" Hg portion of the gauge range that is in a vacuum, which converts to approximately 15 psig, added to the 150 psig positive portion of the gauge. The ± 1.0 psig current calibration tolerance is essentially a tolerance of approximately 0.6% of full scale (0.006 X 165 psig = ~ ± 1.0 psig). Currently, the installed discharge pressure indicator (PI-59) is a 0 to 1500 psig indicator. The discharge indicator is being calibrated to ± 15 psig, or ± 1.0% of full scale (0.01 X 1500 psig = ± 15.0 psig).

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

Although the permanently installed suction pressure gauge (PI-66) is above the maximum range limits of ASME OM Code ISTB-3510(b)(1), it, in conjunction with the permanently installed discharge pressure gauge (PI-59), yields a better accuracy for differential pressure than the minimum requirements dictated by the code and is, therefore, suitable for the test. The range and accuracy of the instruments used to determine differential pressure will be within ± 6% of the differential pressure reference value. Reference NUREG 1482, Revision 2, Section 5.5.1.

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

Using the provisions of this relief request as an alternative to the specific requirements of ISTB-3510(b)(1), identified above, will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

Therefore, pursuant to 10 CFR 50.55a(z)(1), 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 fifth ten-year interval.

7. <u>Precedents</u>

This relief request was previously approved for the fourth ten-year interval at CNS as Relief Request RP-04 (TAC Nos. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, and MC8992, June 14, 2006).

Relief Request RP-05
Loop Accuracy Requirements

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternate Provides Acceptable Level of Quality and Safety

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

CS-P-A	Core Spray (CS) 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
SW-P-BPA	Service Water Booster (SWB) 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 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

Table ISTB-3510-1, "Required Instrument Accuracy"

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (z)(1), relief is requested from the requirement of ASME OM Code ISTB Table ISTB-3510-1 for Group A and B Pump Pressure accuracy (± 2%) and for flow rate accuracy (± 2%). The proposed alternative would provide an acceptable level of quality and safety.

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%
SWB Pump Flowrate	2.03	≤ 2.00%

As a result, the equipment loop accuracies do not meet the ± 2% requirements of Table ISTB-3510-1, "Required Instrument Accuracy."

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

The difference between the code required and presently installed instrument loop accuracies is 0.06%, at a maximum, as presented above. This difference is insignificant when applied to the quantitative measured values for these parameters during the respective Group A or Group B

Relief Request RP-05
Loop Accuracy Requirements
(Continued)

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

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

CS pump flow rate loop is made up of a flow indicator (range of 0 to 6000 gallons per minute [gpm]), and a flow transmitter. The flow indicator (FI-50A/B) has a nameplate accuracy of ± 2%, and the flow transmitter (FT-40A/B) has a nameplate accuracy of ± 0.25%. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for discharge pressure indication is ± 2.02% (square root of the sum of the squares), which exceeds the code requirement of ± 2%. The variation from the code of 0.02%, with a gauge range of 0 to 6000 gpm, would amount to potential deviation of only 1.2 gpm (6000 X .0002). However, CNS is currently calibrating this flow loop to within ± 50 gpm (at the Inservice Testing (IST) reference value of 5000 gpm) or approximately ± 0.83% of full scale (± 0.0083 X 6000 = ~ ± 50 gpm), which is better than the ± 2% of full scale accuracy requirements of the code. If a preservice test were to be run, CNS would ensure that the loop was calibrated to ≤ 2% over the full range of the test prior to performing it.

HPCI pump flow rate loop is made up of a flow indicating controller (range of 0 to 5000 gpm), a flow transmitter, and a flow square rooter. The flow indicating controller (FIC-108) has a nameplate accuracy of ± 0.25%, the flow transmitter (FT-82) has a nameplate accuracy of ± 0.25%, and the flow square rooter (SQRT-118) has a nameplate accuracy of ± 2% from approximately 0 to 1000 gpm and ± 0.5% from approximately 1000 to 5000 gpm. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately ± 2.03% (square root of the sum of the squares) from 0 to 1000 gpm, which does not meet the code requirement of ± 2%, and approximately ± 0.61% from 1000 to 5000 gpm, which does meet the code requirement of ± 2%. The variation from the code of 0.03% in the range of 0 to 1000 gpm, with a gauge range of 0 to 5000 gpm, would amount to a potential deviation of only 1.5 gpm (5,000 X .0003). However, CNS is currently calibrating this flow loop to within ± 100 gpm (at the IST reference of 4000 gpm and at other points from 1000 gpm to 5000 gpm) or ± 2% of full scale (± 0.02 X 5000 = ~ ± 100 gpm), which is equivalent to the ± 2% of full scale accuracy requirements of the code. If a preservice test were to be run, CNS would ensure that the loop was calibrated to ≤ 2% over the full range of the test prior to performing it.

The SWB flow rate is made up of a flow indicator (range of 0 to 10,000 gpm), a flow transmitter, and a flow square rooter. The flow indicator (FI-132A/B) has a nameplate accuracy of ± 2%, the flow transmitter (FT-97) has a nameplate accuracy of ± 0.25%, and the flow square rooter (SQRT-132A/B) has a nameplate accuracy of ± 0.25%. Therefore, based on the nameplate accuracies alone, the equipment loop accuracy for flow indication is approximately ± 2.03%

Relief Request RP-05
Loop Accuracy Requirements
(Continued)

(square root of the sum of the squares), which exceeds the code requirement of ± 2%. The variation from the code of 0.03%, with a gauge range of 0 to 10,000 gpm, would amount to a potential deviation of only 3 gpm (0.0003 X 10,000). However, CNS is currently calibrating this flow loop to within ± 100 gpm, which is equivalent to a ± 1% of full scale tolerance (0.01 X 10,000 gpm = ± 100 gpm), which is better than the ± 2% of full scale accuracy requirements of the code.

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 do not meet the accuracy requirements of ASME OM Code ISTB Table ISTB-3510-1 when looking at nameplate accuracies, the effects of these small inaccuracies are insignificant when compared to the measured values, and credit will be taken for the ability to calibrate the loop within the code-allowed tolerance.

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

Using the provisions of this relief request as an alternative to the specific requirements of ISTB Table 3510-1, 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(z)(1), 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 fifth ten-year interval.

7. **Precedents**

This relief request was previously approved for the fourth ten-year interval at CNS as Relief Request RP-05 (TAC Nos. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, and MC8992, June 14, 2006).

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

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternative Provides Acceptable Level of Quality and Safety

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

REC-P-A	Reactor Equipment Cooling (REC) 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 2004 Edition through 2006 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 (z)(1), 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 to 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 2, 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(z)(1), 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 fifth ten-year interval.

7. **Precedents**

This relief request was previously approved for the fourth ten-year interval at CNS as Relief Request RP-06 (TAC Nos. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, and MC8992, June 14, 2006).

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

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(2)

Alternative Demonstrates a Hardship Without a Compensating Increase in 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 2004 Edition through 2006 Addenda

3. Applicable Code Requirement

ISTB Table ISTB-5121-1, "Centrifugal Pump Test Acceptance Criteria"

4. Reason for Request

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (z)(2), relief is requested from the requirement of ASME OM Code ISTB Table ISTB-5121-1 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 demonstrates a hardship without a compensating increase in quality and safety.

The IST Program has consistently required (prior to obtaining relief per RP-06 of the third interval program) that CS Pump B (CS-P-B) be tested on an increased frequency due to vibration values at Points 1H and 5H, as shown in Figure 1, periodically being in the alert range. Relief is requested from ISTB Table ISTB-5121-1 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.

5. Proposed Alternative and Basis for Use

Pump Testing Methodology

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 minimum flow line isolation valve for CS-P-B is initially open when the pump is started, and flow is initially recirculated through the minimum flow line back to the suppression pool.

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

Then, the full-flow test line isolation valve is throttled open to establish flow through the full-flow recirculation test line. The minimum 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 minimum flow testing due to the ability to evaluate overall pump performance at post-accident flow design conditions. Minimum flow testing would provide only limited information about the pump.

Nuclear Regulatory Commission (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.

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.

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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.

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 OM 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 relief request. 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, which began on March 1, 2006, the 2001 Edition through 2003 Addenda of the ASME OM Code was the code of record. Vibration measurements were required to be taken only during the comprehensive test since the CS-P-B pump is considered a Group B pump. The same will be true for the fifth interval, beginning on March 1, 2016, in which the 2004 Edition through the 2006 Addenda of the ASME OM Code will be the code of record.

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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 eighteen years of data at the same reference points.

CS-P-B IST vibration trend graphs for vibration points 5H, 1V, 2H, and 3H (Figures 3a, 4a, 5a, and 6a in this relief request), which include data from November 6, 1996, to the present, show flat or slightly downward trends. Vibration point 1H shows an essentially flat trend from ~2002 to the present (Figure 2a) and when including the data since 1990 (Figure 2b). These observations indicate 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 approximately twenty years of data for pump D/P with the testing at 5000 gpm. As can be seen from Figure 12, no degradation in pump D/P has occurred.

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. However, 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 ~24.5 years or in D/P for ~20 years.

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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 Hertz [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, Inc., 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.
>
> 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 points 1H and 5H for ~24.5 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 for data since 2010). 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.

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

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

Byron Jackson is the pump manufacturer for CS-P-B. The pump is an 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 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 revolutions per minute (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.

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

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> 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.

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.

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 CS 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.

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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 CS-P-B.

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.

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, Inc. 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, Inc., 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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Machinery Solutions, Inc. 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.

Machinery Solutions, Inc. 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.

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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.

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 CS test return line throttle valve and/or restriction orifices was likely causing the elevated piping vibration in both CS System loops. Vibration testing of the CS 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 CS 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 (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.

IV. Spectral Analysis (Key Component No. 4)

Figures 7 through 11 in this relief request show spectrum plots for CS-P-B, as well as spectrum trends. These plots show that the peak energy spikes for points 1H and 5H

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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, Inc., 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.

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" CS System during pre-operational stage. As discussed previously, this resulted in lowering CS-P-B vibrations.

2. January 1977: Vibration eliminator on "B" CS 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.

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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.

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, 08-30-04, 01-05-05, 08-14-06, 02-28-07, 08-14-07, 02-11-08, 08-14-08, 02-19-09, 08-12-09, 02-09-10, 08-25-10, 03-11-11, 09-02-11, 12-13-11, 03-02-12, 08-24-12, 02-12-13, 08-13-13, 02-11-14, 08-13-14): 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

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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. Engineering Calculation 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.

This search of the maintenance history, covering a time period of approximately forty years, identified no significant maintenance or corrective actions that had to be implemented for the "B" CS 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. <u>Basis for Code Alternative Alert Values for Points 1H and 5H</u>

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 ~24.5 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.

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

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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.

Conclusions

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 ~24.5 years and differential pressure data over nearly the past ~20 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.

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-5121-1. 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-5121-1. The absolute alert and required action limits for all vibration points associated with CS-P-B are summarized in the table below.

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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. **Duration of Proposed Alternative**

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

7. **Precedents**

This relief request was previously approved for the fourth ten-year interval at CNS as Relief Request RP-07 (TAC Nos. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, and MC8992, June 14, 2006).

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CS-P-B Figures

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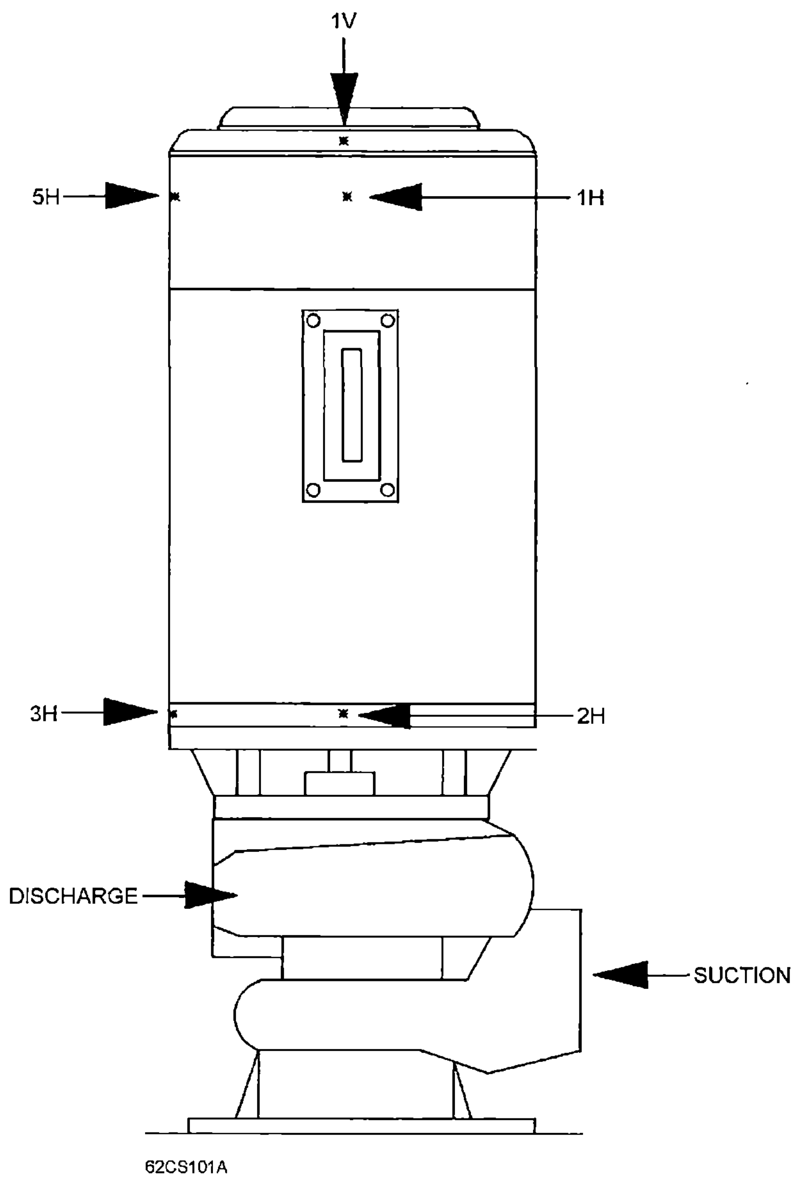

Figure 1
CS-P-B Vibration Monitoring Points

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Core Spray Pump B Vibration Alert Limits
(Continued)

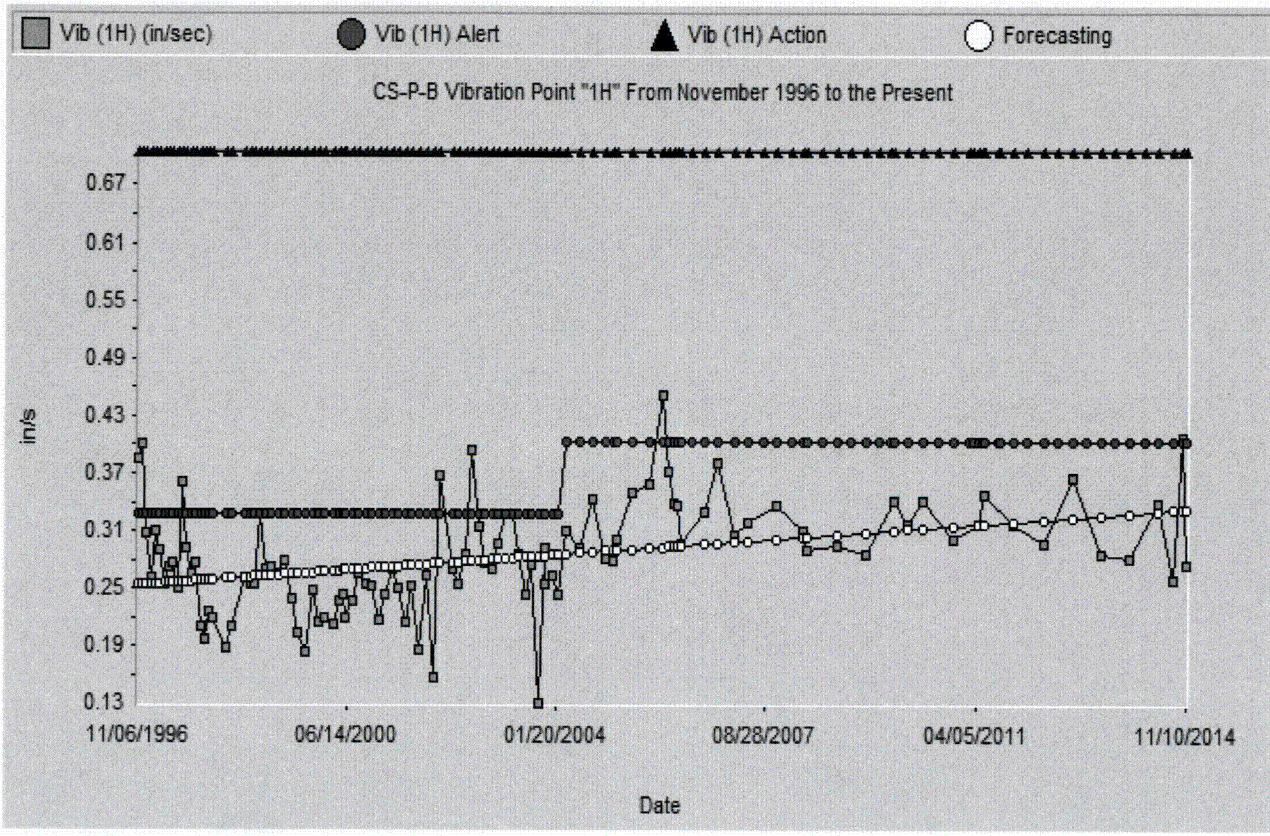


Figure 2a
CS-P-B Vibration Point 1H from November 1996 to the Present

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

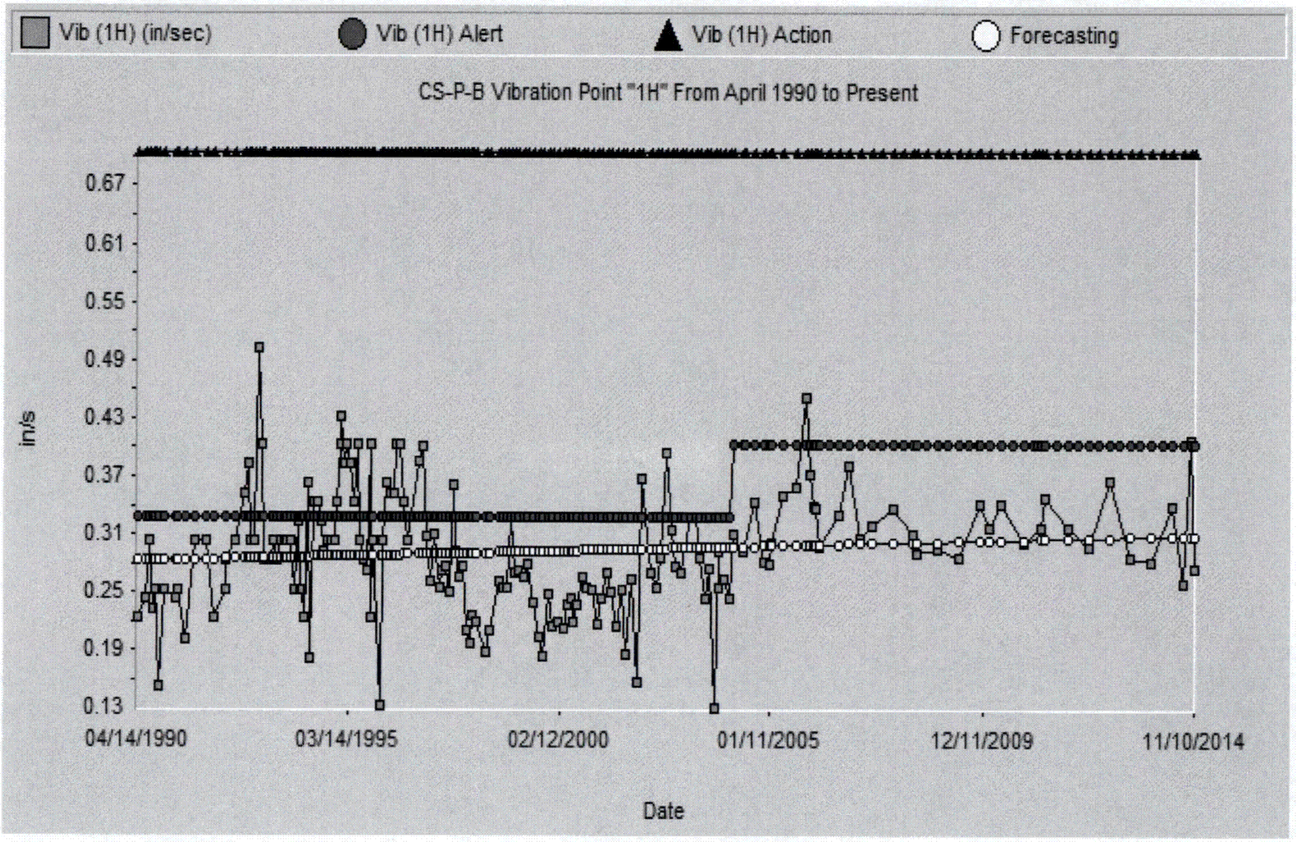
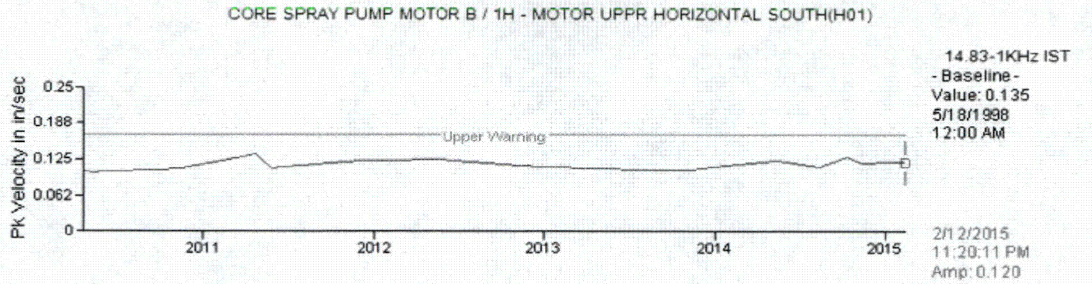
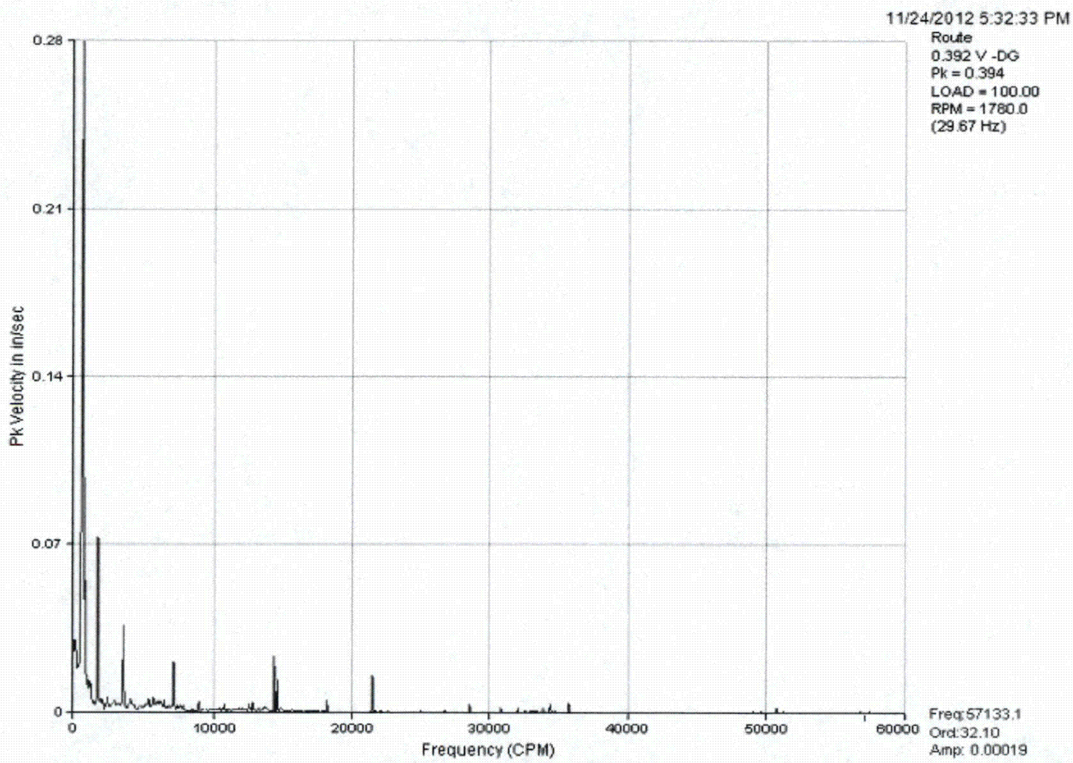


Figure 2b
CS-P-B Vibration Point 1H from April 1990 to the Present

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





List of Trend Points

Station: REACTOR BUILDING
Machine: CS-MOT-B --> CORE SPRAY PUMP MOTOR B
Meas Point: 1H --> MOTOR UPPR HORIZONTAL SOUTH (H01)
Parameter: 14.83-1KHZ (PK Velocity in In/Sec)

Date Time	Value	Date Time	Value
10-May-10 14:21	.103	16-May-13 11:28	.109
16-Nov-10 13:09	.109	13-Nov-13 12:35	.108
21-Apr-11 15:06	.135	13-May-14 22:51	.124
24-May-11 13:43	.110	14-Aug-14 10:55	.112
23-Nov-11 13:32	.122	12-Oct-14 02:08	.130
23-May-12 10:51	.125	10-Nov-14 23:21	.120
24-Nov-12 17:32	.113	12-Feb-15 23:20	.120

Early Warning Limits --- .169
Alert Limit Values --- .300
Fault Limit Values --- .700

Figure 2c
Trend of Vibration Point 1H with Data Below One-Half Pump Running Speed Filtered from May 2010 to the Present

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

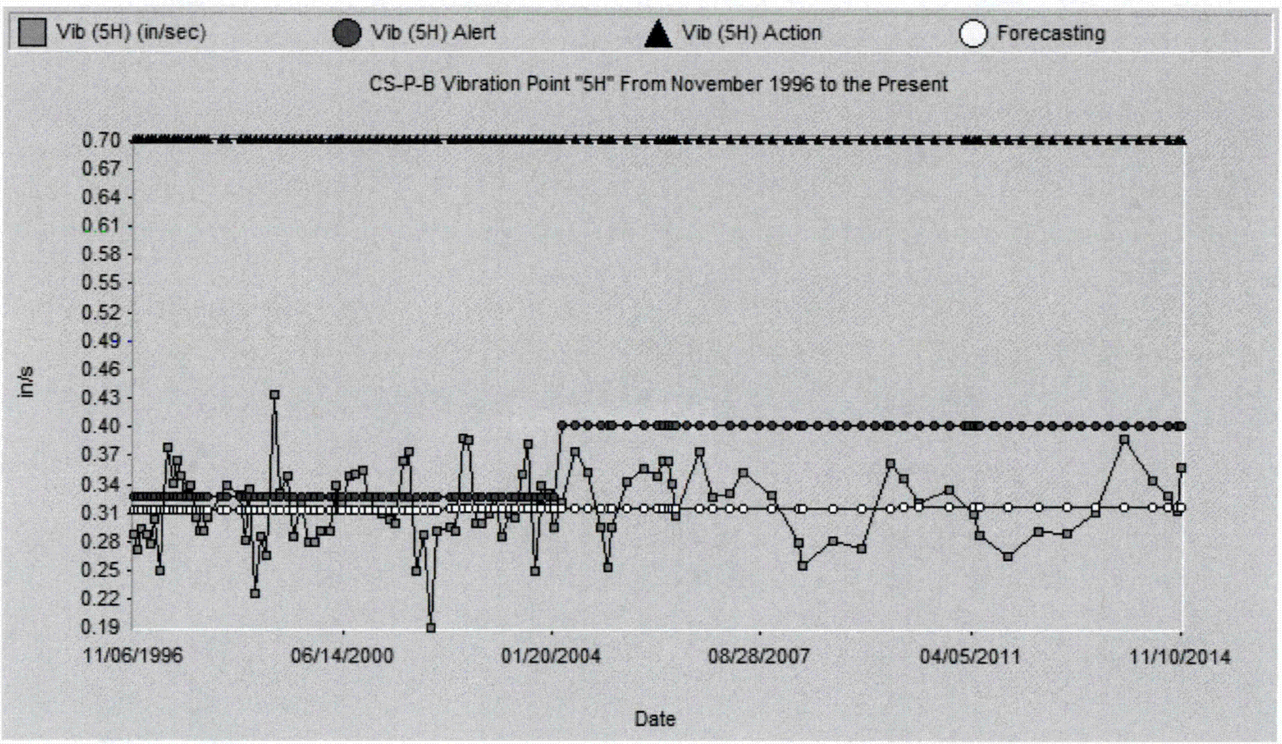


Figure 3a
CS-P-B Vibration Point 5H from November 1996 to the Present

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

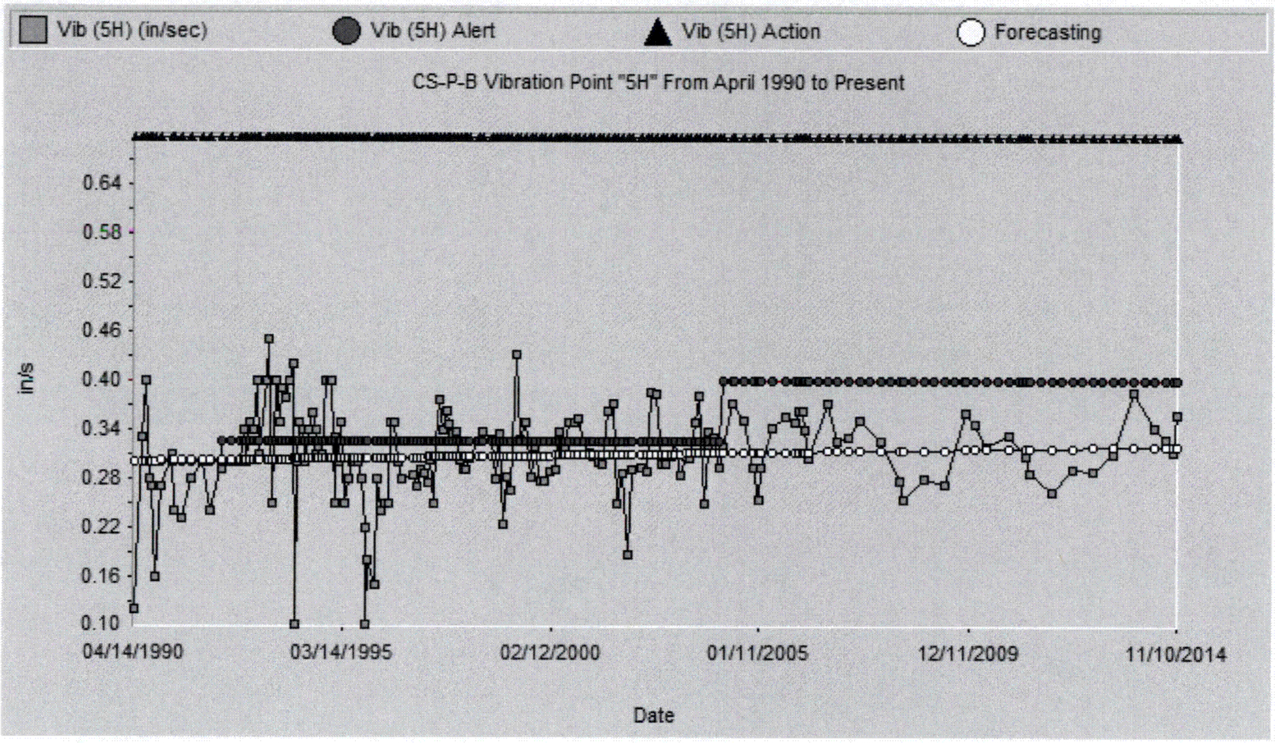
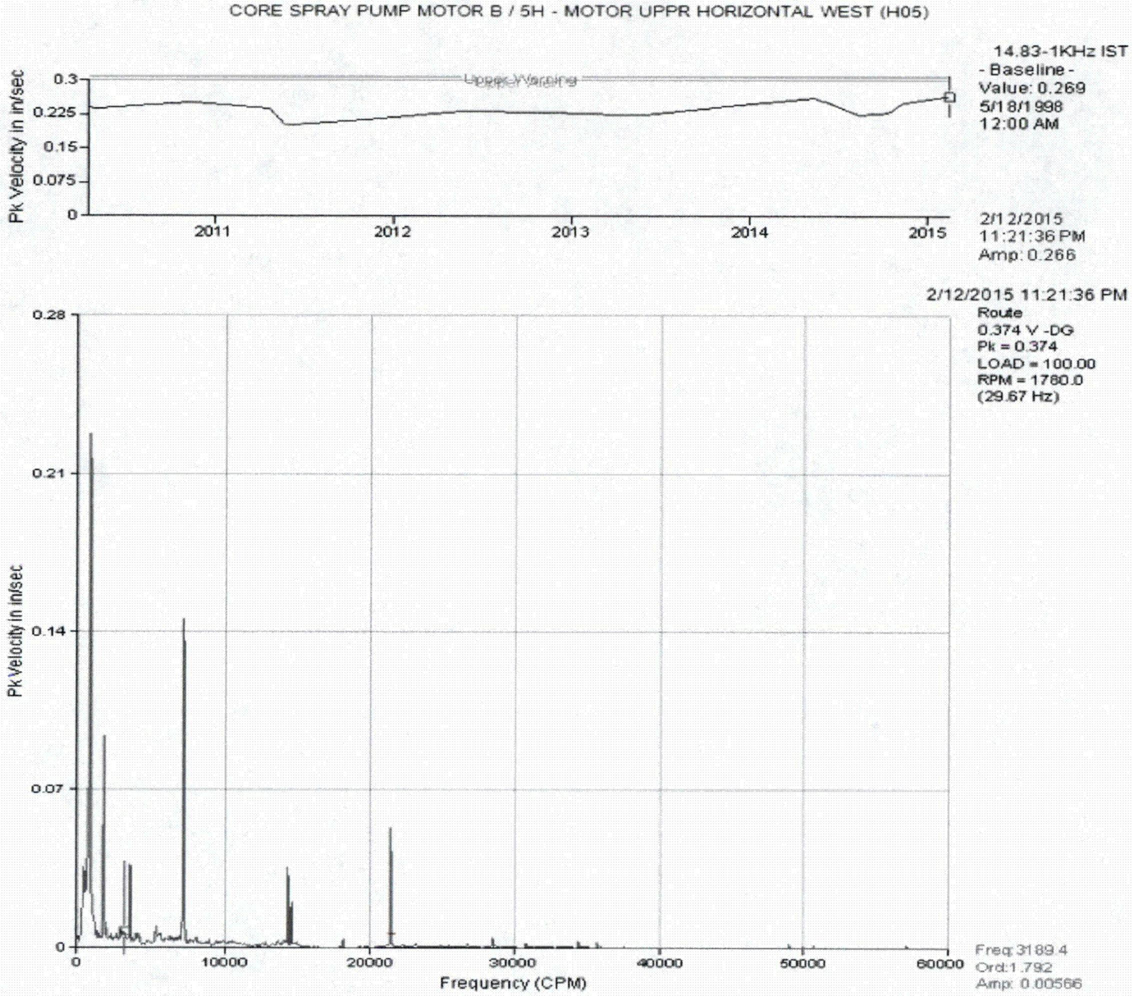


Figure 3b
CS-P-B Vibration Point 5H from April 1990 to the Present

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



<u>List of Trend Points</u>

Station: REACTOR BUILDING
Machine: CS-MOT-B --> CORE SPRAY PUMP MOTOR B
Meas Point: 5H --> MMOTOR UPPR HORIZONTAL WEST (H05)
Parameter: 14.83-1KHZ (PK Velocity in In/Sec)

Date Time	Value	Date Time	Value
09-Feb-10 14:48	.252	24-Nov-12 17:32	.229
10-Feb-10 10:04	.252	16-May-13 11:30	.223
10-May-10 14:21	.238	13-Nov-13 12:35	.243
16-Nov-10 13:09	.252	13-May-14 22:52	.262
21-Apr-11 15:06	.238	14-Aug-14 10:56	.224
24-May-11 13:43	.201	12-Oct-14 02:09	.229
23-Nov-11 13:33	.215	10-Nov-14 23:22	.250
23-May-12 10:52	.232	12-Feb-15 23:21	.266

Early Warning Limits --- .309
Alert Limit Values --- .300
Fault Limit Values --- .700

Figure 3c

Trend of Vibration Point 5H with Data Below One-Half Pump Running Speed Filtered from February 2010 to the Present

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

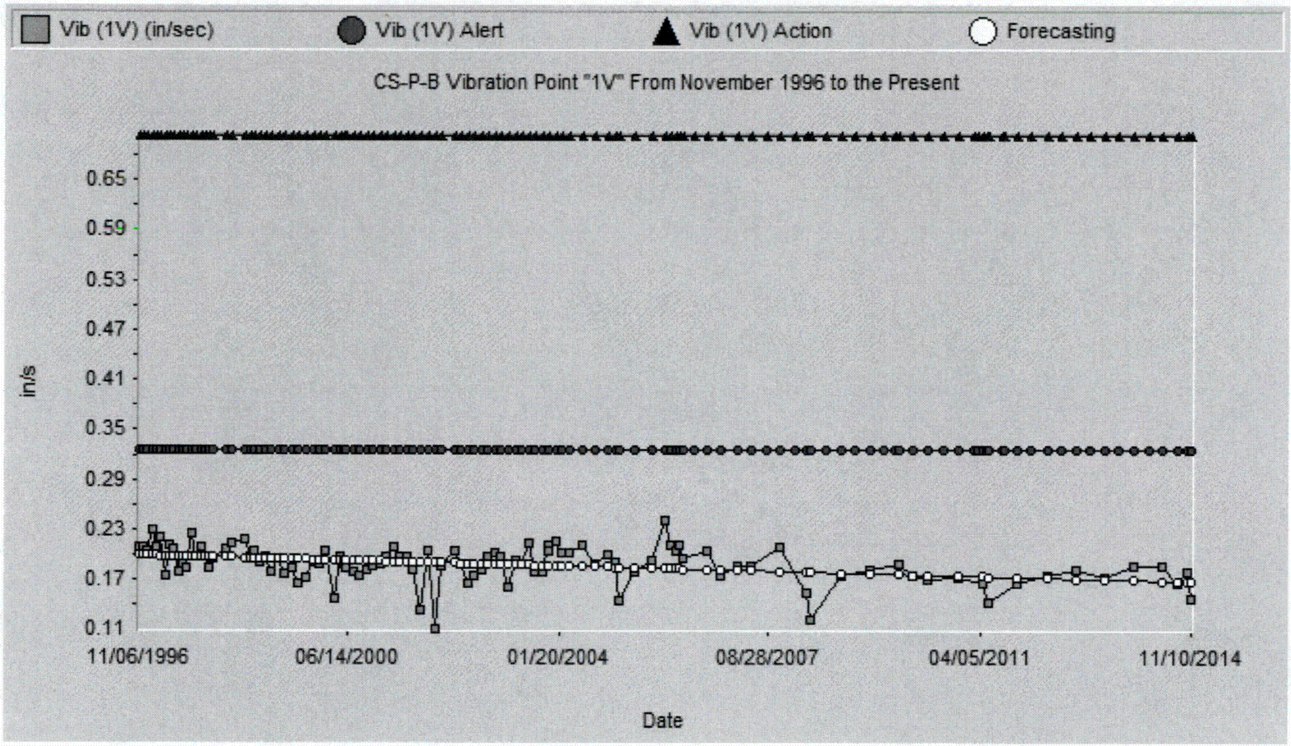


Figure 4a
CS-P-B Vibration Point 1V from November 1996 to the Present

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

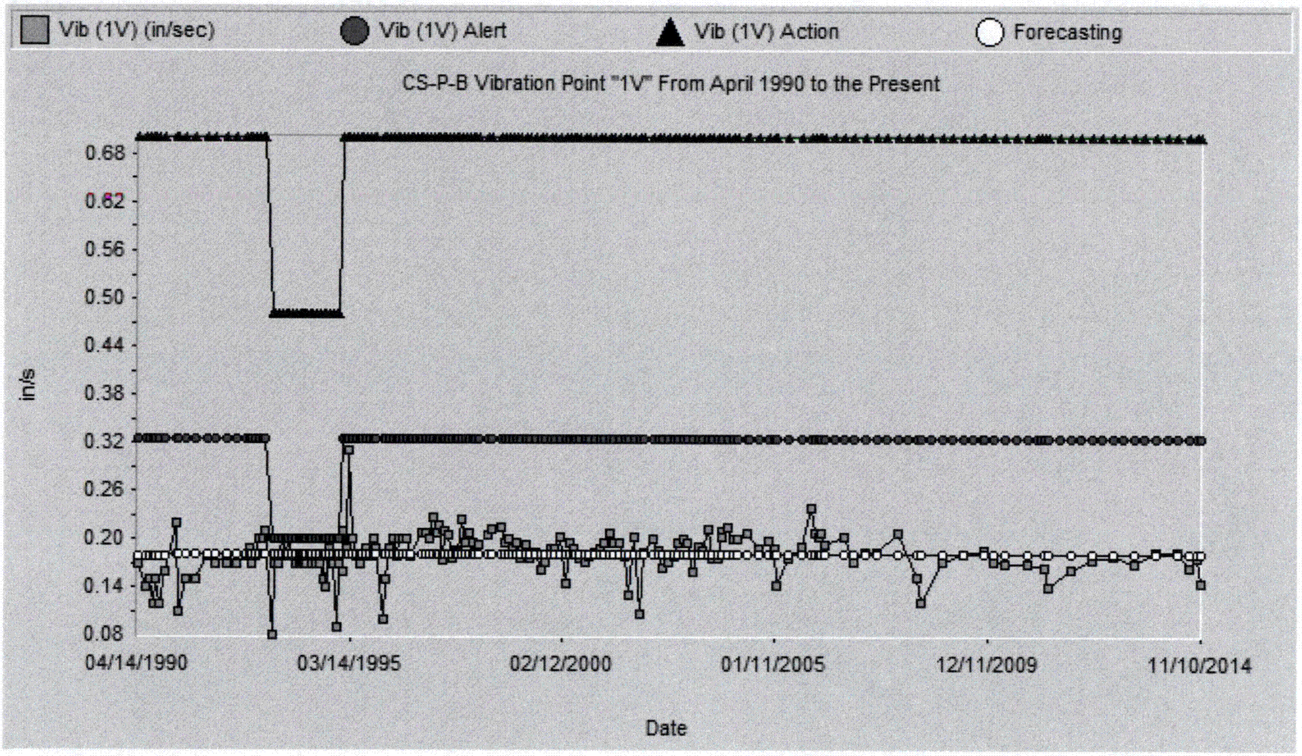


Figure 4b
CS-P-B Vibration Point 1V from April 1990 to the Present

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

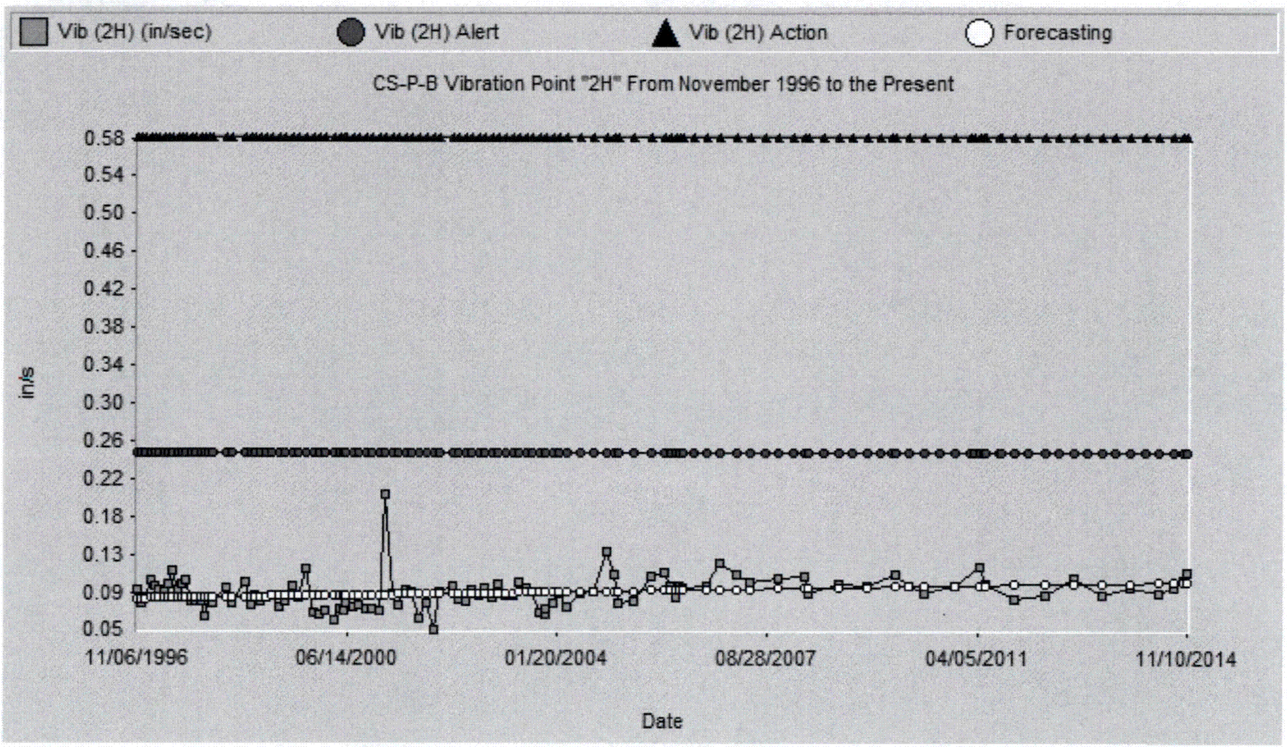


Figure 5a
CS-P-B Vibration Point 2H from November 1996 to the Present

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

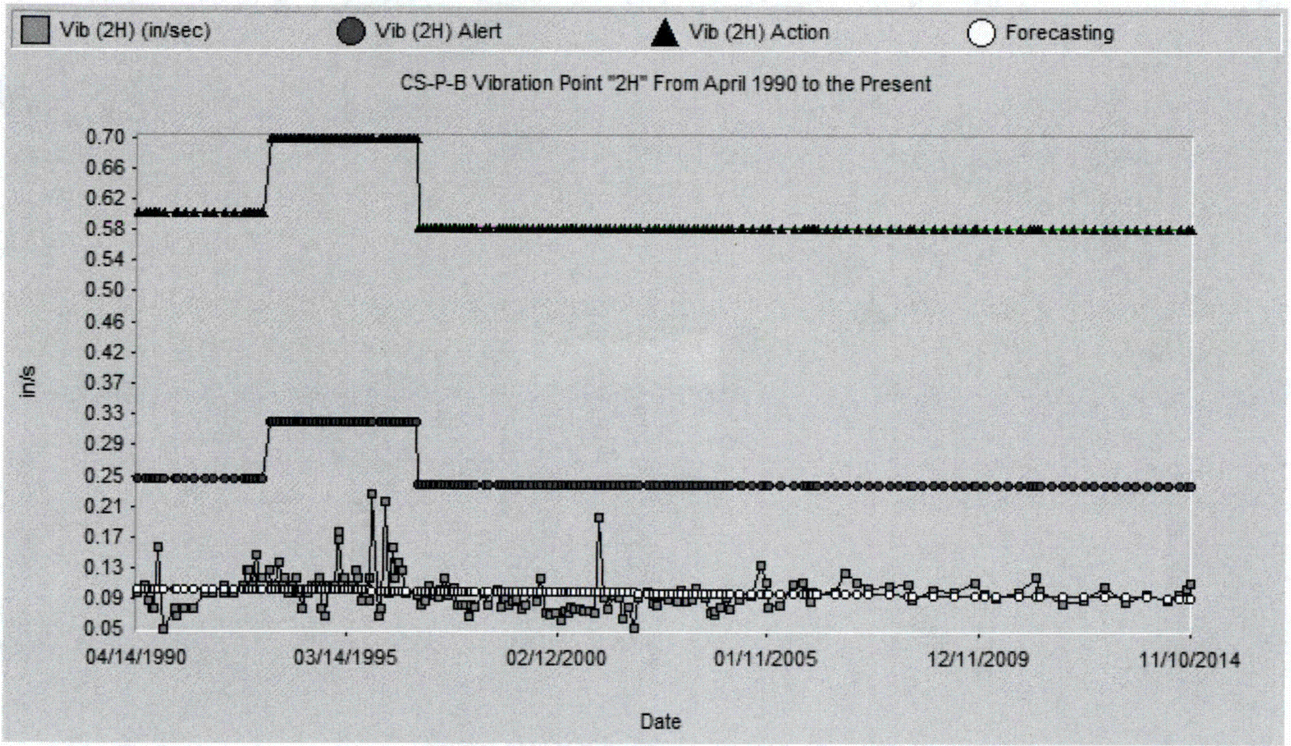


Figure 5b
CS-P-B Vibration Point 2H from April 1990 to the Present

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

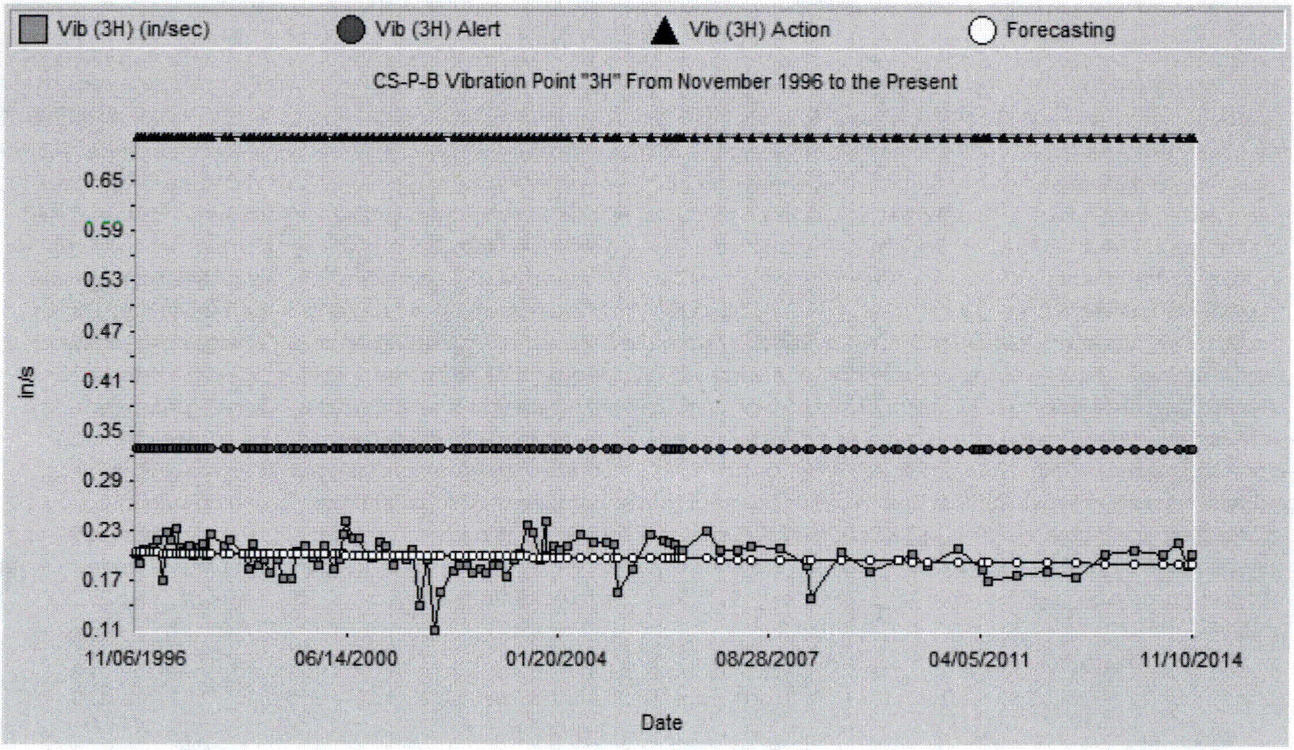


Figure 6a
CS-P-B Vibration Point 3H from November 1996 to the Present

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

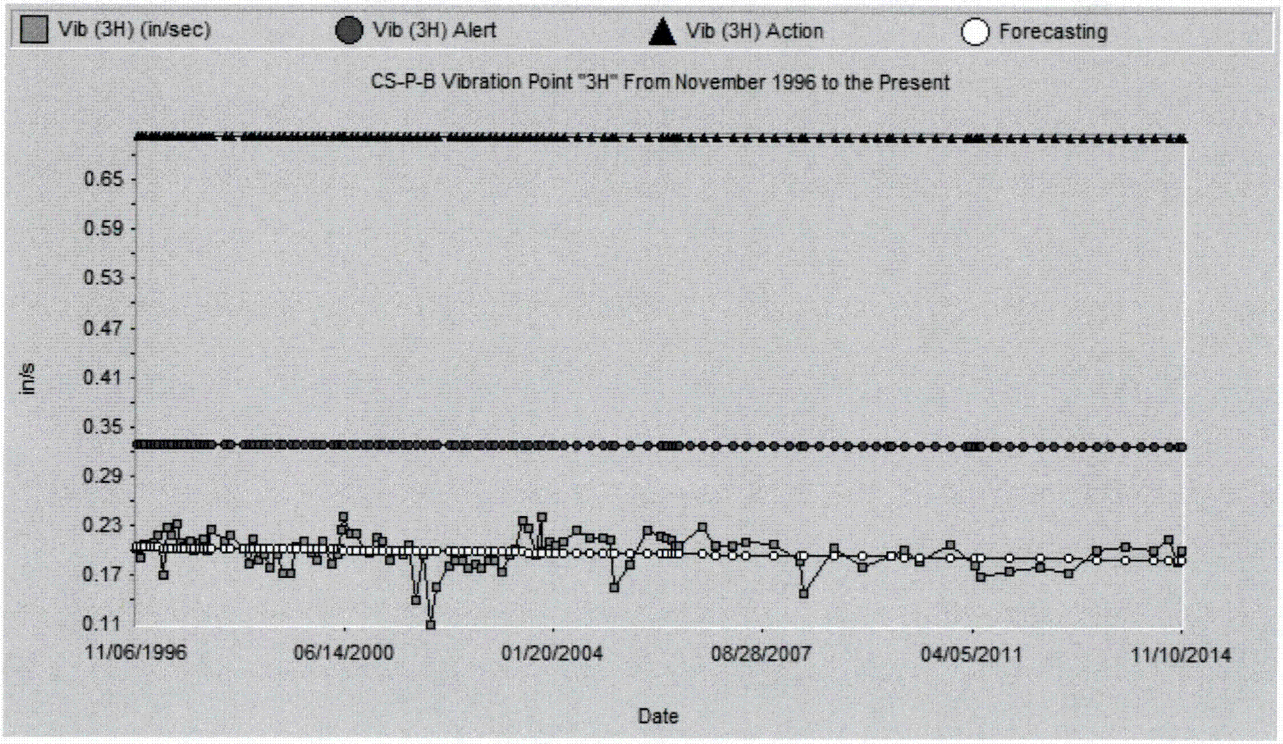
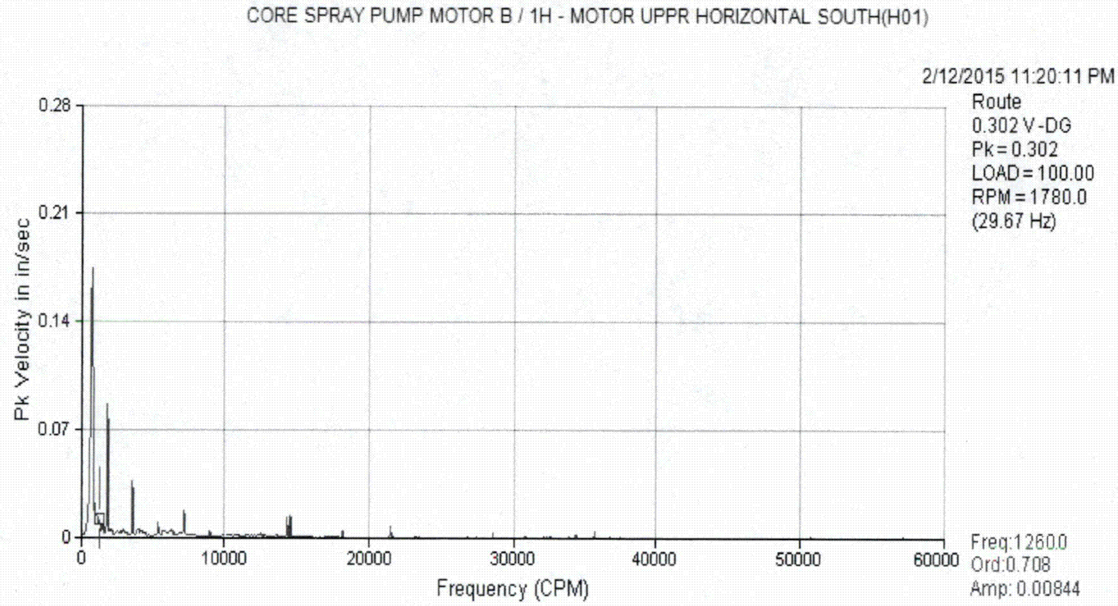


Figure 6b
CS-P-B Vibration Point 3H from April 1990 to the Present

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



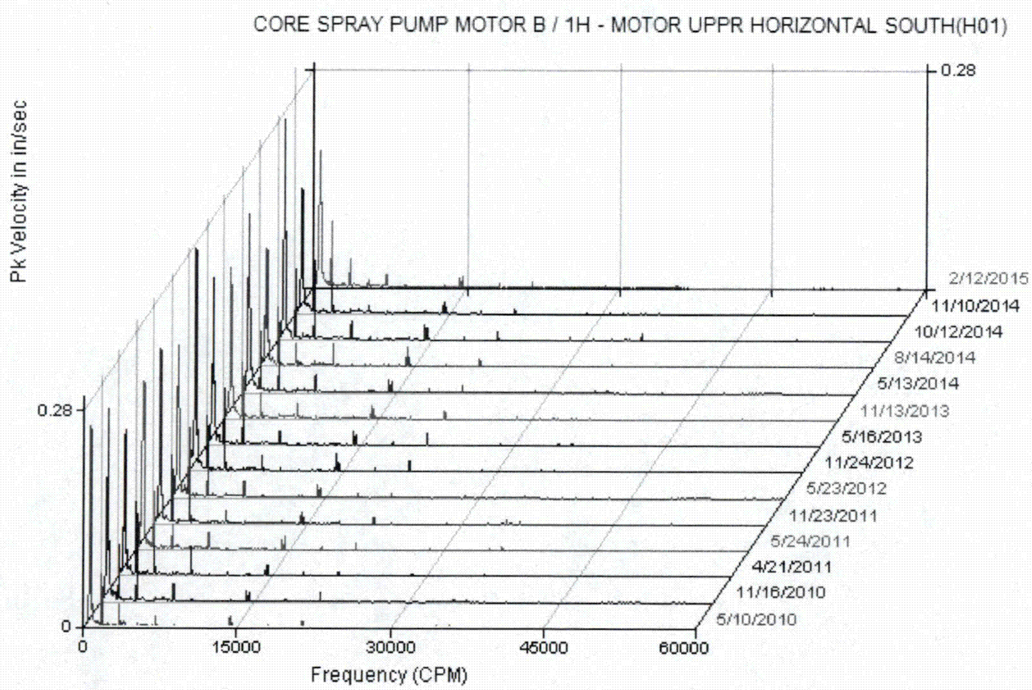
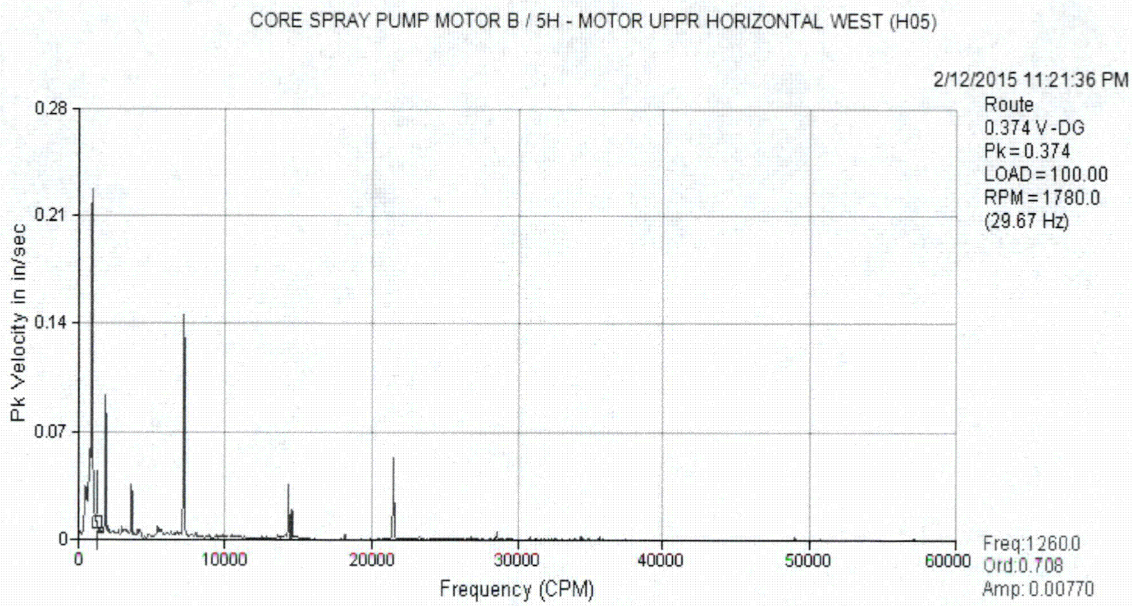


Figure 7
Spectral Trend for Vibration Point 1H

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



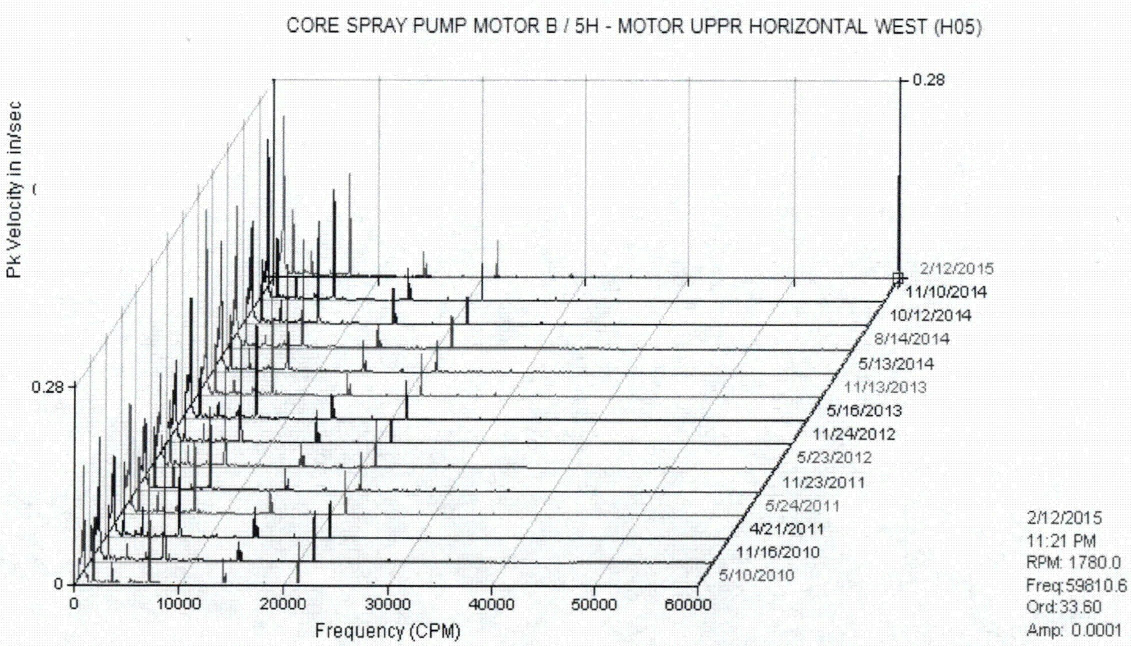
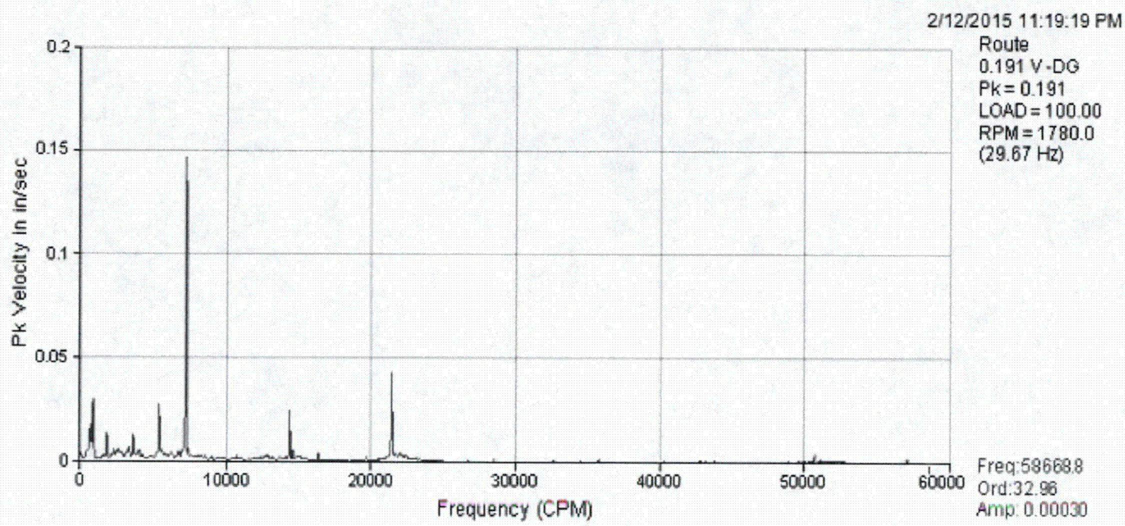


Figure 8
Spectral Trend for Vibration Point 5H

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



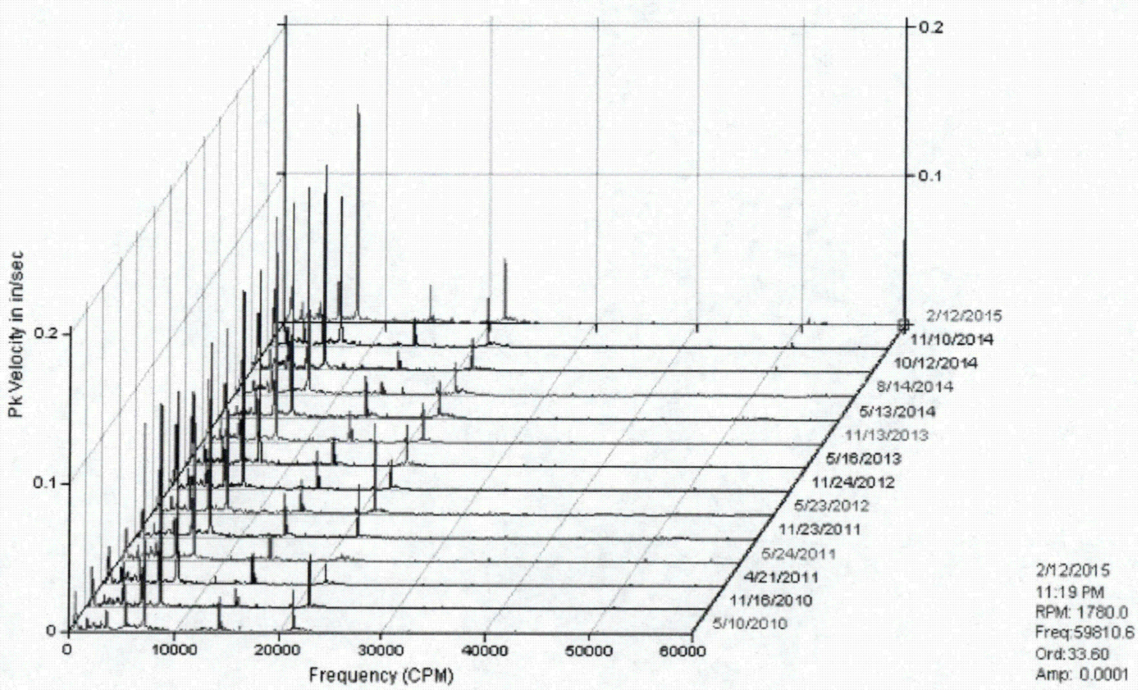
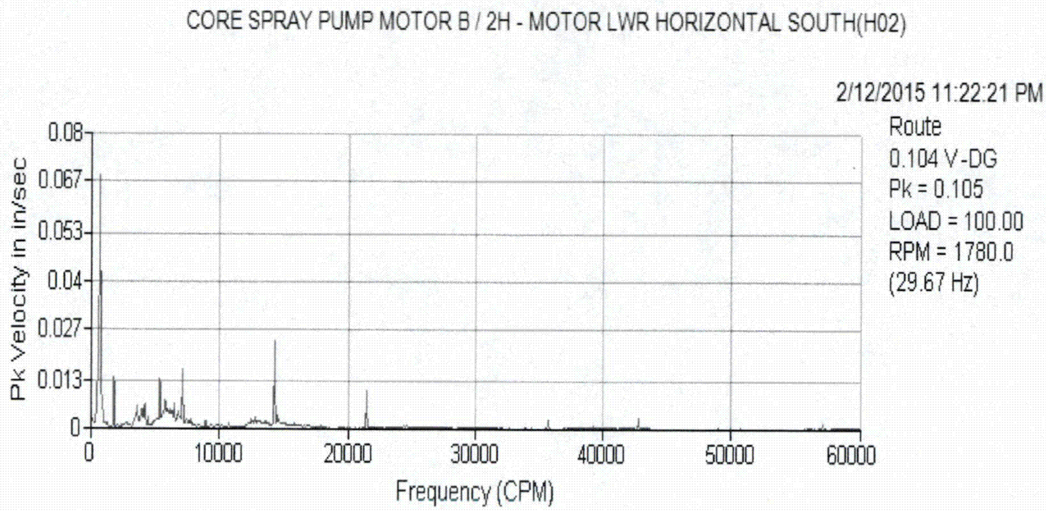


Figure 9
Spectral Trend for Vibration Point 1V

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



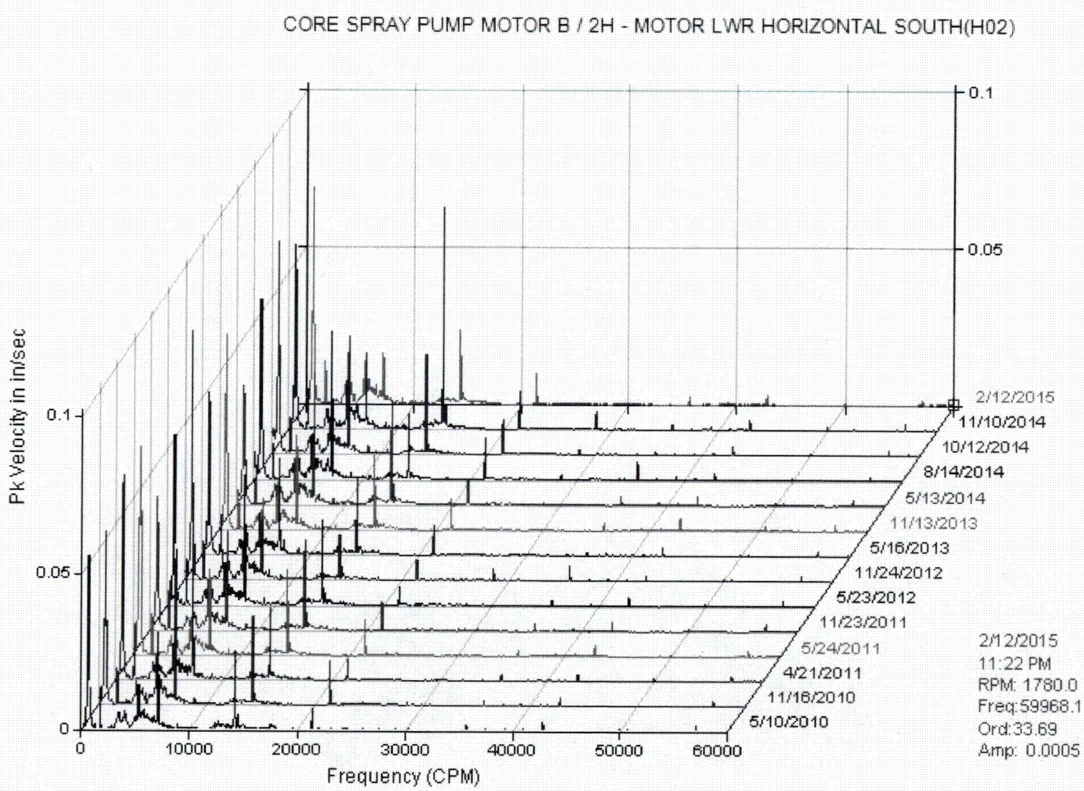
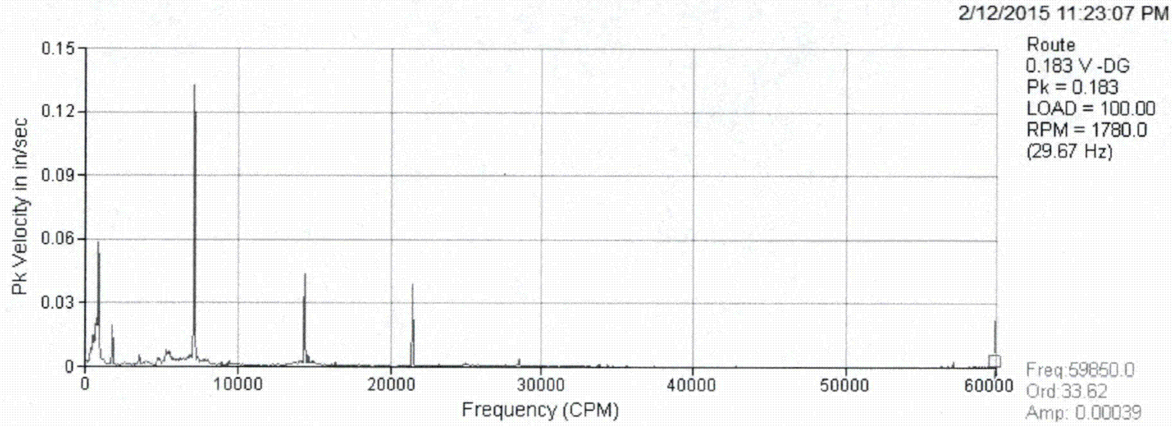


Figure 10
Spectral Trend for Vibration Point 2H

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

RX - CORE SPRAY PUMP MOTOR B
CS-MOT-B -3H MOTOR LWR HORIZONTAL WEST
(H03)



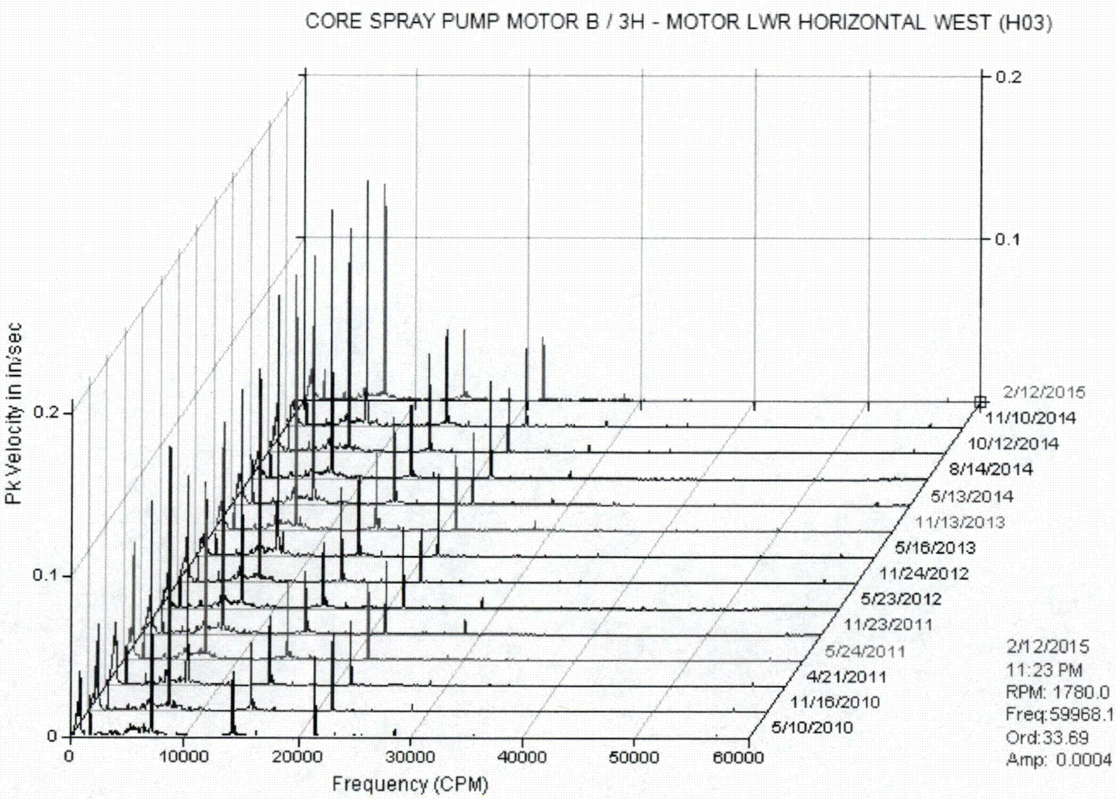


Figure 11
Spectral Trend for Vibration Point 3H

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

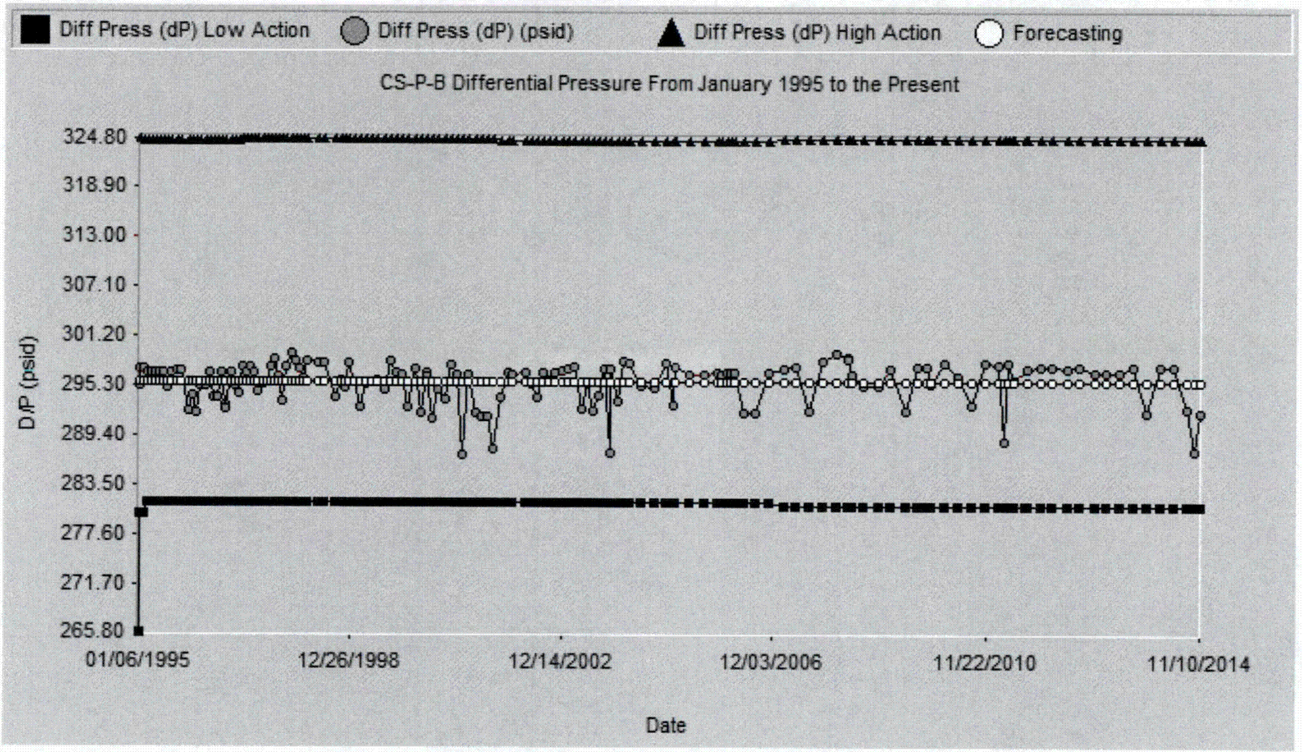


Figure 12
CS-P-B Differential Pressure Since January 1995 to the Present

Relief Request RP-08
Comprehensive Pump Test Upper Limit

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternative Provides Acceptable Level of Quality and Safety

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

REC-P-A/B/C/D	Reactor Equipment Cooling Pumps
RHR-P-A/B/C/D	Residual Heat Removal Pumps
SW-P-A/B/C/D	Service Water Pumps

2. **Applicable Code Edition and Addenda**

ASME OM Code 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ISTB-5123 "Comprehensive Test Procedure," (e), refers to Table ISTB-5121-1, which utilizes a multiplier of 1.03 times the reference value for the comprehensive pump test's upper "Acceptable Range" and "Required Action Range High" criteria.

ISTB-5223 "Comprehensive Test Procedure," (e), refers to Table ISTB-5221-1, which utilizes a multiplier of 1.03 times the reference value for the comprehensive pump test's upper "Acceptable Range" and "Required Action Range High" criteria.

ISTB-5323 "Comprehensive Test Procedure," (e), refers to Tables ISTB-5321-1 and ISTB-5321-2, both of which utilize a multiplier of 1.03 times the reference value for the comprehensive pump test's upper "Acceptable Range" and "Required Action Range High" criteria.

4. **Reason for Request**

Occasionally, NPPD has had some difficulty with implementing the high required action range limit of 1.03% above the established hydraulic parameter reference value due to normal data scatter. NPPD has had to address an inoperability of a pump on at least two occasions during the fourth ten-year interval in which a pump was declared inoperable during a comprehensive pump test due to exceeding this upper limit. The result was that the plant had to enter (or remain in) an applicable Technical Specification Limiting Condition for Operation (LCO) for reasons other than a pump degradation issue.

Based on the similar difficulties experienced by other Owners, ASME OM Code Case OMN-19 was developed and has been published in the 2011 Addenda of the ASME OM Code. The white paper for this code case, Standards Committee Ballot 09-610, record 09-657, discussed the impact of instrument inaccuracies, human factors involved with setting and measuring test parameters, readability of gauges and other miscellaneous factors on the ability to meet the 1.03% acceptance criteria. Industry operating experience is also discussed in the white paper.

Relief Request RP-08
Comprehensive Pump Test Upper Limit
(Continued)

Code Case OMN-19 has not yet been approved for use in RG 1.192, "Operations and Maintenance Code Case Acceptability, ASME OM Code."

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (z)(1), relief is requested from the multiplier of 1.03 times the reference value for the comprehensive pump test's upper "Acceptable Range" and "Required Action Range High" criteria, referenced in Tables ISTB-5121-1, ISTB-5221-1, ISTB-5321-1, and ISTB-5321-2. The proposed alternative would provide an acceptable level of quality and safety.

5. Proposed Alternative and Basis for Use

CNS proposes to use the ASME OM Code Case OMN-19 as published in the 2011 Addenda of the ASME OM Code for the fifth ten year interval IST Program. The ASME OMN-19 Code Case allows for the use of a multiplier of 1.06 times the reference value in lieu of the 1.03 multiplier for the comprehensive pump test's upper "Acceptable Range" criteria and "Required Action Range, High" criteria referenced in the applicable ISTB test acceptance criteria tables ISTB-5121-1, ISTB-5221-1, ISTB-5321-1 and ISTB-5321-2.

The bases for the approval of OMN-19, as discussed in the Standards Committee Ballot white paper, are summarized below:

1) Instrument inaccuracies of measured hydraulic value.
2) Instrument inaccuracies of set value and its effect on measured value.
3) Instrument inaccuracies and allowed tolerance for speed.
4) Human factors involved with setting and measuring flow, D/P, and speed.
5) Readability of Gauges based on the smallest gauge increment.
6) Miscellaneous Factors.

These inaccuracies may cause the measured value to exceed the existing code allowed comprehensive pump test's upper "Acceptable Range" criteria and the "Required Action Range, High" criteria of 3%. The new upper limit of 6%, as approved in Code Case OMN-19, will eliminate declaring the pump inoperable and entering an unplanned Technical Specification LCO or will eliminate the extension of an existing LCO.

As a condition for using OMN-19, CNS will implement a pump periodic verification (PPV) test program to verify that a pump can meet the required differential (or discharge) pressure, as applicable, at its highest design basis accident flow rate, as discussed in Mandatory Appendix V, which was published in the 2012 Edition of the ASME OM Code. CNS will not be required to perform a PPV test if the design basis accident flow rate in the licensee's safety analysis is bounded by the comprehensive pump test or Group A test. Also, if a pump does not have a design basis accident flow rate, then a PPV test is not required. Therefore, any IST pump that is utilizing the 1.06 multiplier for the comprehensive pump test will meet this condition.

On June 30, 2015, in a response to the Nuclear Regulatory Commission's Request for Additional Information, CNS provided the following list of pumps that RP-08 is applicable to along with the requested information. The last column of the table also indicates which pumps will have a pump periodic verification (PPV) test based on the current design basis accident flow rate and the

Relief Request RP-08
Comprehensive Pump Test Upper Limit
(Continued)

current comprehensive pump test flow rate. As is required by the 2012 ASME OM Code, Mandatory Appendix V, Section V-3000(e), the basis for the PPV test parameters will be documented by the owner.

Instrument inaccuracies associated with the PPV test parameters will be accounted for within the safety analyses and/or within the test acceptance criteria. CNS considers this a clarification to Mandatory Appendix V, Section V-3000(f), which states that the owner shall account for the pump periodic verification test instrument accuracies in the test acceptance criteria. Although not expected, any flow rate changes associated with this table would be available for NRC inspection, upon request.

RP-08 IST Class 1, 2, and 3 Applicable Pumps							
Pump Name	Pump Number	Pump Type	ASME Code Class	ASME OM Code Category	Design Basis Accident Flow Rate (gallons per minute)	IST Comprehensive Pump Test Flow Rate (gallons per minute)	PPV Test Required (Yes/No)
Reactor Equipment Cooling Pumps	REC-P-A/B/C/D	Horizontal centrifugal pump	3	Group A	416	1100	No
Residual Heat Removal Pumps	RHR-P-A/B/C/D	Vertical centrifugal pump	2	Group A	7700	7800	No
Service Water Pumps	SW-P-A/B/C/D	Vertical line shaft pump	3	Group A	5846	5500	Yes

Using the upper limit of 1.06 times the reference value in lieu of the 1.03 multiplier for the comprehensive pump test's upper "Acceptable Range" criteria and "Required Action Range, High" criteria referenced in the applicable ISTB test acceptance criteria tables will provide an acceptable level of quality and safety.

6. Duration of Proposed Alternative

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

7. Precedents

This relief request was approved for the fourth ten-year interval at Columbia Generating Station as RP-06 (TAC Nos. MF3847, MF3848, MF3849, MF3851, MF3852, MF3853, MF3854, MF3855, MF3856, MF3857, and MF3858, December 9 and February 9, 2015).

Relief Request RP-09
Variance Around the Reference Values

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternative Provides Acceptable Level of Quality and Safety

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

CS-P-A/B	Core Spray Pumps
HPCI-P-MP & HPCI-P-BP	High Pressure Coolant Injection Main & Booster Pumps
RCIC-P-MP	Reactor Core Isolation Cooling Main Pump
REC-P-A/B/C/D	Reactor Equipment Cooling Pumps
RHR-P-A/B/C/D	Residual Heat Removal Pumps
SW-P-A/B/C/D	Service Water Pumps
SW-P-BPA/B/C/D	Residual Heat Removal Service Water Booster Pumps

2. **Applicable Code Edition and Addenda**

ASME OM Code 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ISTB-5121 Group A Test Procedure

ISTB-5122 Group B Test Procedure

ISTB-5123 Comprehensive Test Procedure

ISTB-5221 Group A Test Procedure

ISTB-5222 Group B Test Procedure

ISTB-5223 Comprehensive Test Procedure

ISTB-5321 Group A Test Procedure

ISTB-5322 Group B Test Procedure

ISTB-5323 Comprehensive Test Procedure

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (z)(1), an alternative is proposed to the pump testing reference value requirements of the ASME OM Code. The basis of the request is that the proposed alternative would provide an acceptable level of quality and safety.

For pump testing, there is difficulty adjusting system throttle valves with sufficient precision to achieve exact flow reference values during subsequent IST exams. Section ISTB of the ASME OM Code does not allow for variance from a fixed reference value for pump testing. However,

Relief Request RP-09
Variance Around the Reference Values
(Continued)

NUREG-1482, Revision 2, Section 5.3, acknowledges that certain pump system designs do not allow for the licensee to set the flow at an exact value because of limitations in the instruments and controls for maintaining steady flow.

ASME OM Code Case OMN-21 provides guidance for adjusting reference flow/DP to within a specified tolerance during Inservice Testing. The Code Case states "It is the opinion of the Committee that when it is impractical to operate a pump at a specified reference point and adjust the resistance of the system to a specified reference point for either flow rate, differential pressure or discharge pressure, the pump may be operated as close as practical to the specified reference point with the following requirements. The Owner shall adjust the system resistance to as close as practical to the specified reference point where the variance from the reference point does not exceed +2% or -1% of the reference point when the reference point is flow rate, or +1% or -2% of the reference point when the reference point is differential pressure or discharge pressure."

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

CNS seeks to perform Inservice Pump testing in a manner consistent with the requirements as stated in ASME OM Code Case OMN-21. Specifically, testing will be performed such that flow rate is adjusted as close as practical to the reference value and within proceduralized limits not to exceed +2%/-1% of the reference value. Or, if differential pressure or discharge pressure is set, then it will be set as close as practical to the reference value and within proceduralized limits not to exceed +1%/-2% of the reference value.

CNS plant operators will still strive to achieve the exact test flow reference values during testing. Typical test guidance will be to adjust flow to the specific reference value. If necessary, additional guidance will be provided such that if the reference value cannot be achieved with reasonable effort, the test will be considered valid if the steady state reference value is within the procedural limits. The procedural limits will be carefully determined on a case by case basis, and will not exceed the limits provided in Code Case OMN-21. The test will be considered valid if the steady state reference value is within the proceduralized limits of the procedure.

On June 30, 2015, in response to the Nuclear Regulatory Commission's Request for Additional Information, CNS provided the following list of pumps that RP-09 is applicable to along with the requested information.

Relief Request RP-09
Variance Around the Reference Values
(Continued)

RP-09 IST Class 1, 2, and 3 Applicable Pumps				
Pump Name	Pump Number	Pump Type	ASME Code Class	ASME OM Code Category
Core Spray Pumps	CS-P-A/B	Vertical centrifugal pump	2	Group B
High Pressure Coolant Injection Main & Booster Pumps	HPCI-P-MP HPCI-P-BP	Turbine driven horizontal centrifugal pump	2	Group B
Reactor Core Isolation Cooling Main Pump	RCIC-P-MP	Turbine driven horizontal centrifugal pump	2	Group B
Reactor Equipment Cooling Pumps	REC-P-A/B/C/D	Horizontal centrifugal pump	3	Group A
Residual Heat Removal Pumps	RHR-P-A/B/C/D	Vertical centrifugal pump	2	Group A
Service Water Pumps	SW-P-A/B/C/D	Vertical line shaft pump	3	Group A
Residual Heat Removal Service Water Booster Pumps	SW-P-BPA/B/C/D	Horizontal centrifugal pump	3	Group A

Using the provisions of this request as an alternative to the specific requirements of ISTB-5121, ISTB-5122, ISTB-5123, ISTB-5221, ISTB-5222, ISTB-5223, ISTB-5321, ISTB-5322, and ISTB-5323 as described above will provide adequate indication of pump performance and continue to provide an acceptable level of quality and safety.

6. **Duration of Proposed Alternative**

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

7. **Precedents**

This relief request was approved for Callaway for their fourth ten-year interval as PR-06 (TAC Nos. MF2784, MF2785, MF2786, MF2787, MF2788, and MF2789, July 15, 2014).

ATTACHMENT 3

AUGMENTED PUMP RELIEF REQUESTS

AUGMENTED PUMP RELIEF REQUEST INDEX		
Relief Request No.	**Description**	**CNS Approval Date**
ARP-01	Elevated Release Point Sump Pump Testing	3-1-2016
ARP-02	Standby Liquid Control Pump Vibration Accuracy	3-1-2016
ARP-03	Standby Liquid Control Pump Testing	3-1-2016
ARP-04	Diesel Generator Fuel Oil Transfer Pump Testing	3-1-2016

Relief Request ARP-01
Elevated Release Point Sump Pump Testing

Alternative Provides Acceptable Level of Quality and Safety

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

RW-P-Z1	Elevated Release Point Sump Pump A
RW-P-Z2	Elevated Release Point Sump 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) 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ISTB-3000, "General Testing Requirements." This includes Preservice and Inservice testing of pumps.

ISTB-5000, "Specific Testing Requirements." This includes the requirements of a Group A test, Comprehensive Pump Test, and Preservice Test.

ISTB-6000. "Monitoring, Analysis, and Evaluation. This includes actions to take based on alert and required action levels.

4. **Reason for Request**

Augmented Relief is requested from the requirements of ISTB-3000, IST-5000, and ISTB-6000. The proposed alternative provides an acceptable level of quality and safety. This Augmented Relief Request does not require NRC approval.

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

Elevated release point sump pumps (Z-Sumps) remove water from the sump supporting the Standby Gas Treatment system drains. Pump failure could cause SGT drain lines to backup and interfere with SGT operation.

These pumps operate intermittently depending on sump level. Testing requires manually providing sufficient sump inventory to facilitate pump operation. The pumps receive automatic actuation signals from sump level switches. Pump testing with insufficient inventory would result in damage to the pumps. Additionally, the pumps are submerged and water cooled. Suction pressure, differential pressure, flowrate, and vibration measurements are not feasible due to inaccessibility, the short time the pump runs, lack of available test instrumentation, and the change in suction pressure throughout the test.

Testing shall be performed quarterly, utilizing pump start and stop level switches and measuring the time (pump run time) it takes to pump a specified quantity of fluid from the sump. Since the quantity of fluid is constant, pump run time, TM, shall be the test parameter that is measured each test and compared with the corresponding acceptable, alert and action limits. The acceptable

Relief Request ARP-01
Elevated Release Point Sump Pump Testing
(Continued)

range shall be 0.80 to 1.20 TM_r (TM_r=reference run time); the alert range low shall be <0.80 TM_r; the alert range high shall be >1.20 TM_r to 1.50 TM_r; and the required action range shall be >1.50 TM_r, not to exceed the maximum pump run time value documented in the Cooper Nuclear Station Inservice Testing Program Basis Document. If run time falls within the alert range, the test frequency shall be doubled until the cause of the deviation is determined and the condition corrected by repair, replacement or an evaluation which resolves the condition. If run time falls into the required action range, the pump shall be declared Non-Functional until the cause of the deviation has been determined and the condition corrected by repair, replacement or an evaluation which resolves the condition.

These pumps are ASME non-code class pumps outside the scope of the IST Program. This method of monitoring these pumps provides a level of testing that is commensurate to the level of safety for these components.

6. **Duration of Proposed Alternative**

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

7. **Precedents**

A similar relief request was previously approved by CNS for the third and fourth ten-year intervals as ARP-01.

Relief Request ARP-02
Standby Liquid Control Pump Vibration Accuracy

Alternative Provides Acceptable Level of Quality and Safety

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

SLC-P-A	Standby Liquid Control Pump A
SLC-P-B	Standby Liquid Control 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) 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

Table ISTB-3510-1, "Required Instrument Accuracy" and ISTB-3510(a), "Accuracy." Vibration instruments require an accuracy of ± 5% over the calibrated range.

4. **Reason for Request**

Augmented Relief is requested from the requirements of table ISTB-3510-1 and paragraph ISTB-3510(a) for vibration measurement accuracy. The proposed alternative provides an acceptable level of quality and safety. This Augmented Relief Request does not require NRC approval.

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

The SLC pumps function to pump a boron neutron absorber solution into the reactor if the reactor cannot be shut down or kept shut down with control rods. The SLC System also has a safety-related accident mitigation function based on the implementation of the Alternate Source Term (AST) methodology as the radiological source term design basis accident analysis (in accordance with RG 1.183). SLC is credited for controlling the pH of the water in the Suppression Pool, Reactor Vessel (Rx), and Core Cooling systems following a Design Basis LOCA.

The Code requires vibration equipment to meet the accuracy of +/- 5% across the frequency response range, which includes the minimum frequency response of 1/3 pump shaft speed. For the SLC pumps, this is 173.3 rpm or 2.8 Hz. The vibration meters used at CNS are calibrated to meet the code down to and including 5 Hz. Currently, there are no calibration points being taken below 5 Hz. Therefore, the accuracy below 5 Hz. may not meet the code tolerance.

The average velocity for an IST test is a single, average energy reading. The effect of this potential change in accuracy below 5 Hz., when averaged into the overall reading, is quite small. It would only be a concern if a single frequency in the spectrum were being evaluated between 2 - 5 Hz. Furthermore, detection of pump degradation via vibration data is based on changes in vibration measurement from one test to another. Thus, if the calibration accuracy is consistent, then the change in vibration measurement from one test to another is appropriate information for trending purposes. Therefore, existing vibration equipment will provide adequate trending information and may be used for SLC pump vibration data collection. These pumps are ASME non-code class pumps outside the scope of the IST Program.

Relief Request ARP-02
Standby Liquid Control Pump Vibration Accuracy
(Continued)

Vibration data for the SLC pumps will be taken with equipment calibrated from 5 Hz. to at least 1000 Hz. at +/- 5% or better, and will not be calibrated to +/- 5% or better below 5 Hz.

6. **Duration of Proposed Alternative**

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

7. **Precedents**

A similar relief request was previously approved by CNS for the third and fourth ten-year intervals as ARP-02.

Relief Request ARP-03
Standby Liquid Control Pump Testing

Alternative Provides Acceptable Level of Quality and Safety

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

SLC-P-A	Standby Liquid Control Pump A
SLC-P-B	Standby Liquid Control 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) 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ISTB-3400, "Frequency of Inservice Tests"

ISTB-5310, "Preservice Testing"

ISTB 5323, "Comprehensive Test Procedure"

4. **Reason for Request**

Augmented Relief is requested from the requirements of ISTB-3400, ISTB-5310, and ISTB-5323. The proposed alternative provides an acceptable level of quality and safety. This Augmented Relief Request does not require NRC approval.

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

The SLC pumps function to pump a boron neutron absorber solution into the reactor if the reactor cannot be shut down or kept shut down with control rods. The SLC System also has a safety-related accident mitigation function based on the implementation of the Alternate Source Term (AST) methodology as the radiological source term design basis accident analysis (in accordance with RG 1.183). SLC is credited for controlling the pH of the water in the Suppression Pool, Reactor Vessel (Rx), and Core Cooling systems following a Design Basis LOCA.

Each SLC system pump shall be capable of delivering no less than 38.2 gal/min against a system head of 1300 psig to be considered operable. This flow rate is based on the original system design requirement that a single standby liquid control pump be capable of shutting down the reactor from the most reactive condition at any time in core life and maintaining it subcritical during cooldown with all control rods withdrawn in the rated power pattern.

The Standby Liquid Control pumps are categorized as Group B pumps since they are standby emergency pumps and are only operated for testing. They are horizontally-mounted reciprocating positive displacement pumps.

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 in place of the Group B quarterly test and the 2-yr Comprehensive pump test. The pumps will be operated at a reference

Relief Request ARP-03
Standby Liquid Control Pump Testing
(Continued)

discharge pressure (Pr) of 1300 psig with pump flow rate (Q) measured and compared to the required action and alert range requirements of Table ISTB-5321-2 for the group A test, which is more stringent than the Group B testing that would normally be applied each quarter. In addition, vibration measurements will be recorded every 6 months (every other quarter) rather than only once every 2 years during the comprehensive pump test. Vibration measurements will be compared to the range requirements of Table ISTB-5321-2 for the Group A test. Corrective actions will be taken in accordance with ISTB-6200.

Permanently installed plant instrumentation will be used to determine discharge pressures and flow rates. Portable vibration instruments will be used to determine vibration measurements. All instrumentation will meet the accuracy requirements of a Group A test unless specific relief is requested. This level of accuracy is sufficient for these augmented pumps, especially based on the large margin to the minimum flow of 38.2 gpm per pump. However, the current discharge pressure gauge is calibrated to ±1/2%, which meets the accuracy requirements of the Group A test (±2%) and the Comprehensive pump test (±1/2%), so no variabilities between the Group A and Comprehensive Pump Test instrumentation currently exist.

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 the design flow discharge pressure:

Design Point:	1300 psig with a minimum of 38.2 gpm
Test Point:	1300 psig with a minimum of 38.2 gpm

Although these are Group B pumps, 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 the code requirements for a Group A test. Additionally, CNS will perform vibration monitoring on these Group B pumps on a frequency of once every 6 months.

The Standby Liquid Control pumps are tested at a set discharge pressure of 1300 psig. Per Table ISTB-5321-2, the required action range for the Group A flow measurement would be <0.93Qr and > 1.10Qr, with an alert range of 0.93Qr to < 0.95Qr. This is the same as the comprehensive test requirement with the exception that the upper range is >1.03Qr. With reference values of approximately only 53-54 gpm, this upper limit for the comprehensive pump test may not encompass the normal data scatter associated with acceptable SLC pump operation. Therefore, CNS will monitor the flow of these pumps at the Group A test criteria each quarter as follows:

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

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 ARP-03
Standby Liquid Control Pump Testing
(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 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. Additionally, this modified group A positive displacement pump test performed with vibrations will verify that the pump is operating acceptably and may be utilized as the post-maintenance test following significant maintenance. Multi-point preservice testing for positive displacement pumps is not required by the OM Code per ISTB-5323.

These pumps are ASME non-code class pumps outside the scope of the IST Program. This method of monitoring these pumps provides a level of testing that is commensurate to the level of safety for these components.

6. **Duration of Proposed Alternative**

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

7. **Precedents**

This relief request was previously approved by CNS for the fourth ten-year interval as ARP-03.

Relief Request ARP-04
Diesel Generator Fuel Oil Transfer Pump Testing

Alternative Provides Acceptable Level of Quality and Safety

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

DGDO-P-DOTA	Diesel Generator Fuel Oil Transfer Pump A
DGDO-P-DOTB	Diesel Generator Fuel Oil Transfer 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) 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ISTB-3400, "Frequency of Inservice Tests"

ISTB-5110, "Preservice Testing"

ISTB-5121, "Group A Test Procedure"

ISTB-5123, "Comprehensive Test Procedure"

4. **Reason for Request**

Augmented Relief is requested from the requirements of ISTB-3400, ISTB-5110, ISTB-5121, and and ISTB-5123. The proposed alternative provides an acceptable level of quality and safety. This Augmented Relief Request does not require NRC approval.

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

The diesel fuel oil transfer pumps have an active safety function to transfer fuel oil to the respective diesel fuel oil day tank during normal diesel generator operation. The pumps will automatically start and stop under certain low and high levels in their respective day tanks.

Each DGDO system pump must provide sufficient fuel flow to one diesel engine to meet consumption requirements. The design flow rate of the diesel fuel oil transfer pumps is 15 gpm. To support continuous Diesel Generator operation at full load, the transfer pump must be capable of delivering 4.64 gpm. Therefore, significant margin exists for these pumps.

The DGDO pumps are conservatively categorized as group A pumps since they are operated routinely in support of diesel generator operation in addition to testing for IST purposes. The pumps are considered vertically mounted centrifugal pumps. Some plants consider these pumps skid-mounted in support of the diesel generators. CNS has decided to individually test these pumps in order to better monitor their performance. As an alternative to the code requirements for performing a Preservice test, Comprehensive test, and a Group A test, a modified Group A test will be performed.

Relief Request ARP-04
Diesel Generator Fuel Oil Transfer Pump Testing
(Continued)

A Comprehensive pump test will not be performed, which would be essentially the same test as the Group A test. During the modified Group A test, the pumps will be operated at a reference flow rate (Qr) of 6 gpm (+/-0.3 gpm) with pump differential pressure (P) measured and compared to its reference value. Deviations from the reference value will be compared to the required action and alert range requirements of Table ISTB-5121-1 for the Group A test. In addition, vibration measurements will be recorded once every 6 months (every other quarter). This 6 month frequency for vibrations is more than adequate based on the steady vibration trends observed over the past several years. The vibration measurements will be compared to the range requirements of Table ISTB-5121-1 for the Group A test. Corrective actions will be taken in accordance with ISTB-6200.

Permanently installed plant instrumentation will be used to determine differential pressures and flow rates. Portable vibration instruments will be used to determine vibration measurements. All instrumentation will meet the accuracy requirements of a Group A test unless specific relief is requested. This level of accuracy is sufficient for these augmented pumps, especially based on the large margin to the minimum flow of 4.64 gpm per pump. The current discharge pressure gauge is calibrated to < ±1%, which is lower than the Group A accuracy requirement (±2%) and nearly meets the Comprehensive pump test accuracy requirement (±1/2%), so minimal variabilities between the Group A and Comprehensive Pump Test instrumentation currently exist.

One of the requirements of the comprehensive test is to perform the test at substantial flow (± 20% of design flow). Since the accident design flow is such a low value, CNS will continue to test the pump at a value slightly higher than 20% above the design value, which allows for plenty of margin for inaccuracies in instrumentation.

Design Point:	4.64 gpm
Test Point:	6 gpm

CNS will perform a modified Group A test as stated above such that the acceptance criteria for hydraulic performance will meet the code requirements for a Group A test. Additionally, CNS will perform vibration monitoring once every six months (every other quarter).

The DGDO pumps are tested at a set flow of 6 gpm (+/-0.3 gpm) and differential pressure is measured. Per Table ISTB-5121-1, the required action range for the Group A differential measurement would be $<0.90 \Delta Pr$ and $> 1.10 \Delta Pr$. There is no alert range. This is the same as the comprehensive test requirement with the exception that the upper range is $>1.03 \Delta Pr$ and a lower alert range is in place for the measured differential pressure. With reference values in the low twenties for differential pressure, this upper limit for the comprehensive pump test may not encompass the normal data scatter associated with acceptable DGDO pump operation. Also, since the measured values are low and there is significant design margin built into the pump design, alert ranges for differential pressure are not necessary. Therefore, CNS will monitor the differential pressure of these pumps utilizing the Group A test criteria each quarter as follows:

Acceptable Range	0.90 to $1.10 \Delta Pr$
Required Action	$<0.90 \Delta Pr$ or $>1.10 \Delta Pr$

Relief Request ARP-04
Standby Liquid Control Pump Testing
(Continued)

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.

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. CNS believes that there would be no benefits added to implementing a 2-year comprehensive test, which would essentially be identical to the quarterly test with vibrations. Therefore, CNS believes that the proposed testing regime establishes an acceptable assessment of pump mechanical and hydraulic health and will determine operational readiness on a quarterly frequency. Additionally, this modified group A centrifugal pump test performed with vibrations will verify that the pump is operating acceptably and may be utilized as the post-maintenance test (in place of a preservice test) following significant maintenance. This one point test is adequate to verify acceptable pump operation due to the simplification of the function the DGDO pumps perform. The fuel oil is being delivered from one large tank to a smaller tank and the minimum amount of oil is verified to be met. No other modes of function occur. As long as this function may be met, and pump performance is trended within the IST Program, this testing will adequately verify pump operability.

These pumps are ASME non-code class pumps outside the scope of the IST Program. This method of monitoring these pumps provides a level of testing that is commensurate to the level of safety for these components.

6. **Duration of Proposed Alternative**

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

7. **Precedents**

A similar relief request was previously approved by CNS for the fourth ten-year interval as ARP-04.

ATTACHMENT 4

VALVE RELIEF REQUESTS

VALVE RELIEF REQUEST INDEX		
Relief Request No.	**Description**	**NRC Approval Date**
RV-01	HPCI Solenoid Operated Drain Valve Testing	2-12-16[1]
RV-02	Main Steam Safety Valve Testing per Code Case OMN-17	2-12-16[1]
RV-03	Main Steam Safety Relief Valve Testing	2-12-16[1]
RV-04	Control Rod Drive (CRD) Technical Specification Testing	2-12-16[1]
RV-05	Performance-Based Scheduling of PIV Leakage Tests	2-12-16[1]

(1) Approved by NRC letter, dated 2-12-16, from Meena K. Khanna, NRC, to Mr. Oscar A. Limpias, Vice President of Nuclear and CNO for CNS

Relief Request RV-01
HPCI Solenoid Operated Drain Valve Testing

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

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**

ASME OM Code 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ISTC-3300 Reference Values – Reference values shall be determined from the results of preservice testing or from the results of inservice testing.

ISTC-3310 Effects of Valve Repair, Replacement, or Maintenance on Reference Values – When a valve or its control system has been replaced, repaired, or has undergone maintenance that could affect the valve's performance, a new reference value shall be determined or the previous value reconfirmed...

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-3570, 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.

ISTC-5151 Valve Stroke Testing –
(a) Active valves shall have their stroke times measured when exercised in accordance with ISTC-3500.
(b) The limiting value(s) of full-stroke time of each valve shall be specified by the Owner.
(c) Stroke time shall be measured to at least the nearest second.

ISTC-5152 Stroke Test Acceptance Criteria – Test results shall be compared to reference values established in accordance with ISTC-3300, ISTC-3310, or ISTC-3320.

ISTC-5153 Stroke Test Corrective Action.

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

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (z)(1), relief is requested from the listed requirements of the ASME OM Code. The proposed alternative would provide an acceptable level of quality and safety.

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 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.

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

CNS has been performing a robust exercise test for these two valves that verifies obturator movement since 1998 on a quarterly basis. In 2001, this test identified some leakage past HPCI-SOV-SSV64 and the valve was removed and refurbished. For the past ~14 years, the exercise test has been completed without any issues. This test is accomplished through the performance of surveillance procedure, 6.HPCI.204, HPCI-SOV-SSV64 and HPCI-SOV-SSV87 IST Closure Test. With HPCI not in operation, a demineralized water source is utilized to verify that HPCI-SOV-SSV64 opens when level switch HPCI-LS-680 (turbine exhaust drain pot high level) trips, allowing level in the gland seal condenser to start to rise due to water flow through HPCI-SOV-SSV64. After HPCI-LS-680 resets and HPCI-SOV-SSV64 closes, the gland seal condenser level is verified to be steady.

Similarly, CNS verifies that HPCI-SOV-SSV87 opens when level switch HPCI-LS-98 (turbine exhaust drip leg high) trips, allowing the observation of water flow to a floor drain from a drain pipe downstream of HPCI-SOV-SSV87. After HPCI-LS-98 resets and HPCI-SOV-SSV87 closes, CNS observes the drain pipe downstream of HPCI-SOV-SSV87 for gross leakage past the valve. Therefore, CNS verifies valve obturator movement for both valves open and closed while simultaneously verifying the calibration of two level switches.

Typically, tests that involve hooking up pressure sources and various amounts of test tubing are not performed on a quarterly basis due to their complexities (i.e. local leak rate tests). In addition, each time this "quarterly" test has been performed, HPCI unavailability time (~1.5

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

hours) is consumed in addition to some minor radiological dose. Finally, this exercise test is actually a much better method of determining the valve's operational readiness than a quarterly fast acting stroke time test would have been. Therefore, based on the complexities of the test, consuming unnecessary HPCI unavailability time and personnel radiation exposure, the exceptional test history dating back to 2001, and the fact that this is a robust test that verifies obturator movement, CNS proposes to exercise each valve to the full closed position, as described, on a 6 month basis.

In addition to performing this robust exercise test every 6 months, each solenoid valve will be disassembled and examined for degradation on a periodic basis per the Preventative Maintenance Program. The valve body, insert, piston, plunger/stem assembly, and stem spring will all be examined per criteria outlined in surveillance procedure 6.HPCI.404. In addition, continuity and the physical condition of the coil will also be checked. The valve and/or valve parts will be refurbished and/or replaced, as necessary, based on this examination. This maintenance shall be performed at an optimized frequency, not to exceed 48 months (2 cycles). The purpose of this enhanced preventative maintenance is to ensure the long term reliability of the components and to monitor for internal degradation. This is consistent with NUREG 1482, Section 4.2.3. The 6 month exercise tests will ensure that the valves are operational and will fulfill their safety function when called upon.

On June 9, 2015, in response to the Nuclear Regulatory Commission's Request for Additional Information, CNS provided an explanation as to how the frequency of the preventative maintenance task of disassembly, inspection, and refurbishment is developed, maintained, and optimized. The following several paragraphs and Table 1 were submitted to the NRC.

The frequency of the preventative maintenance (PM) task was developed after reviewing the maintenance and test histories for these two solenoid valves and after reviewing the Electric Power Research Institute (EPRI) recommendations for PMs on solenoid valves. The maintenance history for these valves since 2005 is documented in Table 1 located at the end of this response. A review of this data demonstrates that each valve has had two examinations that resulted in minor issues resulting in the replacement of parts (March of 2011 and April of 2014 for HPCI-SOV-SSV64; April of 2012 and April of 2014 for HPCI-SOV-SSV87). For these cases, the PM was doing its job by identifying parts that had minor issues and replacing them prior to them becoming a major issue and impacting the safety function of the valve. The exercise testing performed prior to and after these examinations was completed with acceptable results. As long as the exercise testing of the valves continues to demonstrate acceptable performance and the examination PMs do not identify any major issues that could have impacted the closure safety function, then the maximum frequency of 48 months may be utilized for these HPCI PMs.

The maximum frequency of 48 months (2 cycles) is conservative when comparing this frequency to the EPRI PM recommendations. The EPRI recommended task for elastomer replacement and internal inspection of a solenoid valve is 5 years for a severe environment and up to ten years for a mild environment. Cooper Nuclear Station (CNS) considers the location of these valves to be a severe environment, so the maximum frequency allowed by CNS would be one year less than what is recommended by EPRI.

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

The frequency will be maintained through the CNS work management system and the PM process. A maintenance plan has been established with the necessary tasks required to satisfy the PM. A PM work order with these required tasks is automatically created well ahead of the scheduled due date and is scheduled based on the CNS work schedule process. Any frequency changes must be approved by the IST Engineer.

The monitoring of these valves will be done by tracking the proposed six month exercise testing and the results of the internal examinations. As was described in the relief request, CNS has had excellent results with the exercise tests. Based on internal valve degradation, October of 2001 was the last time one of these valves (HPCI-SOV-SSV64) failed its closure acceptance criteria. For clarification purposes, however, there was a system issue in June of 2002 in which foreign material was causing HPCI-SOV-SSV64 to leak. An internal examination identified that there was foreign material found under the valve disc of HPCI-SOV-SSV64, but the valve itself, was examined and found to be in an acceptable condition. The CNS corrective action program addressed the issue and no other foreign material issues have impacted the closure function of these valves since then. Therefore, no internal valve degradation issue has impacted the closure function of these components since October of 2001 and no system issue has impacted the closure function of these components since June of 2002.

The frequency of the PMs is optimized by balancing the component reliability with the correct PM frequency. The goal is to ensure that the solenoid valves continue to perform their closure function in a reliable manner without performing the internal examination PMs too frequently. As long as the PM ensures that any minor issue is taken care of prior to it becoming an issue with the closure function of the valve meeting its acceptance criteria, then the frequency is set at an acceptable duration. This, in conjunction with acceptable exercise tests, justifies the acceptability of the frequency.

If the exercise testing results in a failure of the closure acceptance criteria of one of the solenoid valves, or the examination PM of one of the solenoid valves identifies a significant component issue that may have resulted in the respective valve not being able to perform its closure function, then the examination frequency of both solenoid valves shall be moved from 48 month frequencies to 24 month frequencies. From this point, two periodic examinations would have to be performed and completed satisfactorily at the 24 month frequency prior to returning the frequency to the 48 month frequency.

In conclusion, the PM was developed based on a review of the maintenance and test history results, and review of EPRI recommendations. The existing frequency will be monitored as acceptable as long as the exercise testing is completed satisfactory and the internal examinations are either satisfactory or identify parts for replacement prior to when the parts issue would have caused a failure with the closure exercise testing. The frequency of internal examinations will be reduced from 48 months to 24 months for both valves if one valve were to fail its acceptance criteria for the closure exercise testing or if the findings of an internal examination of one of the valves results in the determination that it would not have met its closure function. Two successful examinations at the 24 month frequency would be required in order to return the PM(s) to a 48 month frequency. This is how the frequency of the preventive maintenance task of disassembly, inspection, and refurbishment was developed, and how it will be maintained, monitored, and optimized, if approved.

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

Table 1: Maintenance historics for HPCI-SOV-SSV64 and HPCI-SOV-SSV87	
HPCI-SOV-SSV64	HPCI-SOV-SSV87
02-10-05: Visual exam satisfactory (PM work order #4363336)	02-10-05: Visual exam satisfactory (PM work order #4363336)
N/A	06-21-05: Replaced valve at same time as non-essential valve, HPCI-SOV-SSV88, was replaced. Valves are in close proximity. New valve allows parts to be procured. (Corrective Maintenance [CM] work order #4211944)
11-7-06: Visual exam satisfactory (PM work order #4446767)	11-14-06: Visual exam satisfactory (PM work order #4446767).
03-18-08: Visual exam satisfactory (PM work order #4569097)	03-18-08: Visual exam satisfactory (PM work order #4569097)
08-19-09: Visual exam satisfactory (PM work order #4626047)	08-19-09: Visual exam satisfactory (PM work order #4626047)
03-21-11: Valve replaced for parts reasons with a valve upgrade to match that of HPCI-SOV-SSV87 (CM work order #4791033)	03-22-11: Visual exam satisfactory (PM work order #4750715)
04-24-12: Visual exam satisfactory (PM work order #4803767)	04-25-12: Seat plug on the bottom was found curled around the edges and was replaced. This issue did not impact the valve's closure function as the previous closure testing was performed successfully (PM work order #4803767)
4-23-13: Visual exam satisfactory (PM work order #4895831).	04-23-13: Visual exam satisfactory (PM work order #4895831).
4-22-14: Plunger found slightly corroded and stem assembly was scored in the seating area. Both parts were replaced. Did not impact the valve's closure function as the previous closure testing was performed successfully. (PM work order #4938492)	4-22-14: Insert showed minor erosion/corrosion and plunger/stem has a small groove around seating area. Both parts were replaced. Did not impact the valve's closure function as the previous closure testing was performed successfully. (PM work order #4938492)
2-10-15: Visual exam satisfactory (PM work order 5003464).	2-10-15: Visual exam satisfactory (PM work order 5003464).

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

The robust 6 month exercise testing and the enhanced preventative maintenance will provide an adequate indication of valve performance and will continue to provide an acceptable level of quality and safety. Therefore, pursuant to 10 CFR 50.55a(z)(1), 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 fifth ten-year interval.

7. **Precedents**

A version of this relief request was previously approved for the fourth ten-year interval at CNS as Relief Request RV-01, Revision 1 (TAC NO. ME7021, August 28, 2012) and Revision 0 (TAC Nos. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, and MC8992, June 14, 2006).

A version of this relief request was previously approved for the fifth ten-year interval at Dresden Nuclear Power Station as Relief Request RV-23H (TAC Nos. ME9865, ME9866, ME9869, ME9870, ME9871, and ME9872, October 31, 2013).

Relief Request RV-02
Main Steam Safety Valve Testing per Code Case OMN-17

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternative Provides Acceptable Level of Quality and Safety

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

Valve	Class	Category	System
MS-RV-70ARV	1	C	Main Steam (MS)
MS-RV-70BRV	1	C	MS
MS-RV-70CRV	1	C	MS

2. **Applicable Code Edition and Addenda**

ASME OM Code 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ISTC-5240 - Safety and Relief Valves. Safety and relief valves shall meet the inservice test requirements of Mandatory Appendix I.

ASME OM Code Mandatory Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," Section I-1320, "Test Frequencies, Class 1 Pressure Relief Valves," paragraph (a), "5-Year Test Interval," states that Class 1 pressure relief valves shall be tested at least once every 5 years.

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (z)(1), relief is requested from the requirements of ASME OM Code Appendix I, I-1320(a). The proposed alternative would provide an acceptable level of quality and safety.

Section ISTC-3200, "Inservice Testing," states that inservice testing shall commence when the valves are required to be operable to fulfill their required function(s). Section ISTC-5240, "Safety and Relief Valves," directs that safety and relief valves meet the inservice testing requirements set forth in Appendix I of the ASME OM Code. Appendix I, Section I-1320(a), of the ASME OM Code states that Class 1 pressure relief valves shall be tested at least once every 5 years, starting with initial electric power generation. This section also states a minimum of 20 percent of the pressure relief valves are tested within any 24-month interval and that the test interval for any individual valve shall not exceed 5 years. Prior to Cycle 28, CNS had refueling cycles of 18 months. With three safety valves, CNS has been meeting the ASME OM Code by removing,

Relief Request RV-02
Main Steam Safety Valve Testing per Code Case OMN-17
(Continued)

testing, rebuilding, and re-installing one valve per refueling outage. All three of these safety valves have an acceptable test history since 1997 as will be described in section 5.

However, after Refueling Outage (RE) 27 (Fall/2012), CNS began the current 24-month refueling cycle. The five year frequency was met for the safety valve due in RE28 (Fall/2014), but a relief request, requesting the use of Code Case OMN-17, will be necessary in order to continue with the process of testing only one valve each refueling outage for the fifth ten-year interval, beginning March 1, 2016. Without this relief request, CNS would be required to remove and test all three valves within a two cycle frequency (two one outage and one the next) in order to ensure that all three valves are removed and tested in accordance with the ASME OM Code requirements. This testing pattern would ensure compliance with the ASME OM Code requirements for testing Class 1 pressure relief valves within a 5 year interval.

Extending the test interval to 6 years, as described in Code Case OMN-17, would allow CNS to continue with the current method of removing, testing, rebuilding, and re-installing one safety valve per outage so that all three safety valves would be replaced over three refuel cycles (i.e., ~6 years).

Without Code relief, the incremental outage work due to the inclusion of an additional safety valve every other outage would be contrary to the principle of maintaining radiation dose As Low As Reasonably Achievable (ALARA). The removal and replacement of the additional safety valve every other outage results in an additional exposure of approximately 450 millirem (mrem) to 726 mrem. This estimate is based on the actual radiation received to remove and re-install a safety valve each of the last three refueling outages.

In accordance with 10 CFR 50.55a(z)(1), NPPD requests approval of an alternative to the 5 year test interval requirement of the ASME OM Code, Appendix I, Section I-1320(a) for the safety valves at CNS.

5. Proposed Alternative and Basis for Use

NPPD requests that the test interval be increased from 5 years to 6 years in accordance with Code Case OMN-17. All aspects of Code Case OMN-17 will be followed for the MS safety valves.

As an alternative to the Code required 5-year test interval per Appendix I, paragraph I-1320(a), NPPD proposes that the subject Class 1 safety valves be tested at least once every three refueling cycles (approximately 6 years/72 months) with a minimum of 20% of the valves tested within any 24-month interval. This 20% would consist of valves that have not been tested during the current 72-month interval, if they exist. The test interval for any individual valve would not exceed 72 months except that a 6-month grace period is allowed to coincide with refueling outages to accommodate extended shutdown periods and certification of the valve prior to installation. This is all in accordance with OMN-17, paragraph (a).

After as-found set-pressure testing, the valves shall be disassembled and inspected to verify that parts are free of defects resulting from time-related degradation or service induced wear. As-left

Relief Request RV-02
Main Steam Safety Valve Testing per Code Case OMN-17
(Continued)

set-pressure testing shall be performed following maintenance and prior to returning the valve to service. Each valve shall have been disassembled and inspected prior to the start of the 72-month interval. Disassembly and inspection performed prior to the implementation of Code Case OMN-17 may be used.

Each refueling outage, CNS will remove one safety valve to be sent off-site to a test facility. Upon receipt at the off-site facility, the valves are subject to an as-found inspection, as-found seat leakage test, and as-found set pressure test in accordance with Appendix I of the ASME OM Code. Prior to the returning the valve to the plant for re-installation, the safety valve is disassembled and inspected to verify that internal surfaces and parts are free from defects or service induced wear. During this process, anomalies or damage are identified for resolution. Damaged or worn parts (i.e. springs, gaskets and seals) are replaced or repaired, as necessary. Following reassembly, the valve's set pressure is recertified. This existing process is in accordance with ASME OM Code Case OMN-17, paragraphs (d) and (e). Alternatively, CNS may elect to replace the removed valve with a spare valve that has previously already been through the process just described. Up to three spare valves may be used in accordance with paragraph (b) of OMN-17.

NPPD has reviewed the as-found set point test results for all three safety valves tested since 1997 as detailed in Table 1. Since 1997, all as found lift tests have been within a +/-3% tolerance (maximum of +2.02%). The current Technical Specification requirements are that the as found test results fall within a +/-3% tolerance. Technical Specifications require the as left certification of the valves to meet a +/-1% tolerance. If an as found test is found to be outside of the +/-3% tolerance, the other 2 safety valves will be removed and tested in accordance with Code Case OMN-17, paragraph (c).

Accordingly, the proposed alternative of implementing all aspects of OMN-17, which will increase the test interval for the subject Class 1 safety valves from 5 years to 3 fuel cycles (approximately 6 years/72 months), will provide an acceptable level of quality and safety. This will also restore the operational and maintenance flexibility that was lost when the 24-month fuel cycle created the unintended consequences of more frequent testing. This proposed alternative will continue to provide assurance of the valves' operational readiness and provides an acceptable level of quality and safety pursuant to 10 CFR 50.55a(z)(1).

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

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

7. <u>Precedents</u>

A similar relief was previously approved at Peach Bottom for the fourth ten-year interval as Relief Request 01A-VRR-3 (TAC Nos. MF2509 and MF2510, April 30, 2014).

Relief Request RV-02
Main Steam Safety Valve Testing per Code Case OMN-17
(Continued)

Monticello Nuclear Generating Plant Relief Request VR-04 was approved in a NRC Safety Evaluation Report dated September 26, 2012 (ML12244A272).

Quad Cites Nuclear Power Station, Units 1 and 2 Relief Request RV-05 was approved in a NRC Safety Evaluation Report dated February 14, 2013 (ML13042A348).

Table 1: Cooper Nuclear Station Safety Valve Test History

Safety Valve	AF Test Date	Set Pressure	As Found Set Pressure	Deviation from Set Pressure
MS-RV-70ARV	4/9/1997	1240	1217	-1.85%
	10/9/1998	1240	1252	+0.97%
	3/8/2003	1240	1226	-1.13%
	4/19/2008	1240	1232	-0.65%
	10/21/2012	1240	1255	+1.21%
MS-RV-70BRV	4/10/1997	1240	1226	-1.13%
	3/12/2000	1240	1231	-0.73%
	1/25/2005	1240	1241	+0.08%
	10/3/2009	1240	1260	+1.61%
	10/8/2014	1240	1253	+1.05%
MS-RV-70CRV	4/10/1997	1240	1262	+1.77%
	11/12/2001	1240	1237	-0.24%
	10/26/2006	1240	1265	+2.02%
	3/21/2011	1240	1262	+1.77%

Relief Request RV-03
Main Steam Safety Relief Valve Testing

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternativc 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 2004 Edition through 2006 Addenda

3. Applicable Code Requirement

ISTC-5240 - Safety and Relief Valves. Safety and relief valves shall meet the inservice test requirements of Mandatory Appendix I.

ASME OM Code Mandatory Appendix I, "lnservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," Section I-1320, "Test Frequencies, Class 1 Pressure Relief Valves," paragraph (a), "5-Year Test Interval," states that Class 1 pressure relief valves shall be tested at least once every 5 years.

ASME OM Code Mandatory 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 performed for I-3310(a), (b) and (c) in sequence. The remaining shall be performed after maintenance or set-pressure adjustments:

a. visual examination;

Relief Request RV-03
Main Steam Safety Relief Valve Testing
(Continued)

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 (z)(1), relief is requested from the requirements of ASME OM Code Appendix I, sections I-1320(a) and I-3310. The proposed alternative would provide an acceptable level of quality and safety.

Section ISTC-5240, "Safety and Relief Valves," directs that safety and relief valves meet the inservice testing requirements set forth in Appendix I of the ASME OM Code. Appendix I, Section I-1320(a), of the ASME OM Code states that Class 1 pressure relief valves shall be tested at least once every 5 years, starting with initial electric power generation. This section also states a minimum of 20 percent of the pressure relief valves are tested within any 24-month interval and that the test interval for any individual valve shall not exceed 5 years.

CNS has eight MS safety relief valves (SRV). The approach for the past several years has been to remove either 2 or 3 of the entire valves (i.e. main body and pilot assembly) every refueling outage and send them off for as found testing, refurbishment, rebuilding, and re-certification in preparation for the next time they are re-installed into the plant. Those 2 or 3 entire valves have been replaced with refurbished valves that were recertified just prior to the outage. The schedule is planned so that all eight entire valves get sent off, as found tested, refurbished, and re-certified within a three cycle frequency. In addition, CNS has replaced the remainder of the pilot assemblies (5 or 6 per outage) and sent them off for testing, refurbishment, and re-certification in preparation for the next time they are re-installed into the plant. These 5 or 6 additional pilot assemblies are replaced with refurbished and recertified pilot assemblies that were recertified just prior to the outage. Therefore, the pilot assemblies for the full complement of 8 valves have been set pressure tested every outage for several years.

Relief Request RV-03
Main Steam Safety Relief Valve Testing
(Continued)

CNS plans to continue this approach into the fifth ten-year interval. However, refueling outage 27 (Fall/2012) was the last refueling outage under an 18-month cycle. CNS is now operating with 24-month cycles. With this in mind, the refurbishment of the entire valves will eventually align with a six year frequency, which is consistent with Code Case OMN-17. However, all eight of the pilot assemblies are being removed, tested and replaced with refurbished/recertified spare pilot assemblies every refueling outage, which means a full complement of the set pressure portion of the valves are being tested every refueling outage. Therefore, although this approach is very conservative, documenting acceptability of this approach is being pursued per this relief request.

Additionally, since 5-6 pilot assemblies, alone, are being replaced every outage (versus the entire valve), documenting acceptability of how portions of Appendix I-3310 are being satisfied is also being pursued per this relief request.

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

These eight SRVs are considered Class 1 main steam pressure relief valves with auxiliary actuating devices. They are located on the main steam lines. In addition to their automatic function of opening to prevent over pressurization of the reactor vessel, six of these valves are associated with the Automatic Depressurization System and two are associated with the Low Low Set logic. The valves are two-stage Target Rock valves, each equipped with a main body, a pilot assembly for set pressure control, a solenoid valve, and an air operator assembly.

CNS proposes to follow the Code Case OMN-17, paragraph (d), recommendations for Maintenance on these eight valves. Therefore, on a three cycle (up to 6 year) frequency, CNS proposes to remove the entire valve unit (i.e. main body and pilot assembly) for each one of these valves and ship it off for as found testing, refurbishment, and re-certification. CNS will replace these entire valve units with spare refurbished and re-certified entire valve units.

As mentioned earlier, each valve is equipped with a pilot valve assembly that controls the set pressure. The remainder of the pilot valve assemblies (5 or 6 per refueling outage) will be removed from the main body and sent off site for examination, as found testing, refurbishment, and re-qualification testing (set point, reseat, and pilot stage seat tightness). The test facility has a main body slave for this purpose. The removed pilot valve assemblies are replaced with previously refurbished and re-qualified pilot valve assemblies. By testing all of the pilot valve assemblies every outage, the potential need to expand to test additional valves due to set pressure failures is alleviated and the future valve reliability is improved. Test results are being monitored by serial numbers. Any as found set pressure failure will be addressed via the CNS Corrective Action Program.

ASME OM Code Interpretation, 98-8, clarifies that a pilot operated relief valve with an auxiliary actuating device is not required to be tested as a unit. Furthermore, it clarifies that set pressure determination on the pilot operator may be performed after the pilot operator is removed from the valve body.

Rclief Request RV-03
Main Steam Safety Relief Valve Testing
(Continued)

Appendix I, I-3310(a) visual examination is completed at the test facility for those main bodies and pilot assemblies being sent there for examination, testing and refurbishment. With the removal of the pilot assemblies from the main bodies at the plant, the accessible portions of the main bodies will be examined in place without further disassembly as permitted by I-1310(c).

Appendix I, I-3310(b) seat tightness, and I-3310(c) set pressure, is satisfied through as found seat leakage and set pressure testing at the offsite test facility for those main valves and pilot valve assemblies being sent there for inspection, testing and refurbishment. Paragraph I-3310(i) is satisfied through as left seat leakage testing at the facility. Seat leakage of installed main valves is continuously monitored and also satisfies I-3310(i). 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.

During startup, the main valve and Auxiliary Actuation Devices are verified to function properly by being full stroke exercised open and closed. Successfully exercising these valves open and closed verifies the electrical characteristics and pressure integrity of the solenoid valve and air actuator (satisfying Appendix I, paragraphs (d) and (e)). During this exercise, Appendix I, paragraph I-3310(f), is also satisfied through the use of the valve indicating lights, discharge pressure switches, and temperature elements.

Finally, Appendix I, paragraphs I-3310(g) and I-3310(h), are not applicable to the CNS MS safety relief valves.

This proposed alternative is conservative in nature and will continue to provide an acceptable level of quality and safety pursuant to 10 CFR 50.55a(z)(1).

6. **Duration of Proposed Alternative**

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

7. **Precedents**

A version of this relief request was previously approved for the fourth ten-year interval at CNS as Relief Request RV-04 (TAC Nos. MC8837, MC8975, MC8976, MC8977, MC8978, MC8979, MC8980, MC8981, MC8989, MC8990, MC8991, and MC8992, June 14, 2006).

Relief Request RV-04
Control Rod Drive (CRD) Technical Specification Testing

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternative Provides Acceptable Level of Quality and Safety

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

Valve	Class	Category	System
CRD-SOV-SO120*	2	B	CRD
CRD-SOV-SO121*	2	B	CRD
CRD-SOV-SO122*	2	B	CRD
CRD-SOV-SO123*	2	B	CRD
CRD-AOV-CV126*	2	B	CRD
CRD-AOV-CV127*	2	B	CRD
CRD-CV-114CV*	2	C	CRD
CRD-CV-138CV*	2	C	CRD

SOV=Solenoid Operated Valve
AOV=Air Operated Valve
CV=Check Valve

*Typical of 137 Hydraulic Control Units (HCU)

2. **Applicable Code Edition and Addenda**

ASME OM Code 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ASME OM Code 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 three (3) months, except as provided by ISTC-3520, ISTC-3540, ISTC-3550, ISTC-3570, 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.

ISTC-5131(a) Valve Stroke Testing – Active valves shall have their stroke times measured when exercised in accordance with ISTC-3500.

ISTC-5151(a) Valve Stroke Testing – Active valves shall have their stroke times measured when exercised in accordance with ISTC-3500.

Relief Request RV-04
Control Rod Drive (CRD) Technical Specification Testing
(continued)

ISTC-5221(a) Valve Obturator Movement – The necessary valve obturator movement during exercise testing shall be demonstrated by performing both an open and a close test.

4. Reason for Request

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (z)(1), relief is requested from the requirements of ASME OM Code ISTC-3500, ISTC-3510, ISTC-3560, ISTC-5131(a), ISTC-5151(a), and ISTC-5221(a). The proposed alternative would provide an acceptable level of quality and safety.

This relief is needed to make the fifth ten-year inservice test program consistent with NUREG 1482, Revision 2.

5. Proposed Alternative and Basis for Use

Background Information

It is typical for Boiling Water Reactors (BWR) to perform the subject CRD testing per their respective plant Technical Specifications. This originated from Generic Letter (GL) 89-04, Position 7. Per section 1.3 of NUREG 1482, Revision 2, specific relief is required to implement the guidance derived from GL 89-04, which is why this testing is being documented under a relief request. The proposed alternatives and the basis for use are discussed in further detail below.

CRD-CV-138CV; CRD-SOV-SO120, SO121, SO122, SO123:

The CRD cooling water header check valve, CRD-CV-138CV (typical of 137 HCUs), has a safety function to close in the event of a scram to prevent diversion of pressurized HCU accumulator water to the cooling water header. The exhaust water withdrawal/settle (CRD-SOV-SO120), exhaust water insert (CRD-SOV-SO121), drive water withdrawal (CRD-SOV-SO122), and drive water insert (CRD-SOV-SO123) solenoid valves (typical of 137), have a safety function to close in order to provide a boundary to non-code class piping.

Normal control rod motion will verify that the associated cooling water check valve has moved to its safety function position of closed. Industry experience has shown that rod motion may not occur if this check valve were to fail in the open position.

The solenoid valves listed above have a safety function to close in order to provide a class 2 to non-code class boundary isolation. During normal operation, these solenoid valves are used for control rod insertion and withdrawal. They are exercised open and closed during normal operation of the associated CRD. They are not equipped with position indication or control switches. They automatically change position to affect control rod movement.

Therefore, control rod exercising in accordance with the CNS Technical Specifications, Surveillance Requirement (SR) 3.1.3.3, will provide an acceptable level of quality and safety for these valves. This testing method is consistent with GL 89-04, Position 7, and NUREG 1482, Revision 2, Section 4.4.6.

Relief Request RV-04
Control Rod Drive (CRD) Technical Specification Testing
(continued)

CRD-AOV-CV126, CRD-AOV-CV127, and CRD-CV-114CV:

These valves operate as an integral part of their respective HCU to rapidly insert the control rods in support of a scram. The CRD scram inlet valve, CRD-AOV-CV126 (typical of 137), opens with a scram signal to pressurize the lower side of the Control Rod Drive Mechanism (CRDM) pistons from the accumulator or from the charging water header. The CRD outlet isolation valve, CRD-AOV-CV127 (typical of 137), opens with scram signal to vent the top of the CRDM piston to the scram discharge header. The CRD scram outlet check valve, CRD-CV-114CV (typical of 137), opens to allow flow from the top of the CRDM piston to the scram discharge header.

Individual stroke time measurements of air-operated valves CRD-AOV-CV126 and CRD-AOV-CV127 are impractical due to their rapid acting operation and they are not equipped with position indication. Therefore, valve stroke times will not be measured. Additionally, the air-operated valves fail-open on a loss of air or power. Normal opening removes power to the pilot solenoid valve, simulating a loss of power. On loss of power, the solenoid vents the air operator and CRD-AOV-CV126 and CRD-AOV-CV127 are spring-driven open. Thus, each time a scram signal is given, the valves "experience" a loss of air/power to verify each valve's fail-safe open feature.

Testing these valves simultaneously would result in a full reactor scram. An excess number of scrams performed routinely could cause thermal and reactivity transients, which could lead to fuel, vessel, CRD, or piping damage. The CRDs cannot be tested during cold shutdown because the control rods are inserted and must remain inserted.

Therefore, control rod scram time testing in accordance with the CNS Technical Specifications, SR 3.1.4.1, SR 3.1.4.2, SR 3.1.4.3, and SR 3.1.4.4, will provide an acceptable level of quality and safety for these valves. This testing method for these valves is consistent with GL 89-04, Position 7, and NUREG 1482, Revision 2, Section 4.4.6.

6. **Duration of Proposed Alternative**

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

7. **Precedents**

This relief request was previously approved for the fourth ten-year interval at CNS as relief request RV-06 (TAC No. ME1521, April 26, 2010). A similar alternative was approved at Perry-1 for relief request VR-1, revision 1 (TAC No. ME7380, February 22, 2012).

Relief Request RV-05
Performance-Based Scheduling of Pressure Isolation Valve Leakage Tests

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(1)

Alternative Provides Acceptable Level of Quality and Safety

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

Valve	Class	Category	System
RHR-MOV-MO25A	1	A	RHR
RHR-MOV-MO25B	1	A	RHR
RHR-MOV-MO274A	1	A	RHR
RHR-MOV-MO274B	1	A	RHR
RHR-CV-26CV	1	A/C	RHR
RHR-CV-27CV	1	A/C	RHR
RHR-MOV-MO17	1	A	RHR
RHR-MOV-MO18	1	A	RHR
CS-MOV-MO12A	1	A	CS
CS-MOV-MO12B	1	A	CS
CS-CV-18CV	1	A/C	CS
CS-CV-19CV	1	A/C	CS

MOV=Motor Operated Valve

2. **Applicable Code Edition and Addenda**

ASME OM Code 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ISTC-3630 – Leakage Rate for Other Than Containment Isolation Valves.

ISTC-3630(a) – Frequency. Tests shall be conducted at least once every two years.

4. **Reason for Request**

Pursuant to 10 CFR 50.55a, "Codes and standards," paragraph (z)(1), relief is requested from the requirement of ASME OM Code ISTC-3630(a). ISTC-3630(a) requires that leakage rate testing (water) for pressure isolation valves (PIV) be performed at least once every two years. Data from RE25 and RE26 was used to identify that PIV testing alone each refueling outage incurs a total dose of at least 600 mRem. The reason for this relief request is to reduce outage dose. The basis of this relief request is that the proposed alternative would provide an acceptable level of quality and safety.

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

The RHR and CS systems at CNS contain valves that function as PIVs. PIVs are defined as two normally closed valves in series at the reactor coolant system boundary that isolate the reactor

Relief Request RV-05
Performance-Based Scheduling of Pressure Isolation Valve Leakage Tests
(continued)

coolant system from an attached low pressure system. These affected valves, listed in Section 1, are located on the 'A' and 'B' CS and RHR injection lines and the RHR shutdown cooling line.

PIVs are not specifically included in the scope for performance-based testing as provided for in 10 CFR 50 Appendix J, Option B. The concept behind the Option B alternative for containment isolation valves is that licensees should be allowed to adopt cost effective methods for complying with regulatory requirements. Additionally, NEI 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," describes the risk-informed basis for the extended test intervals under Option B. That justification shows that for valves which have demonstrated good performance by passing their leak rate tests (air) for two consecutive cycles, further failures appear to be governed by the random failure rate of the component. NEI 94-01 also presents the results of a comprehensive risk analysis, including the statement that "the risk impact associated with increasing [leakrate] test intervals is negligible (less than 0.1 percent of total risk)." The valves identified in this relief request are in water applications. The PIV testing is performed with water pressurized to normal plant operating pressures. This relief request is intended to provide for a performance-based scheduling of PIV tests at CNS.

As stated in the previous section, the reason for requesting this relief is dose reduction. Data reviewed from RE25 and RE26 identified that PIV testing alone incurred a total dose of approximately 600 mrem in RE26, which benefited from the chemical decontamination that was performed, and approximately 1600 mrem in RE25. Therefore, assuming the PIVs remain classified as good performers, extended test intervals of three refueling outages would provide a savings of at least 1200 mrem over a three-cycle period.

NUREG 0933, "Resolution of Generic Safety Issues," Issue 105, discusses the need for PIV leak rate testing based primarily on three pre-1980 historical failures of applicable valves industry-wide. These failures involved human errors in either operations or maintenance. None of these failures involved inservice equipment degradation. The performance of PIV leak rate testing provides assurance of acceptable seat leakage with the valve in a closed condition. Typical PIV testing does not identify functional problems which may inhibit the valves ability to re-position from open to closed. For check valves, such functional testing is accomplished per ASME OM Code ISTC-3522 and ISTC-3520. Power-operated valves are routinely full stroke tested per ASME OM Code to ensure their functional capabilities. The periodic functional testing of the PIVs is adequate to identify abnormal conditions that might affect closure capability. Performance of the separate 24-month PIV leak rate testing does not contribute any additional assurance of functional capability; it only determines the seat tightness of the closed valves.

Relief Request RV-05
Performance-Based Scheduling of Pressure Isolation Valve Leakage Tests
(continued)

The functional test and position indication test (PIT) frequencies are as follows:

Valve	Functional Test	PIT
RHR-MOV-MO25A	Quarterly	2 years
RHR-MOV-MO25B	Quarterly	2 years
RHR-MOV-MO274A	Normally De-energized Closed (exercised during PIT test)	Refueling Outage
RHR-MOV-MO274B	Normally De-energized Closed (exercised during PIT test)	Refueling Outage
RHR-CV-26CV	Refueling Outage	Refueling Outage
RHR-CV-27CV	Refueling Outage	Refueling Outage
RHR-MOV-MO17	Cold S/D	Refueling Outage
RHR-MOV-MO18	Cold S/D	Refueling Outage
CS-MOV-MO12A	Cold S/D	Refueling Outage
CS-MOV-MO12B	Cold S/D	Refueling Outage
CS-CV-18CV	Refueling Outage	Refueling Outage
CS-CV-19CV	Refueling Outage	Refueling Outage

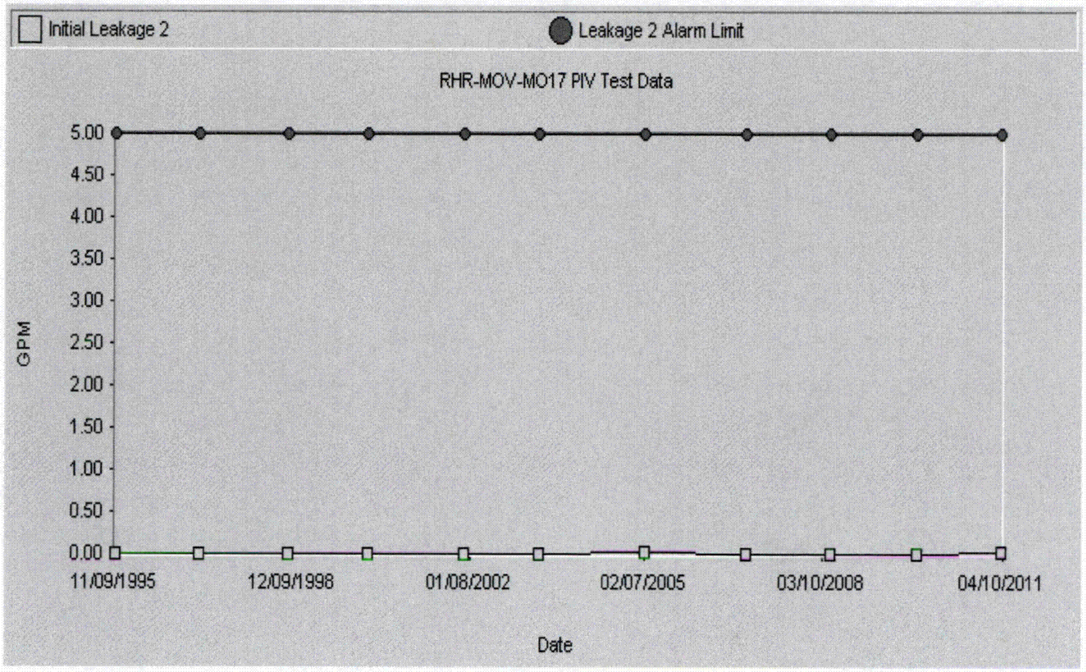
CNS proposes to perform PIV testing at intervals ranging from every refueling outage to every third refueling outage. The specific interval for each valve would be a function of its performance and would be established in a manner consistent with the containment isolation valve (CIV) process under 10 CFR 50 Appendix J, Option B. Five of the 12 valves listed in Section 1 (RHR-MOV-MO25A, RHR-MOV-MO25B, CS-MOV-MO12A, CS-MOV-MO12B, RHR-MOV-MO17) are also classified as CIVs and are leak rate tested with air at intervals determined by 10 CFR 50 Appendix J, Option B. Appendix J and inservice leak testing program guidance will be established such that if any of those five valves fail either their as found CIV test or their PIV test, the test interval for both tests will be reduced to every refueling outage until they can be re-classified as good performers per Appendix J, Option B requirements.

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

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

Relief Request RV-05
Performance-Based Scheduling of Pressure Isolation Valve Leakage Tests
(continued)

The test results for the PIVs listed in Section 1 have been exceptional. For example, a plot of the RHR-MOV-MO17 test results is shown below:



This graph is typical of the affected PIVs listed in Section 1; however, there have been cases where the CIV air testing has indicated a failure with components identified in this relief request. There is a general industry-wide consensus that CIV air testing is a more challenging and accurate measurement of seat condition, and more likely to identify any seat condition degradation. PIV testing has also been utilized at CNS as a post-maintenance test following packing replacements on the CS and RHR injection check valves to ensure the packing is adjusted adequately at normal system pressure. Therefore, PIV testing will continue to be utilized as post-maintenance testing, as necessary.

On June 8, 2012, the NRC staff reviewed and endorsed NEI 94-01, Revision 3 (see the safety evaluation at Accession No. ML121030286), which allows for up to a 75-month frequency for "Type C tests." Per the NRC safety evaluation report (SER) for the fourth interval IST Program (TAC No. ME7021, dated August 28, 2012), to obtain a frequency extension beyond 60 months (up to 75 months), licensees should provide additional information, such as maintenance history, acceptance tests criteria, condition monitoring programs, etc., to justify the acceptability of the extension. In order to further justify the proposed maximum frequency of 3 cycles (72 months) with a standard grace period of 6 months, additional information is being provided.

Table 1 of this relief request contains the maintenance history and Local Leak Rate Test (LLRT)/PIV test history for all 12 of these pressure isolation valves for the past 10 years (since 01/01/2005). The table includes the as found and as left LLRT and PIV test results with the

Relief Request RV-05
Performance-Based Scheduling of Pressure Isolation Valve Leakage Tests
(continued)

associated operability limits. Note that corrective and preventative maintenance has been performed over the past 10 years (and beyond) in order to maintain the acceptable performance of the components. For instance, the MOV Program requires regular inspections and diagnostic tests of the motor operators to ensure that they continue to be relied upon throughout the life of the plant and the check valves have preventative maintenance plans to replace the valve packing on a periodic basis to ensure the packing material is properly maintained. Note that not all of the maintenance performed impacts the seating ability of the components or the test boundary of the associated LLRT/PIV tests, so pre- or post-LLRT/PIV testing may not have been required to be performed. Exercise testing, stroke time testing, and position indication testing was not listed in Table 1.

As can be observed from Table 1, the As Found LLRT test results have been excellent with no failures associated with these valves over the past 10 years and a significant amount of margin has been maintained to the administrative component operability limit. Even more so, a very large margin exists between the PIV test results and the operability limit for each PIV test. With a limit of 5 gpm, the highest recorded PIV leakage in the last 10 years was 0.435 gpm, which is only 8.7% of the allowed leakage. Historically, since 1995, all of the PIV valves have maintained this much or more of a margin to the 5 gpm acceptance criteria as shown below.

Test #	Components	Maximum PIV leakage recorded since 1995 (gpm)	Percent of allowed leakage	Percent of margin to 5 gpm limit
1	RHR-MOV-MO25A	0.299	5.98%	94.02%
2	RHR-MOV-MO25B	0.272	5.44%	94.56%
3	RHR-CV-26CV / RHR-MOV-MO274A	0.1224	2.45%	97.55%
4	RHR-CV-27CV / RHR-MOV-MO274B	0.326	6.52%	93.48%
5	RHR-MOV-MO17	0.0272	0.54%	99.46%
6	RHR-MOV-MO18	0.218	4.36%	95.64%
7	CS-MOV-MO12A	0.435	8.70%	91.30%
8	CS-MOV-MO12B	0.082	1.64%	98.36%
9	CS-CV-18CV	0.3264	6.53%	93.47%
10	CS-CV-19CV	0.082	1.64%	98.36%

The NRC SER for NEI TR 94-01, Revision 3, resulted in a condition that the licensee report the margin between the Type B and Type C leakage rate summation and its regulatory limit and maintain an acceptable margin to the regulatory limit. A second condition requires the licensee to include considerable extra margin in order to extend the LLRT intervals beyond 5 years to a 75-month interval. In comparison, for these PIV tests, CNS will establish an administrative limit of ≤1 gpm for each of the PIV tests in order to maintain each test on an extended frequency. This administrative limit is only 20% of the allowed leakage and will provide considerable extra margin to the limit of 5 gpm when looking at the historical test results.

Relief Request RV-05
Performance-Based Scheduling of Pressure Isolation Valve Leakage Tests
(continued)

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

Summary of bases / rationale for this relief request:

- Performance-based PIV testing would yield a dose reduction of up to 1200 mrem over a three-cycle period.
- Performance of separate functional testing of PIVs per ASME Code.
- Excellent historical performance results from PIV testing for the applicable valves.
- Low likelihood of valve mispositioning during power operations (procedures, interlocks).
- Air testing versus water testing - degrading seat conditions are identified much sooner with air testing.
- Relief valves in the low pressure piping - these relief valves may not provide ISLOCA mitigation for inadvertent PIV mispositioning (gross leakage), but their relief capacity can easily accommodate conservative PIV seat leakage rates.
- Alarms that identify high pressure to low pressure leakage - Operators are highly trained to recognize symptoms of a present or incipient ISLOCA and to take appropriate actions.

The intent of this relief request is simply to allow for a performance-based approach to the scheduling of PIV leakage testing. It has been shown that ISLOCA represents a small risk impact to BWRs such as CNS. CNS PIVs have an excellent performance history in terms of seat leakage testing. The risks associated with extending the leakage test interval to a maximum of three refueling outages (nominal 24 months) are extremely low. The performance-based interval shall not exceed 72 months. Standard scheduling practice may extend the program interval by 25%, not to exceed six months. This relief will provide significant reductions in radiation dose.

6. **Duration of Proposed Alternative**

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

7. **Precedents**

A version of this relief request was previously approved for the fourth ten-year interval at CNS as relief request RV-07 (TAC No ME7021, dated 8-28-2012). Fermi 2 received a Safety Evaluation by the NRC, dated September 28, 2010, on a similar relief request for the performance-based testing of PIVs (TAC No. ME2558, ME2557, and ME2556).

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
RHR-MOV-MO25A (Test #1)	Spring/2005	RE22	N/A	N/A	LLRT: 2.02 scfh (< 30 scfh) PIV: 0.299 gpm (< 5 gpm)	N/A	LLRT and PIV test due.
	10/02/2005	Online	CM 4464719	Remove insulation and validate leak; tightened cap screws on pressure seal; slowed leakage.	N/A	N/A	No impact on LLRT or PIV testing.
	02/10/2006	Online	CM 4465302	Efforts were made to stop bonnet seal leak.	N/A	N/A	No impact on LLRT or PIV testing.
	05/30/2006	Online	PM 4390882	Clean & Lubricate Stem	N/A	N/A	No impact on LLRT or PIV testing.
	Fall/2006	RE23	CM 4464912 CM 4534360	Repaired pressure seal leak, refurbed motor operator, disassembled and examined valve, and diagnostically tested.	LLRT: 0.83 scfh (< 30 scfh)	LLRT (Final AL): 7.95 scfh (< 30 scfh)) PIV: 0.08 gpm (AL)	Major maintenance resets LLRT Freq. to every refueling outage.
	04/03/2007	Online	PM 4542913	Perform Motor Pinion Inspection	N/A	N/A	No impact on LLRT or PIV testing.
	10/04/2007	Online	PM 4498618 PM 4498668	Examine MO-Mech Examine MO-Elect	N/A	N/A	No impact on LLRT or PIV testing.
	Spring/2008	RE24	N/A	N/A	LLRT: 1.25 scfh (< 50 scfh) PIV: 0.109 gpm (< 5 gpm)	N/A	1st periodic test for LLRT (and PIV) test.
	03/30/2009	Online	PM 4625205 PM 4625262 PM 4625267	Clean & Lubricate Stem Examine MO-Mech Examine MO-Elec	N/A	N/A	No impact on LLRT or PIV testing.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Fall/2009	RE25	CM 4641890	MOV Program Diagnostic test/motor replacement. No AL LLRT required due to minimal seat thrust change.	LLRT: 1.75 scfh (< 50 scfh)	PIV: 0.109 gpm (< 5 gpm)	No impact to LLRT or PIV testing. 2nd periodic test for LLRT (and PIV) test.
	Spring/2011	RE26	N/A	N/A	LLRT: 2.1 scfh (< 50 scfh) PIV: 0.136 gpm (< 5 gpm)	N/A	3rd (extra) periodic test for LLRT (and PIV) test.
	06/05/2012	Online	PM 4802964 PM 4803040 PM 4803052	Clean and Lubricate Stem Examine MO-Mech Examine MO-Elec	N/A	N/A	No impact on LLRT or PIV testing.
	Fall/2012	RE27	N/A	N/A	N/A	N/A	No tests due to Option B / approved PIV relief request.
	Fall/2014	RE28	N/A	N/A	LLRT: 3.82 scfh (< 50 scfh)	N/A	No PIV test due to approved PIV relief request.
RHR-MOV-MO25B (Test #2)	Spring/2005	RE22	CM 4335229	Votes diagnostic test	LLRT: 24 scfh (< 30 scfh)	LLRT: 23.8 scfh (< 30 scfh) PIV: 0.0544 gpm (< 5 gpm)	MOV periodic test.
	04/11/2005	Online	PM 4381354	Clean and Lubricate Stem	N/A	N/A	No impact on LLRT or PIV testing.
	10/17/2006	Online	CM 4531030	Examine Torque Switch	N/A	N/A	No impact on LLRT or PIV testing.
	10/18/2006	Online	CM 4531090	Replace Motor Pinion Gear	N/A	N/A	No impact on LLRT or PIV testing.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005

Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Fall/2006	RE23	CM 4537229:	Packing Leak; No AL LLRT required due to minimal packing/seat load change.	LLRT: 17.5 scfh (< 50 scfh)	PIV: 0 gpm (< 5 gpm)	No impact on LLRT or PIV testing. Monitoring LLRT; assume 1st periodic test for PIV.
	04/18/2007	Online	PM 4485530 PM 4498698	Examine MO-Elec Examine MO	N/A	N/A	No impact on LLRT or PIV testing.
	Spring/2008	RE24	CM 4632406 CM 4631163 CM 4531210	Repack valve Adjust Packing/Viper Test Refurbed AO; No AL LLRT/PIV required due to minimal packing/seat load change.	LLRT: 32.14 scfh (< 50 scfh) PIV: 0.0544 gpm (< 5 gpm)	N/A	No impact on LLRT or PIV testing. Monitoring LLRT; 2nd periodic test for PIV.
	10/14/2008	N/A	PM 4600595	Clean and Lubricate Stem	N/A	N/A	No impact on LLRT or PIV testing.
	Fall/2009	RE25	N/A	N/A	LLRT: 12.74 scfh (< 50 scfh) PIV: 0.054 gpm (< 5gpm)	N/A	Monitoring LLRT; 3rd periodic test for PIV.
	07/13/2010	Online	PM 4664227 PM 4664250	Examine MO-Elec Examine MO-Mech	N/A	N/A	No impact on LLRT or PIV testing.
	Spring/2011	RE26	N/A	N/A	LLRT: 23.16 scfh (< 50 scfh) PIV: 0.136 gpm (< 5 gpm)	N/A	Monitoring LLRT (1st periodic test); 4th periodic test for PIV.
	07/19/2011	Online	PM 4749837	Clean and Lubricate Stem	N/A	N/A	No impact on LLRT or PIV testing.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Fall/2012	RE27	CM 4842207	Viper diagnostic test; No AL LLRT/PIV required due to minimal seat load change.	LLRT: 0.17 scfh (< 50 scfh)	N/A	No impact on LLRT or PIV testing. Monitoring LLRT (2nd periodic test); No PIV test due to approved PIV relief request.
	01/14/2013	Online	PM 4864090 PM 4864089	Examine MO-Mech Examine MO-Elec	N/A	N/A	No impact on LLRT or PIV testing.
	01/16/2014	Online	CM 4996016	Reterminate Motor Wiring	N/A	N/A	No impact on LLRT or PIV testing.
	Fall/2014	RE28	N/A	N/A	N/A	N/A	No tests due to Option B / approved PIV relief request.
	01/12/2015	Online	PM 4953672	Clean and Lubricate stem	N/A	N/A	No impact on LLRT or PIV testing.
RHR-MOV-MO274A & RHR-CV-26CV (Test #3)	Spring/2005	RE22	RHR-MO-MO274A PM 4363586	Examine Motor Operator	LLRT: 7.5 scfh (< 35 scfh) PIV: 0.1224 gpm (< 5 gpm)	N/A	No impact on LLRT or PIV testing.
	Fall/2006	RE23	RHR-MOV-MO274A: PM 4446728 RHR-MO-MO274A PM 4446878	Evaluate Packing - Adjust or Repack - Repacked valve Examine Motor Operator	LLRT: 0.75 scfh (< 35 scfh)	LLRT: 4.7 scfh (< 35 scfh) PIV: 0.041 gpm (< 5 gpm)	Routine PM

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Spring/2008	RE24	N/A	N/A	LLRT: 4.27 scfh (< 35 scfh) PIV: 0.054 gpm (< 5 gpm)	N/A	Assume 1st periodic test for LLRT (and PIV) test.
	Fall/2009	RE25	RHR-MO-MO274A PM 4645290 RHR-CV-26CV CM 4723494	Examine MO-Mech Adjust Reed Switches	LLRT: 8.31 scfh (< 35 scfh) PIV: 0.082 gpm (< 5 gpm)	N/A	No impact on LLRT or PIV testing. 2nd periodic test for LLRT (and PIV) test.
	Spring/2011	RE26	RHR-MOV-MO274A: PM 4744619:	Evaluate Packing - Adjust or Repack - Tightened Packing	N/A	PIV: 0.082 gpm (< 5 gpm)	No impact on PIV test. LLRT no longer required due to closed loop analysis. 3rd periodic test for PIV test.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Fall/2012	RE27	RHR-CV-26CV: PM 4848060 RHR-CV-26CV: CM 4918074 RHR-MO-MO274A: PM 4848151	Repack Valve; performed exercise test and no external leakage at pressure as PMT; PIV test not required as had no impact to seating ability and located inside Drywell. Adjust Limit Switch Examine MO-Mech	N/A	N/A	No PIV test due to approved PIV relief request.
	Fall/2014	RE28	N/A	N/A	N/A	N/A	No PIV test due to approved PIV relief request.
RHR-MOV-MO274B & RHR-CV-27CV (Test #4)	Spring/2005	RE22	RHR-MO-MO274B CM 4299766 PM 4363585	Refurbish MO Examine MO	LLRT: 9.6 scfh (< 35 scfh)	LLRT: 9.4 scfh (< 35 scfh) PIV: 0.136 gpm (< 5 gpm)	AF ~ AL LLRT.
	Fall/2006	RE23	RHR-MOV-MO274B PM 4446729 PM 4446875	Evaluate Packing - Adjust or Repack - No packing adjustment required. Examine MO	LLRT: 9.8 scfh (< 35 scfh)	PIV: 0.109 gpm (< 5 gpm)	No impact on LLRT or PIV testing.
	Spring/2008	RE24	RHR-CV-27CV: PM 4541360	Repacked Valve	LLRT: 14.5 scfh (< 35 scfh)	LLRT: 28.59 scfh (< 35 scfh) PIV: 0.163 gpm (< 5 gpm)	Assume resets LLRT frequency.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005

Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Fall/2009	RE25	RHR-MO-274B: PM 4645289	Examine MO-Mech	<u>LLRT</u>: 15.7 scfh (< 35 scfh) <u>PIV</u>: 0.218 gpm (< 5 gpm)	N/A	No impact on LLRT or PIV tests. Assume 1st periodic test for LLRT and PIV test.
	Spring/2011	RE26	RHR-MOV-MO274B: PM 4744620	Evaluate Packing - Adjust or Repack - Tightened packing	N/A	<u>PIV</u>: 0.326 gpm (< 5 gpm)	LLRT no longer required due to closed loop analysis. No impact on PIV test; 2nd periodic PIV test.
	Fall/2012	RE27	PM 4848150	Examine MO-Mech	N/A	N/A	No PIV test due to approved PIV relief request.
	Fall/2014	RE28	N/A	N/A	N/A	N/A	No PIV test due to approved PIV relief request.
RHR-MOV-MO17 (Test #5)	Spring/2005	RE22	PM 4363507 PM 4363526	Examine MO and Verify Indication Examine MO	<u>LLRT</u>: 2.95 scfh (< 30 scfh) <u>PIV</u>: 0.027 gpm (< 5 gpm)		No impact on LLRT or PIV testing. Assume 1st periodic test for LLRT and PIV.
	Fall/2006	RE23	PM 4446718 CM 4535994	Clean and Lube Stem Perform Motor Pinion Inspection	<u>LLRT</u>: 1.75 scfh (< 30 scfh) <u>PIV</u>: 0 gpm (< 5 gpm)		No impact on LLRT or PIV testing. 2nd periodic test for LLRT and PIV.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Spring/2008	RE24	CM 4546759	Replace MO and diagnostic test; AL LLRT not required due to minimal change in seat load.	LLRT: 0.68 scfh (< 30 scfh)	PIV: 0 gpm (< 5 gpm)	No impact on LLRT or PIV testing. 3rd periodic test for LLRT and PIV.
	Fall/2009	RE25	PM 4645142	Clean and Lubricate	PIV: 0 gpm (< 5 gpm)		LLRT not required due to Option B; 4th periodic PIV test.
	Spring/2011	RE26	PM 4744696 CM 4740307 PM 4744691	Examine MO - Mech Motor Pinion Inspection Examine MO - Elect	PIV: 0.027 gpm (< 5 gpm)		LLRT not required due to Option B; 5th periodic PIV test.
	Fall/2012	RE27	PM 4848600	Examine MO	LLRT: 5.32 scfh (< 30 scfh)		No PIV test due to approved PIV relief request.
	Fall/2014	RE28	PM 4983676	Examine MO	N/A		No tests due to Option B / PIV relief request.
RHR-MOV-MO18 (Test #6)	Spring/2005	RE22	PM 4363506 CM 4212544 PM 4363568	Examine MO and Verify Indication Refurb MO and diagnostic test Examine MO	LLRT: 1.96 scfh (< 30 scfh)	LLRT: 2.06 scfh (< 30 scfh) PIV: 0.0408 gpm (< 5 gpm)	Assume resets LLRT frequency.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Fall/2006	RE23	PM 4446727 PM 4446867 PM 4446860	Evaluate Packing Adjust or Repack - (tightened 2 flats); AL LLRT not required due to minimal change in packing and seating forces. Examine Motor Operator Examine MO and Verify Indication	LLRT: 2.6 scfh (< 30 scfh)	PIV: 0.109 gpm (< 5 gpm)	No impact on LLRT or PIV testing. 1st periodic test for LLRT and PIV.
	Spring/2008	RE24	PM 4549525 CM 4531750	Examine Motor Operator Motor Pinion Gear Inspection	LLRT: 0.7 scfh (< 30 scfh) PIV: 0.109 gpm (< 5 gpm)		No impact on LLRT or PIV testing. 2nd periodic test for LLRT and PIV.
	Fall/2009	RE25	CM 4640553	Motor Pinion Gear Inspection	LLRT: N/A	PIV: 0.218 gpm (< 5 gpm)	LLRT no longer required due to closed loop analysis. No impact on PIV test. 3rd periodic PIV test.
	Spring/2011	RE26	PM 4744618 PM 4746148 PM 4744690	Evaluate Packing Adjust or Repack - (1 flat): Examine MO-Mech Examine MO-Elec	LLRT: N/A	PIV: 0.027 gpm (< 5 gpm)	No impact on PIV test. 4th periodic PIV test.
	Fall/2012	RE27	PM 4848601	Examine MO-Mech	N/A	N/A	No impact on PIV test. No PIV test due to approved PIV relief request.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Fall/2014	RE28	CM 4945389 PM 4949440 PM 4950106	Viper Test - no torque switch or packing adjustments required (AF=AL); PIV not required Evaluate Packing Adjust or Repack - Not needed Examine MO (Mech/Elec)	N/A	N/A	No PIV test due to approved PIV relief request.
CS-MOV-MO12A (Test #7)	Spring/2005	RE22	N/A	N/A	<u>LLRT</u>: 0.004 scfh (< 10 scfh) <u>PIV</u>: 0.299 gpm (< 5 gpm)	N/A	Periodic LLRT and PIV test. Assume 1st periodic PIV test.
	08/02/2005	Online	PM 4387217	Clean, Lubricate, Partial Stroke	N/A	N/A	No impact on LLRT or PIV testing.
	08/02/2006	Online	CM 4447691	Adjust Packing (tightened 2 flats); no AL LLRT/PIV required.	N/A	N/A	No impact on LLRT or PIV testing.
	Fall/2006	RE23	CM 4531453	Motor Pinion Gear Inspection	N/A	<u>PIV</u>: 0.435 gpm (< 5 gpm)	No impact on LLRT or PIV testing. LLRT not required due to option B. 2nd periodic PIV test.
	02/05/2008	Online	PM 4532685	Examine MO - Mech	N/A	N/A	No impact on LLRT or PIV testing.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Spring/2008	RE24	CM 4547083 CM 4561197	Refurb and test MO Install ETT/QSS	LLRT: 0.86 scfh (< 10 scfh)	LLRT: 1.05 scfh (< 10 scfh) PIV: 0.19 gpm (< 5 gpm)	AF~AL LLRT. No impact on LLRT or PIV testing. 3rd periodic PIV test.
	Fall/2009	RE25	CM 4723418	Adjust close limit switch	PIV: 0 gpm (< 5 gpm)	N/A	No impact on LLRT or PIV testing. LLRT not required due to option B. 4th periodic PIV test.
	Spring/2011	RE26	N/A	N/A	PIV: 0 gpm (< 5 gpm)	N/A	LLRT not required due to option B. 5th periodic PIV test.
	08/10/2011	Online	PM 4749833	Clean, Lubricate, and Partial Stroke	N/A	N/A	No impact on LLRT or PIV testing.
	Fall/2012	RE27	PM 4848626	Examine MO (Mech & Elec);	LLRT: 0.1528 scfh (< 10 scfh) PIV: 0 gpm (< 5 gpm)	N/A	No impact on LLRT or PIV testing. 6th periodic PIV test.
	Fall/2014	RE28	CM 4945454 PM 4950123	Viper Test; AL LLRT/PIV tests not required due to minimal change in packing and seating forces. Examine MO (Clean/Lube Stem)	LLRT: 1.1 scfh (< 10 scfh)		No impact on LLRT or PIV testing. PIV test not required due to approved relief request.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
CS-MOV-MO12B (Test #8)	Spring/2005	RE22	N/A	N/A	LLRT: 1.23 scfh (< 10 scfh) PIV: 0 gpm (< 5 gpm)	N/A	Periodic LLRT and assume 1st periodic PIV test.
	08/14/2006	Online	PM 4465037 CM 4334765	Clean/Lube/Partial Stroke Periodic Diagnostic Test; no AL LLRT/PIV	N/A	N/A	No impact on LLRT or PIV testing.
	Fall/2006	RE23	CM 4534089	Motor Pinion Gear Inspection	PIV: 0 gpm (< 5 gpm)	N/A	No impact on LLRT or PIV testing. LLRT not required due to option B. 2nd periodic PIV test.
	Spring/2008	RE24	CM 4561198	Install ETT/QSS	PIV: 0.082 gpm (< 5 gpm)	N/A	No impact on LLRT or PIV testing. LLRT not required due to option B. 3rd periodic PIV test.
	Fall/2009	RE25	PM 4658094	Examine & Clean Operator	LLRT: 1.67 scfh (< 10 scfh) PIV: 0 gpm (< 5 gpm)	N/A	No impact on LLRT or PIV testing. 4th periodic PIV test.
	11/12/2009	Online	PM 4625209	Clean/Lube/Partial Stroke	N/A	N/A	No impact on LLRT or PIV testing.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Spring/2011	RE26	PM 4767601	Examine Motor Operator	PIV: 0 gpm (< 5 gpm)	N/A	No impact on LLRT or PIV testing. LLRT not required due to option B. 4th periodic PIV test.
	Fall/2012	RE27	CM 4840074 PM 4848541	Viper Test Examine MO (Mech/Elec)	LLRT: 1.82 scfh (< 10 scfh)	LLRT: 2.02 scfh PIV: 0.0136 gpm (< 5 gpm)	No impact on LLRT or PIV testing. 5th periodic PIV test.
	Fall/2014	RE28	PM 4950054	Examine MO (Clean/Lube Stem)	N/A	N/A	No impact on LLRT or PIV testing. No LLRT test performed due to option B and no PIV test performed due to an approved relief request.
CS-CV-18CV (Test #9)	Spring/2005	RE22	N/A	N/A	PIV: 0 3264 gpm (< 5 gpm)	N/A	LLRT not required due to Option B; periodic PIV test.
	Fall/2006	RE23	N/A	N/A	PIV: 0.326 gpm (< 5 gpm)	N/A	LLRT not required due to Option B; periodic PIV test.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Spring/2008	RE24	N/A	N/A	LLRT: 1.19 scfh (< 15 scfh) PIV: 0.136 gpm (< 5 gpm)	N/A	Periodic LLRT and PIV tests.
	Fall/2009	RE25	PM 4645121 CM 4724012	Repack Valve Disassemble and Repair following issues during repack	LLRT: 0.131 scfh (< 15 scfh)	LLRT (Final AL): 0.79 scfh (< 15 scfh) PIV: 0 gpm (< 5 gpm)	Significant Maint. Resets LLRT/PIV frequency.
	Spring/2011	RE26	N/A	N/A	PIV: 0 gpm (< 5 gpm)	N/A	LLRT no longer required due to closed loop analysis. First periodic PIV test.
	Fall/2012	RE27	N/A	N/A	PIV: 0 gpm (< 5 gpm)	N/A	Second periodic PIV test.
	Fall/2014	RE28	N/A	N/A		N/A	PIV test not required due to approved relief request.
CS-CV-19CV (Test #10)	Spring/2005	RE22	N/A	N/A	LLRT: 0.95 scfh (< 15 scfh) PIV: 0 gpm (< 5 gpm)	N/A	Periodic LLRT and PIV tests.
	Fall/2006	RE23	N/A	N/A	PIV: 0 gpm (< 5 gpm)	N/A	LLRT not required due to Option B; periodic PIV test.
	Spring/2008	RE24	CM 4631924 PM 4541346	Adjust/add packing Repack valve	LLRT: 0.65 scfh (< 15 scfh)	LLRT (Final AL): 1.4 scfh PIV (Final AL): 0.05 gpm (< 5 gpm)	Elected to Reset LLRT/PIV frequency.

Relief Request RV-05: Table 1: Maintenance and PIV/LLRT Test History Since 01/01/2005							
Component(s)	~Date	Outage	Work Order	Work Order Description	AF Tests	AL Tests	Comments
	Fall/2009	RE25	N/A	N/A	LLRT: 1.37 scfh (< 15 scfh) PIV: 0 gpm (< 5 gpm)	N/A	First periodic LLRT and PIV test.
	Spring/2011	RE26	N/A	N/A	PIV: 0 gpm (< 5 gpm)	N/A	LLRT no longer required due to closed loop analysis. Second periodic PIV test.
	Fall/2012	RE27	N/A	N/A	N/A	N/A	No PIV test required due to approved relief request.
	Fall/2014	RE28	N/A	N/A	N/A	N/A	No PIV test required due to approved relief request.

AF = As Found
AL = As Left
CM = Corrective Maintenance
PM = Preventative Maintenance

ATTACHMENT 5

AUGMENTED VALVE RELIEF REQUESTS

AUGMENTED VALVE RELIEF REQUEST INDEX		
Relief Request No.	**Description**	**CNS Approval Date**
ARV-01	DGDO Day Tank Valve Test Method	3-1-2016
ARV-02	Diesel Fuel Oil Relief Valve Test Media	3-1-2016
ARV-03	DGDO Check Valve Closure Tests	3-1-2016

Relief Request ARV-01
DGDO Day Tank Valve Test Method

Alternative Provides Acceptable Level of Quality and Safety

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

Valve	Class	Category	System
DGDO-SOV-SSV5028	A	B	DGDO
DGDO-SOV-SSV5029	A	B	DGDO

2. **Applicable Code Edition and Addenda**

American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ISTC-5151(a), Active valves shall have their stroke times measured when exercised in accordance with ISTC-3500.

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**

Augmented Relief is requested from the requirements of table ISTC-5151(a) and ISTC-3560, as applicable, for the valves listed above. The proposed alternative provides an acceptable level of quality and safety. This Augmented Relief Request does not require NRC approval.

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

The DG Day Tank Fuel Safety Solenoid Valves (DGDO-SOV-SSV5028, SSV5029) have a passive safety function in the open position to permit filling of the associated Day Tank during fuel oil transfer operations. These solenoid operated valves also have an active defense-in-depth (non-safety) function in the closed position to prevent overfilling of the associated Diesel Fuel Tank. However, this is only a back-up function to the safety-related day tank high level switch function to stop the fuel oil transfer pump in the same division on a high level in the day tank.

DGDO-SOV-SSV-5028, 5029 are encapsulated solenoid valves and are not provided with remote position indication or remote manual switches. The design of these valves prohibits visual verification of the physical position of the valve operator, stem, or internal components. If the safety-related high level switch fails, the solenoid valve will close at the high-high level.

Relief Request ARV-01
DGDO Day Tank Valve Test Method
(Continued)

Modification of the system to verify individual valve exercising capability is not practicable nor cost beneficial since no commensurate increase in safety would be derived. These valves are ASME non-code class valves and are not within the scope of the IST Program.

Since the Diesel Fuel Oil transfer system is an Augmented IST System, the components within this system are not required to follow the requirements of class 1, 2, or 3 components. However, components are required to be tested in a manner that is commensurate with the level of safety that they provide. Although these valves are considered to be passive open valves, CNS will conservatively test these valves periodically in the open position. At least quarterly, the diesel fuel oil day tank level alarms and transfer pump control level switches are functionally tested during diesel runs. The solenoid valves shall be verified open by observing restoration of day tank levels and measurement of sufficient flows during the IST transfer pump test surveillances. The testing being performed will ensure that these valves may be relied upon to fulfill their open safety function.

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

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

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

A version of this relief request was previously approved by CNS for the fourth ten-year interval as ARV-01.

Relief Request ARV-02
Diesel Fuel Oil Relief Valve Test Media

Alternative Provides Acceptable Level of Quality and Safety

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

Valve	Class	Category	System
DGDO-RV-10RV	A	C	DGDO
DGDO-RV-11RV	A	C	DGDO

2. **Applicable Code Edition and Addenda**

American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

Mandatory Appendix I, paragraph I-4130(a), "Test Media." Valves shall be tested with the normal system operating fluid and temperature for which they are designed. Alternative liquids and different temperatures may be used, provided the requirements of I-4300 are met.

4. **Reason for Request**

Augmented Relief is requested from the requirements of Mandatory Appendix I, paragraph I-4130(a), concerning the liquid test media. The proposed alternative provides an acceptable level of quality and safety. This Augmented Relief Request does not require NRC approval.

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

These augmented relief valves provide over pressure protection of the engine driven fuel oil pump suction due to thermal expansion.

These relief valves are periodically tested onsite at CNS. However, performing this relief valve set pressure testing with diesel fuel oil would be an unsafe practice due to the dangerous characteristics associated with this media. The fuel oil is flammable, and could be damaging to the eyes and/or skin. Utilizing the fuel oil as the test media would also contaminate the test equipment, making it difficult to clean and re-use this test equipment for other relief valve testing.

In order to alleviate the concerns with utilizing diesel fuel oil as the test media for these relief valves, water may be used with negligible effects on the results of the relief valve testing performed to satisfy Mandatory Appendix I. The diesel fuel oil is slightly more viscous than water, but this should not affect the IST set pressure or seat leakage tests for the following reasons. The set pressure is determined by applying a static force against the upstream portion of the valve disc and recording the initial gush or first sign of continuous flow through the valve.

Relief Request ARV-02
Diesel Fuel Oil Relief Valve Test Media
(Continued)

Utilizing fuel oil or water should have a negligible effect on this test. In support of this statement, the Anderson Greenwood Crosby Test Report #5595, which compared opening pressures with water, lube oil and fuel oil, concluded that a one-to-one correlation exists between Fuel oil and water. The test results indicated no significant differences in the opening pressures. The seat leakage testing criteria is set at zero leakage at 90% of set pressure. If water passes this test, then diesel fuel oil should also pass the test since water is less viscous than diesel fuel.

These valves are Seismic Class IS and are ASME non-Code Class. Therefore, they are outside the scope of the IST requirements of 10CFR50.55a. The valves are included in the IST Augmented Program.

Relief Valve testing will be performed per Mandatory Appendix I, with the exception that water will be utilized as the test media rather than diesel fuel oil.

6. **Duration of Proposed Alternative**

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

7. **Precedents**

This relief request was previously approved by CNS for the fourth ten-year interval as ARV-02.

Relief Request ARV-03
DGDO Check Valve Closure Tests

Alternative Provides Acceptable Level of Quality and Safety

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

Valve	Class	Category	System
DGDO-CV-10CV	A	C	DGDO
DGDO-CV-11CV	A	C	DGDO
DGDO-CV-12CV	A	C	DGDO
DGDO-CV-13CV	A	C	DGDO

2. **Applicable Code Edition and Addenda**

American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

ISTC-5221(a), "The necessary valve obturator movement during exercise testing shall be demonstrated by performing both an open and a close test."

4. **Reason for Request**

Augmented Relief is requested from the requirements of ISTC-5221(a), concerning the closure testing of these check valves. The proposed alternative provides an acceptable level of quality and safety. This Augmented Relief Request does not require NRC approval.

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

DGDO-CV-10CV and DGDO-CV-11CV are the fuel oil transfer pump discharge check valves and DGDO-CV-12CV and DGDO-CV-13CV are the day tank inlet check valves. These augmented check valves have a safety function in the open position to allow transfer of fuel oil to their respective diesel fuel oil day tank during normal diesel generator operation. These check valves have no safety function to close, but the code requires bi-directional testing of check valves.

Some plants may have elected to classify the Diesel Fuel Oil Transfer pumps and their associated check valves as being skid-mounted in accordance with the ISTA-2000 definition for skid-mounted pumps/valves and the ISTC-1200 exemptions. This position would allow these components to be considered adequately tested with an acceptable diesel generator run. However, CNS has elected to include the pumps within the augmented IST Program to better track the performance of these pumps. As a part of this pump testing, the check valves associated with each transfer pump are tested to the open position by verification that the valves can deliver

Relief Request ARV-03
DGDO Check Valve Closure Tests
(Continued)

> 4.64 gpm, which is the flow required to support continuous operation of a diesel generator at full load. The closure function, however, cannot be tested within this surveillance.

The fuel oil transfer pump headers are isolated downstream of the check valves via normally closed cross-tie manual valve, DGDO-V-19. With this manual valve in the passive closed position, the potential of a diversion of fuel oil from one division to the other is eliminated. Satisfactory surveillance testing of the diesel generators and fuel oil transfer pumps ensure that sufficient fuel flow is transferred to the day tanks. Finally, the diesel fuel oil discharge header cross-tie valve, DGDO-V-16, is a normally closed passive manual valve that is never opened during normal operations or during transient or accident conditions, which alleviates the concern of backflow through this line.

Since the Diesel Generator Diesel Fuel Oil transfer System is an Augmented IST System, the components within this system are not required to follow the requirements of class 1, 2, and 3 components. However, the components are required to be tested in a manner that is commensurate with the level of safety that they provide. Testing DGDO-CV-10CV, DGDO-CV11CV, DGDO-CV-12CV, and DGDO-CV-13CV in the open position clearly demonstrates that the check valves within the diesel fuel oil transfer system are adequately tested and may be relied upon to fulfill their safety functions. This is consistent with CNS Engineering Evaluation, EE 08-026, which reconfigured DGDO-V-19 from open to closed. For these reasons, the closure testing of these check valves are not required.

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

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

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

This relief request was previously approved by CNS for the fourth ten-year interval as ARV-03.

ATTACHMENT 5

GENERAL RELIEF REQUESTS

VALVE RELIEF REQUEST INDEX		
Relief Request No.	**Description**	**NRC Approval Date**
RG-01	ASME OM Code Test Frequencies	Pending

Relief Request RG-01
ASME OM Code Test Frequencies

Proposed Alternative in Accordance with 10 CFR 50.55a(z)(2)

Hardship or Unusual Difficulty without a Compensating Increase in Level of Quality and Safety

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

All Pumps and Valves contained within the Inservice Testing Program (IST) scope.

2. **Applicable Code Edition and Addenda**

ASME OM Code 2004 Edition through 2006 Addenda

3. **Applicable Code Requirement**

This request for relief applies to the frequency specification of the ASME OM Code for all pump and valve testing contained within the IST Program scope. The applicable ASME OM Code (2004 Edition through the 2006 Addenda) sections include the following:

Code Paragraph	Description
ISTA-3120(a)	The frequency for inservice testing shall be in accordance with the requirements of Section IST
ISTB-3400	Frequency of Inservice Tests
ISTB-6200	Corrective Action
ISTC-3510	Exercising Test Frequency
ISTC-3540	Manual Valves
ISTC-3560	Fail-Safe Valves
ISTC-3630(a)	Frequency
ISTC-3700	Position Verification Testing
ISTC-5221(c)(3)	At least one valve from each group shall be disassembled and examined at each refueling outage; all valves in a group shall be disassembled and examined at least once every 8 years.
ISTC-5222	Condition-Monitoring Program
ISTC-5230	Vacuum Breaker Valves
ISTC-5240	Safety and Relief Valves
ISTC-5260	Explosively Actuated Valves
Appendix I*, I-1320	Test Frequencies, Class 1 Pressure Relief Valves
Appendix I, I-1330	Test Frequency, Class 1 Nonreclosing Pressure Relief Devices
Appendix I, I-1340	Test Frequency, Class 1 Pressure Relief Valves That Are Used for Thermal Relief Applications
Appendix I, I-1350	Test Frequency, Classes 2 and 3 Pressure Relief Valves
Appendix I, I-1360	Test Frequency, Classes 2 and 3 Nonreclosing Pressure Relief Devices
Appendix I, I-1370	Test Frequency, Classes 2 and 3 Primary Containment Vacuum Relief Valves
Appendix I, I-1380	Test Frequency, Classes 2 and 3 Vacuum Relief Valves, Except for Primary Containment Vacuum Relief Valves

Relief Request RG-01
ASME OM Code Test Frequencies
(continued)

Code Paragraph	Description
Appendix I, I-1390	Test Frequency, Classes 2 and 3 Pressure Relief Devices that are Used for Thermal Relief Application.
Appendix II**, II-4000(a)	Performance Improvement Activities
Appendix II, II-4000(b)	Optimization of Condition-Monitoring Activities

*Appendix I is for Pressure Relief Devices
** Appendix II is for the Check Valve Condition Monitoring Program (CVCM)

4. Reason for Request

Pursuant to 10 CFR 50.55a, "Codes and Standards," paragraph (z)(2), relief is requested from the frequency specification of the ASME OM Code. The basis of the Relief Request is that the Code requirement presents an undue hardship without a compensating increase in the level of quality and safety.

The ASME OM Code, 2004 Edition through the 2006 Addenda, establishes the inservice test frequency for all components within the scope of the Code. The frequencies (e.g., quarterly) have always been interpreted as "nominal" frequencies (generally as defined in Table 3.2 of NUREG 1482, Revision 2) and if necessary, owners applied the surveillance extension time period (i.e. grace period) contained in the plant Technical Specifications (TS) SRs. The CNS TS SR 3.0.2 states that the specified frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency. This would allow an extension of up to 25% of the surveillance test interval to accommodate plant conditions that may not be suitable for conducting the surveillance. However, regulatory issues have been raised concerning the applicability of the TS grace period to ASME OM Code required inservice test frequencies.

The lack of a tolerance band (grace period) on the ASME OM Code IST frequency restricts operational flexibility. There may be a conflict where an IST test could be required (i.e., its frequency could expire), but it is not possible or not desired that it be performed until sometime after a plant condition or associated TS is applicable. Therefore, to avoid this conflict, the IST test intervals should be allowed to be extended by up to 25%.

Thus, just as with TS required surveillance testing, some tolerance is needed to allow adjusting OM Code testing intervals to suit the plant conditions and other maintenance and testing activities. This assures operational flexibility when scheduling IST tests that minimize the conflicts between the need to complete the test and plant conditions.

5. Proposed Alternative and Basis for Use

Code Case OMN-20 is included in the ASME OM Code, 2012 Edition, and will be used as an alternative to the frequencies of the ASME OM Code. The requirements of Code Case OMN-20 are described below.

Relief Request RG-01
ASME OM Code Test Frequencies
(continued)

ASME OM, Division 1, Section IST and all earlier editions and addenda specify component test frequencies based either on elapsed time periods (e.g., quarterly, 2 year, etc.) or the occurrence of plant conditions or events (e.g., cold shutdown, refueling outage, upon detection of a sample failure, following maintenance, etc.).

(a) Components whose test frequencies are based on elapsed time periods shall be tested at the frequencies specified in Section IST with a specified time period between tests as shown in Table 1. The specified time period between tests may be reduced or extended as follows:

(1) For periods specified as fewer than 2 years, the period may be extended by up to 25% for any given test.

(2) For periods specified as greater than or equal to 2 years, the period may be extended by up to 6 months for any given test.

(3) All periods specified may be reduced at the discretion of the owner (i.e., there is no minimum period requirement).

Period extension is to facilitate test scheduling and considers plant operating conditions that may not be suitable for performance of the required testing (e.g., performance of the test would cause an unacceptable increase in the plant risk profile due to transient conditions or other ongoing surveillance, test, or maintenance activities). Period extensions are not intended to be used repeatedly merely as an operational convenience to extend test intervals beyond those specified.

Period extensions may also be applied to accelerated test frequencies (e.g., pumps in alert range) and other fewer than 2 year test frequencies not specified in Table 1.

Period extensions may not be applied to the test frequency requirements specified in Subsection ISTD, Preservice and Inservice Examination and Testing of Dynamic Restraints (Snubbers) in Light-Water Reactor Nuclear Power Plants, as Subsection ISTD contains its own rules for period extensions.

(b) Components whose test frequencies are based on the occurrence of plant conditions or events may not have their period between t ests extended except as allowed by ASME OM, Division 1, Section IST, 2009 Edition through OMa-2011 Addenda and all earlier editions and addenda.

Relief Request RG-01
ASME OM Code Test Frequencies
(continued)

Table 1 Specified Test Frequencies	
Frequency	**Specified Time Period Between Tests**
Quarterly (or every 3 months)	92 days
Semiannually (or every 6 months)	184 days
Annually (or every year)	366 days
x years	x calendar years where x is a whole number of years ≥ 2

6. Duration of Proposed Alternative

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

7. Precedents

This relief request was previously approved for the Fermi-2 third ten-year interval as Relief Request PVRR-001 (TAC No. MF2967, dated July 16, 2014).

Three Mile Island Nuclear Station, Unit 1 - Relief Requests PR-01, PR-02, and VR-02, Associated With The Fifth 10-Year Inservice Test Interval (TAC Nos. MF0046, MF0047 and MF0048, dated August 15, 2013).

ATTACHMENT 7

COLD SHUTDOWN JUSTIFICATIONS

COLD SHUTDOWN JUSTIFICATION INDEX	
Cold Shutdown Justification No.	**Description**
CSJ-01	SGT-CV-14/15CV Exercising (Augmented)
CSJ-02	HPCI-AOV-PCV50 Exercising
CSJ-03	MS-AOV-AO80A/B/C/D and MS-AOV-AO86A/B/C/D Exercising
CSJ-04	RR-MOV-MO53A/B Exercising
CSJ-05	RHR-MOV-MO17/18 Exercising
CSJ-06	RHR-MOV-920MV/921MV Exercising
CSJ-07	SW-AOV-TCV451A/B Exercising
CSJ-08	HV-MOV-262/264/266/268MV Exercising (Augmented)
CSJ-09	CS-MOV-MO12A/B Exercising
CSJ-10	Exercising of Backseated Valves

Cold Shutdown Justification CSJ-01 (Augmented)

Valve Number	System	Class	Category
SGT-CV-14CV	SGT	A	C
SGT-CV-15CV	SGT	A	C

Function

These check valves open to provide flow paths from their respective SGT filter trains and close to prevent back flow from the operating SGT train discharge.

Justification

The required full flowrate for these valves is > 1602 cfm. During plant power operations, system conditions exist that prevent the SGT system from achieving a flowrate of > 1602 cfm. Reactor building differential pressure and back pressure from the Off Gas Dilution Fans act against SGT system pressure restricting SGT system flowrate. Therefore, it is impracticable to perform a full flowrate test of these valves at power operations.

These valves are ASME non-code class and are not within the scope of the IST Program.

Alternative Test

A full flow open test will be performed on these valves during cold shutdown periods. The full flow test shall also satisfy the closure exercise requirements of the check valve in the idle train.

Cold Shutdown Justification CSJ-02

Valve Number	System	Class	Category
HPCI-AOV-PCV50	HPCI	2	B

Function

Air operated, pressure regulating valve for the cooling water supply line to the HPCI lube oil cooler. The valve performs an active safety function in the open/throttled position to allow cooling water flow to the lube oil cooler.

Justification

This valve functions to control pressure in the cooling water supply line to the HPCI turbine lube oil cooler. Cooling water is supplied from the HPCI booster pump discharge. The valve is normally maintained in the closed position as a result of the HPCI pump being idle and pressure maintenance, supplied by the auxiliary condensate system, maintaining pressure above the control valve's set point.

The valve travels to a throttled position when the HPCI pump starts to automatically maintain pressure in the cooling water line at 50 psig. The valve is designed to fail to the open position on a loss of instrument air to ensure continuity of cooling water flow to the lube oil cooler. Fail open travel is limited by a travel stop in order to prevent the downstream relief valve from lifting. The travel stop is set such that the required flow rate to the lube oil cooler is met under all operating conditions.

Stroke timing and fail-safe testing to the open position online would require HPCI to be declared inoperable and the HPCI pressure controller, HPCI-PC-50, to be taken out of service. Then, with instrument air isolated, a test rig would be utilized to apply air to the HPCI-AOV-PCV50 actuator in order to close the valve. Upon completion of valve closure, air to the actuator would then be removed, allowing the valve to be timed as it travels to the open position. This complex process to time this valve open is impracticable to perform every quarter independently during power operation and is also impracticable to perform in conjunction with the HPCI run. HPCI testing duration is limited by the resulting suppression pool heat up and Tech Spec temperature limitations.

Alternative Test

This pressure control valve shall be stroke timed and fail-safe tested open during cold shutdowns by manipulating the valve position by controlling air to the actuator, as discussed above. A partial stroke exercise test will be considered to be performed quarterly with the HPCI pump test.

Cold Shutdown Justification CSJ-03

Valve Number	System	Class	Category
MS-AOV-AO80A	MS	1	A
MS-AOV-AO80B	MS	1	A
MS-AOV-AO80C	MS	1	A
MS-AOV-AO80D	MS	1	A
MS-AOV-AO86A	MS	1	A
MS-AOV-AO86B	MS	1	A
MS-AOV-AO86C	MS	1	A
MS-AOV-AO86D	MS	1	A

Function

The inboard and outboard main steam isolation valves (MSIVs) must be capable of automatic closure to limit the release of radioactivity during a reactor transient or accident condition and to prevent damage to the fuel barrier by limiting the loss of reactor coolant water in case of a major leak from the steam piping outside of primary containment.

Justification

Quarterly full closure testing of the MSIVs during 100% power operation is impracticable due to the potential for reactor transients and scrams. Also, full MSIV closure could create the potential of lifting the main steam safety relief valves (SRVs) due to an increase in steam line pressure. Failure of an SRV to re-close could result in reactor vessel depressurization.

These affects may be minimized by performance at a reduced power level of < 70%, but then this activity contributes to the financial burden of reducing reactor power levels to facilitate valve testing. More importantly, the full stroke testing of MSIVs, even at reduced power, places the plant in an abnormal operating condition and introduces an unnecessary challenge to plant equipment. For example, the MSIVs are challenged to close and then re-open with steam in the lines, the plant must stabilize following the isolation and un-isolation of a Main Steam Line. Also, the testing has the potential to cause the plant to remain at a reduced power level and/or cause the initiation of a shutdown in order to make repairs. This would introduce additional equipment cycling and plant thermal transients.

Therefore, the testing conditions associated with full-stroke testing the MSIVs online meets the deferral criteria outlined in NUREG-1482 Revision 2, section 2.4.5.

Finally, per Technical Specification surveillance requirement, SR 3.6.1.3.6, which verifies that the isolation time of each MSIV is between 3 and 5 seconds, the frequency of the test is to be determined by the IST Program (via this cold shutdown). Technical Specification surveillance requirement, SR 3.3.1.1.9, requires a channel functional test to be performed every 92 days and may be satisfied by a partial stroke test closed.

Alternative Test

The MSIVs shall be partially exercised closed from the full open position, at least once per quarter, to satisfy Technical Specification requirement, SR 3.3.1.1.9, and in accordance with ASME OM Code ISTC-3520. Stroke timing to the closed position and fail-safe testing closed shall be performed on a cold shutdown basis in accordance with ASME OM Code ISTC-3520.

Cold Shutdown Justification CSJ-04

Valve Number	System	Class	Category
RR-MOV-MO53A	RR	1	B
RR-MOV-MO53B	RR	1	B

Function

These valves are the Reactor Recirculation Pump 1A and 1B Discharge Isolation valves and have an active safety function to close in order to prevent diversion of LPCI injection flow following a LOCA.

Justification

Closure of either of the RR pump discharge valves at power would reduce recirculation flow and result in reactor water temperature transients and reactivity transients. These transients would reduce control of power distribution and fuel usage, and increase the risk of other plant transients. This could lead to decreased fuel reliability and increase the possibility of a fuel element failure. In addition, failure of these valves during operation would require reactor shutdown due to inaccessibility.

Alternative Test

These valves will be exercised (and stroke timed) to the closed position during cold shutdowns when the reactor recirculation system is not required to be in service.

Cold Shutdown Justification CSJ-05

Valve Number	System	Class	Category
RHR-MOV-MO17	RHR	1	A
RHR-MOV-MO18	RHR	1	A

Function

These valves are the reactor vessel return to the RHR pump suction and containment isolation valves during reactor operations. These valves are only opened for low pressure shutdown cooling.

Justification

Valves RHR-MOV-MO17 and RHR-MOV-MO18 are interlocked for pressure isolation during plant operation. Opening these valves during normal operation could possibly allow high pressure reactor coolant water into the low pressure suction lines of the RHR system. Therefore, it is essential that these valves remain closed during plant operations.

Alternative Test

These valves will be exercised (and stroke timed) to the closed position during cold shutdowns when reactor pressure isolation is not required.

Cold Shutdown Justification CSJ-06

Valve Number	System	Class	Category
RHR-MOV-920MV	RHR	2	B
RHR-MOV-921MV	RHR	A	B

Function

These valves provide isolation of main steam to the Augmented Off Gas (AOG) system.

Justification

The steam supply cannot be isolated during normal plant operation without causing significant Augmented Off Gas (AOG) system transients. Transients could include a fast or uncontrolled burn of hydrogen gas in the AOG piping buried underground and leading outside the plant. Also, routine quarterly testing of either of these valves could cause a release of radioactive material several orders of magnitude above normal release activities.

Alternative Test

These valves will be exercised (and stroke timed) to the closed position during cold shutdowns when the steam supply to the augmented off gas system may be isolated.

Cold Shutdown Justification CSJ-07

Valve Number	System	Class	Category
SW-AOV-TCV451A	SW	3	B
SW-AOV-TCV451B	SW	3	B

Function

These valves open to provide a flow path for cooling water to the REC heat exchangers.

Justification

One temperature control valve is normally open to control flow to the associated REC heat exchanger. During the hot summer months both heat exchangers are in service. Placing either valve in the closed position for an exercise test during this period would interrupt the flow to the associated heat exchanger. The REC heat exchangers provide cooling water for a variety of essential and non-essential components. Therefore, it is essential that both of these valves remain open during plant operations. During cold shutdowns, when the heat load is reduced, one REC heat exchanger can be removed from service. The associated temperature control valve can then be closed and exercised to the full open position.

Alternative Test

Valve exercising (and stroke timing) to the open position will be performed quarterly except when both heat exchangers are in service. When both heat exchangers are in service, valve exercising (and stroke timing) to the open position will be performed during cold shutdowns, when the heat load is reduced. When a refueling outage falls within the seasonal period in which these valves may be tested quarterly, then an additional test during the refueling outage will not be required (i.e. valves may be tested online just prior to and after the refueling outage, being maintained on a quarterly frequency).

Cold Shutdown Justification CSJ-08 (Augmented)

Valve Number	System	Class	Category
HV-MOV-262MV	HV	A	B
HV-MOV-264MV	HV	A	B
HV-MOV-266MV	HV	A	B
HV-MOV-268MV	HV	A	B

Function

These valves open to provide flow paths for ventilation to be supplied through the casing of both MG sets for cooling purposes, and close upon receipt of a PCIS Group VI signal to provide secondary containment isolation.

Justification

These valves are required to remain in the open position during power operation to support reactor recirculation pump operation. Closure of these valves during reactor operation could result in overheating the MG set which would compromise reactor recirculation pump operation causing plant shutdown. Also, the valves' control circuitry does not provide for partial stroke capability. These valves are ASME non-code class valves and are not within the scope of the IST Program.

Alternative Test

These valves will be exercised (and stroke timed) to the closed position during cold shutdowns when the reactor recirculation pumps are in an idle state. During unscheduled cold shutdowns when the recirculation pumps are required to remain in operation, valve exercising will be deferred until the next available opportunity when the recirculation pumps can be removed from service.

Cold Shutdown Justification CSJ-09

Valve Number	System	Class	Category
CS-MOV-MO12A	CS	1	A
CS-MOV-MO12B	CS	1	A

Function

Open to admit Core Spray water to the reactor vessel to mitigate the consequences of a LOCA and close for primary containment / pressure isolation valve functions.

Justification

These valves are normally closed for primary containment isolation and to isolate the Core Spray System from the reactor vessel pressure. Operating these valves at RCS pressures above 450 psig (quarterly) would require them to be manually cracked off their seat in the open direction. This action serves to equalize pressure across the valves since downstream of the valves may be pressurized by minor leak-by of the inboard check valves, CS-CV-18CV and CS-CV-19CV. Pressure equalization greatly decreases the forces required to pull the valve disk out of the seat and makes it possible to electrically stroke time the valve.

Design calculation, NEDC 95-003, lists the MOV limiting components for the CS valves. The stem to disc T-head is the most limiting sub-component for the opening direction at normal operating conditions.

The forces affecting the valve stem T-head are equivalent whether the valve is manually opened or electrically opened. Pressure forces acting on the disks must still be overcome by tension on the T-head. Manipulation of the equations in NEDC 95-003 that calculate opening forces indicate that the valve stem T-head limits could be exceeded under maximum reactor pressure and worse-case seat friction coefficients.

In order to eliminate the possibility of overstressing the valve T-head during the quarterly surveillances, the stroke time test should be limited to periods during cold shutdowns when the reactor pressure is below 450 psig.

Alternative Test

Valve exercising (and strke timing) to the open and closed position for CS-MOV-MO12A/B will be performed during cold shutdowns when the reactor pressure is below 450 psig.

Cold Shutdown Justification CSJ-10

Valve Number	System	Class	Category
HPCI-MOV-MO15	HPCI	1	A
MS-MOV-MO74	MS	1	A
RCIC-MOV-MO15	RCIC	1	A

Function

HPCI-MOV-MO15: Normally open to provide steam to the HPCI turbine and closes automatically on high flow, low pressure, or high temperature signals.

MS-MOV-MO74: Normally open valve provided to prevent condensed steam from accumulating in the main steam lines and closes to isolate the main steam line inboard drain penetration.

RCIC-MOV-MO15: Normally open to provide steam to the RCIC turbine and closes automatically on high flow, low pressure, or high temperature signals.

Justification

This cold shutdown justification only applies if one or more of the motor operated valves listed have been power backseated in an effort to reduce Drywell leakage. This method of backseating is performed outside of the Drywell at the motor control centers for the valves. The valves, themselves, are located inside the Drywell. However, the backseated valves will be verified to meet any analyzed closed stroke time limits from the power backseated position prior to declaring the valve operable. The valve would then be placed back into the same backseated configuration and returned to service. If one or more of these valves have been backseated in this manner, it would be impracticable to perform subsequent stroke time testing each quarter based on the following discussion.

Repeat backseating each quarter introduces the potential for causing component damage each quarter in addition to potentially re-initiating a Drywell packing leak that had previously been stopped. Power backseating of motor operated valves entails bypassing the normal valve open limit control and using the actuator motor to stall the valve into its backseat. The end result is that the valve stem seals off leakage past the packing by interference with a beveled backseat area in the valve bonnet. Valve vendors have supplied the maximum allowable backseat forces that can be applied. Although there are some risks involved, power backseating has been successfully performed on a limited basis in the Entergy fleet after engineering analysis.

Once the motor has been stalled, it is desirable to not repeat this process more than necessary. The backseating process intentionally takes the motor out of the normal control circuit and causes motor heating that with repeated events would be severely damaging to the motor and motor cabling. In addition, if the backseating was previously successful in stopping a Drywell packing leak, the potential exists to re-initiate the packing leak with each backseating evolution.

Finally, quarterly testing should not be pursued on backseated valves due to the significant evolution that would be required every quarter. If quarterly testing did continue, the valve would first be stroke timed. Then, an LCO would have to be entered and the backseating test equipment would have to be set up. In order to backseat the valve, maintenance must access the motor control center and auxiliary power. A variable transformer is connected to an alternate power supply, then motor cables are lifted at the motor control center. Outputs of the leads of the variable transformer are connected to the motor power cables, and this current is monitored with meters and the diagnostic test system. The circuit is closed and the

**Cold Shutdown Justification CSJ-10 (Augmented)
(Continued)**

valve is first stroked from the normally open position to partially closed. Opening the valve from the mid range position allows for the technicians to start motor movement at full voltage and then dial the voltage down to a predetermined reduced voltage level that controls the stall forces that impact the valve backseat. Therefore, it would be a significant evolution every quarter if the valve were to be stroke timed and re-backseated at this frequency.

In conclusion, any one of the three valves listed may be backseated at some time in the future as a mitigating strategy associated with reducing Drywell leakage. Once one or more of these valves are backseated, the stroke time frequency will be changed from quarterly to a cold shutdown frequency. Quarterly testing is impracticable due to the increased potential for causing component damage, the potential of re-initiating a Drywell leak, and the significant evolution that would need to be undertaken every quarter to stroke time the valve and re-backseat it. There would be little to gain from this process, especially since MOVs are characteristically very steady with their stroke times over long periods of time. Therefore, the stroke time testing for these valves would require a re-classification from testing quarterly to a cold shutdown frequency for an interim period until the presence of a packing leak can be ruled out or the packing repaired.

Alternative Test

If backseated, valve stroke time testing for HPCI-MOV-MO15, MS-MOV-MO74, or RCIC-MOV-MO15 will be performed during cold shutdowns.

ATTACHMENT 8

REFUELING OUTAGE JUSTIFICATIONS

REFUELING OUTAGE JUSTIFICATION INDEX	
Refueling Outage Justification No.	**Description**
ROJ-01	NBI-CV-49B/50B/51B/52BCV and NBI-SOV-SSV738/739 Exercising
ROJ-02	NBI-CV-55/56CV Exercising
ROJ-03	RF-CV-13/14/15/16CV Exercising
ROJ-04	RWCU-CV-15CV Exercising
ROJ-05	RWCU-MO-15/18 Exercising
ROJ-06	CRD-CV-CV115 (Typical of 137) Exercising
ROJ-07	IA-CV-17/18/19/20/21/22/36/37CV Exercising (Augmented)
ROJ-08	IA-CV-28/29/30/31/32/33/34/35CV Exercising (Augmented)
ROJ-09	HPCI-CV-29CV and RCIC-CV-26CV Exercising
ROJ-10	SW-MOV-MO89A/B Exercising
ROJ-11	Core Spray and RHR Injection Check Valve Exercising
ROJ-12	CRD-CV-25/26CV Exercising (Augmented)
ROJ-13	IA-CV-57/58/59/60CV Exercising (Augmented)

Refueling Outage Justification ROJ-01

Valve Number	System	Class	Category
NBI-CV-49BCV	NBI	3	C
NBI-CV-50BCV	NBI	3	C
NBI-CV-51BCV	NBI	3	C
NBI-CV-52BCV	NBI	3	C
NBI-SOV-SSV738	NBI	3	B
NBI-SOV-SSV739	NBI	3	B

Function

The reference leg injection check valves and solenoid operated valves have an active safety function in the open position to inject Core Spray water to the reactor vessel level instrumentation lines in case the reference leg water has flashed or boiled off due to accident conditions in the drywell.

Justification

This system provides the capability for the Core Spray System to supply a backfill of water for maintaining inventory of the Nuclear Boiler Instrumentation System cold reference legs (condensing chambers 3A and 3B) during accident conditions in the drywell where the reference leg inventory could be compromised. Exercising these valves to the open position, full or partial, would require manually isolating and venting the Cold Reference Leg Backfill System. This is not practicable during power operation or cold shutdown, other than refueling, due to the possible introduction of air into the system. This could cause a spurious reactor vessel level indication which could cause a reactor trip during power operation. During cold shutdown spurious level indications could interrupt the operation of systems required for decay heat removal, thereby placing the reactor in an unsafe condition. During refueling outages, sufficient time exists for decay heat to be reduced to a level which minimizes the impact of momentary interruption in the operation of systems required for decay heat removal such that testing can be performed.

Alternative Test

Exercising these check valves to the full open and closed positions, and full exercising with stroke timing to the open position of the solenoid operated valves, shall be performed during refueling outages when the cold reference leg backfill system may be isolated and vented to allow testing.

Refueling Outage Justification ROJ-02

Valve Number	System	Class	Category
NBI-CV-55CV	NBI	3	C
NBI-CV-56CV	NBI	3	C

Function

These Cold Reference Leg Continuous Backfill System check valves have an active safety function in the closed position to isolate the Class 3 instrumentation piping from the Seismic IIS non-class CRD piping.

Justification

This system provides for a continuous flow of water from the CRD drive water pumps to prevent noncondensible gases from building up in the Nuclear Boiler Instrumentation System cold reference legs (condensing chambers 3A and 3B). Exercising these valves to the closed position would require manually isolating and venting of the Cold Reference Leg Continuous Backfill System upstream of the check valves. This is not practicable during power operation or cold shutdown, other than refueling, due to the possibility of causing a spurious reactor vessel level indication from entrained air in the system. False level indications resulting from entrained air in the system may either cause a reactor trip during power operation or interrupt the operation of systems required during cold shutdown for decay heat removal, thereby placing the reactor in an unsafe condition. During refueling outages, sufficient time exists for decay heat to be reduced to a level which minimizes the impact of momentary interruption in the operation of systems required for decay heat removal such that testing can be performed.

Alternative Test

Exercising these check valves to the closed position shall be performed during refueling outages when the cold reference leg backfill system may be isolated and vented to allow testing. Exercise testing shall be accomplished by performing a seat leakage test. The open test will also be credited during each reactor refueling as is allowed per ISTC-3522(a).

Refueling Outage Justification ROJ-03

Valve Number	System	Class	Category
RF-CV-13CV	RF	1	A/C
RF-CV-14CV	RF	1	A/C
RF-CV-15CV	RF	1	A/C
RF-CV-16CV	RF	1	A/C

Function

These valves are the main feedwater check valves which open to allow normal feedwater flow. Additionally, RF-CV-14CV and RF-CV-16CV open to allow HPCI and RCIC flow to the vessel, respectively. All four of these valves must be capable of closure to provide containment isolation. Additionally, RF-CV-13CV and RF-CV-15CV must be capable of closure to prevent diversion of HPCI and RCIC flow, respectively.

Justification

These valves are normally open and must remain open during reactor operations to ensure adequate feedwater flow. Exercising these valves closed during plant operation could cause a transient in reactor water level resulting in a reactor scram. The observation of specified leakage during local leak-rate testing provides the only means for verification to the closed position.

With the installation of highly accurate ultrasonic flow meters on the feedwater injection lines in RE24, per CED 6023681, individual flow rates for each feedwater injection line may now be determined at any time during normal operation. Therefore, the safety-related required flows through RF-CV-14CV and RF-CV-16CV (in addition to the non-safety related flows through RF-CV-13CV and RF-CV-15CV), may be verified during normal operations.

If the flow meters were to become unavailable, the open test for all the valves may be satisfied via an IST valve disassembly and examination (which requires manual exercising of the valve and visual inspection), or a torque test, both of which would be completed during a refueling outage due to their location and the allowance provided by ISTC-3522(a). In addition, the non-safety open test for RF-CV-13CV and RF-CV-15CV may be satisfied through Operation logs, in which verification of being at full power would verify that adequate feedwater flows exist in supporting this power.

Alternative Test

These valves will be exercised to the closed position during the Type C leak rate test performed each refueling outage in accordance with the requirements of ASME OM Code ISTC-3522 for category C check valves and ISTC-3620 for Containment Isolation valves. The open direction test will be credited at least once each reactor refueling as is allowed per ISTC-3522(a). Normally, the open flow test will be satisfied through the recording of acceptable flows through each injection line during normal operation per ISTC-3550. If the flow meters become unavailable, disassembly and examinations (all), torque testing (all), or verification of full power (13CV, 15CV only) may be utilized.

Refueling Outage Justification ROJ-04

Valve Number	System	Class	Category
RWCU-CV-15CV	RW	1	A/C

Function

This check valve is normally open to allow Reactor Water Cleanup (RWCU) return and must close to provide containment isolation.

Justification

This valve cannot be verified as being closed upon reversal or stopping of flow without opening and venting the line upstream of the check valve. Opening or venting the RWCU line during operations could cause a leak of high pressure reactor coolant and potentially lead to the release of radioactive material.

Stopping RWCU flow during normal operations or cold shutdown for an extended period would lead to a degradation of reactor water purity. This would add to the radioactive contamination in the reactor coolant system and could lead to additional exposure of site personnel. It is essential that RWCU remain in operation as much as possible and RWCU-CV-15CV be exercised to the closed position only during refueling outages.

Alternative Test

The open capability of RWCU-CV-15CV is verified during normal operations. The closure capability will be verified during refueling outages by performing a Type C local leak rate test per the requirements of ASME OM Code ISTC-3522 and the CNS Primary Containment Leakage Rate Testing Program. The open direction test will be credited at least once each reactor refueling as is allowed per ISTC-3522(a).

Refueling Outage Justification ROJ-05

Valve Number	System	Class	Category
RWCU-MO-15	RW	1	A
RWCU-MO-18	RW	1	A

Function

These normally open Reactor Water Cleanup (RWCU) valves must close for containment isolation. The open function is not required for safe shutdown of the plant and is considered an operational function only.

Justification

These normally open containment isolation valves have a function during normal operation to provide a path for reactor coolant to and from the reactor water cleanup system to maintain high reactor water purity. In order to exercise these valves during normal plant operation, the RWCU system would need to be shutdown. Shutdown of the RWCU system induces chemistry transients in the reactor and should be minimized in order to maintain consistent reactor water chemistry. Additionally, shutdown of the RWCU system can lead to hydraulic transients and crud bursts that will result in increases in radiation levels and higher worker dose.

Failure of one of these RWCU valves in the closed position would result in the complete loss of the RWCU system. This, in turn, could result in a plant shutdown to repair the valve due to the loss of reactor coolant chemistry parameters. Additionally, shutting down the RWCU system every quarter cycles the equipment without a compensating increase in safety. Shutdown of the RWCU system in a forced outage will also inhibit the ability to cleanup the vessel and result in an increase in radiation levels and personnel dose. Additionally, RWCU-MO-15 is located inside the primary containment and is inaccessible during power operation due to high radiation levels and the inerted atmosphere. It is also impractical to de-inert containment for repair of this valve if it fails during cold shutdown testing.

Refueling outages have sufficient duration to allow the RWCU System to adequately cleanup the primary coolant prior to being shutdown for testing. Additionally, the refueling outage schedules include periods in which RWCU must be shutdown while maintenance is performed on its support systems. If a tested RWCU valve does fail in the closed position during a refueling outage, adequate time is available to correct the condition without impacting unit availability and without adverse ALARA effects.

Alternative Test

The closure capability of RWCU-MO-15 and RWCU-MO-18 will be verified during refueling outages by performing a stroke time test in the closed direction.

Refueling Outage Justification ROJ-06

Valve Number	System	Class	Category
CRD-CV-CV115 (Typical of 137)	CRD	2	C

Function

These valves have a safety function to close to prevent the loss of water pressure in the event that charging supply pressure is lost which prevents bypassing scram water (from the accumulator) to the charging water header (if depressurized).

This valve has a function to open to allow charging water to pass from the control rod drive pumps to the hydraulic control units. Flow to the accumulators is required only during scram reset or system startup. This valve has no safety function to open.

Justification

Exercising these valves requires the depressurization of the charging water header. The header is depressurized by either stopping the CRD pumps or by valving out and depressurizing the charging water header. Stopping the CRD pumps could result in seal damage to the control rod drive mechanisms (CRDM) from a loss of seal cooling water. Additionally, stopping the pumps would interrupt seal cooling water flow to the reactor recirculation pumps resulting in shaft seal damage. This is impracticable during normal plant operation since valving out and depressurizing the charging water header would render the CRD accumulators inoperable and stopping the CRD pumps could cause pressure variations in the CRD System during the test evolution.

Exercising these valves during cold shutdown is not possible due to the interruption of shaft seal cooling water flow as previously discussed. If the recirculation pump became idle stopping the CRD pumps or manually isolating the charging water header for reverse exercise testing could delay plant startup due to the necessity of depressurizing upstream of each individual valve (137 each) in order to accomplish an adequate test. This additional test activity during cold shutdown represents an unusual burden without a compensating increase in the level of quality and safety.

Alternative Test

These valves will be tested during each reactor refueling outage. Proper closure shall be verified by isolating each of the CRD scram accumulators and venting pressure on the upstream side of the check valve. Accumulator pressure decay would be observed should the respective valve fail to close properly. The open test will also be credited during each reactor refueling as is allowed per ISTC-3522(a).

Refueling Outage Justification ROJ-07 (Augmented)

Valve Number	System	Class	Category
IA-CV-17CV	IA	A	A/C
IA-CV-18CV	IA	A	A/C
IA-CV-19CV	IA	A	A/C
IA-CV-20CV	IA	A	A/C
IA-CV-21CV	IA	A	A/C
IA-CV-22CV	IA	A	A/C
IA-CV-36CV	IA	A	A/C
IA-CV-37CV	IA	A	A/C

Function

These valves are the Instrument Air/Nitrogen supply inlet check valves for Main Steam Relief Valve (SRV) accumulators. These check valves must be capable of closure to maintain accumulator integrity in the event of a loss of normal actuating air supply.

The check valves must open to allow flow to their respective accumulators.

Justification

These valves are located inside the drywell and are inaccessible during normal operations or cold shutdowns. They cannot be exercised during each cold shutdown because the drywell is not routinely de-inerted each cold shutdown. Valve exercising during cold shutdown when the drywell is de-inerted could delay plant restart due to the necessity of using portable test equipment inside the drywell. The additional test activity during cold shutdown represents an unusual burden without a compensating increase in the level of quality and safety. Testing these valves during refueling outages is consistent with NUREG 1482, revision 2, section 3.1.1.3.

These valves are ASME non-code class valves that are not within the scope of the IST Program.

Alternative Test

An extended time/pressure decay procedure will be used to verify each valve's closure. This will be done by venting the upstream side of the check valve and monitoring accumulator pressure to ensure each check valve functions properly. The above valves will be tested each refueling outage to verify valve closure. The open test will also be credited during each reactor refueling as is allowed per ISTC-3522(a).

Refueling Outage Justification ROJ-08 (Augmented)

Valve Number	System	Class	Category
IA-CV-28CV	IA	A	A/C
IA-CV-29CV	IA	A	A/C
IA-CV-30CV	IA	A	A/C
IA-CV-31CV	IA	A	A/C
IA-CV-32CV	IA	A	A/C
IA-CV-33CV	IA	A	A/C
IA-CV-34CV	IA	A	A/C
IA-CV-35CV	IA	A	A/C

Function

These check valves must close to isolate individual Main Steam Isolation Valve accumulators for emergency gas supply.

The check valves must open to allow flow to their respective accumulators.

Justification

These check valves do not have position indication devices. The only practicable method to verify valve closure is a pressure decay test. The valves are located in the steam tunnel and the drywell. They are inaccessible during operation and normal cold shutdowns. The complexity of the pressure decay test could delay plant startup after a cold shutdown when the drywell is de-inerted. Since these emergency air supply accumulators are a backup to the normal pneumatic supply, performing the test at refueling outages is adequate to assess valve operational readiness. Testing these valves during refueling outages is consistent with NUREG 1482, revision 2, section 3.1.1.3.

These valves are ASME non-code class valves and are not within the scope of the IST Program.

Alternative Test

A pressure decay test will be performed each refueling outage to verify valve closure. The open test will also be credited during each reactor refueling as is allowed per ISTC-3522(a).

Refueling Outage Justification ROJ-09

Valve Number	System	Class	Category
HPCI-CV-29CV	HPCI	1	A/C
RCIC-CV-26CV	RCIC	1	A/C

Function

HPCI-CV-29CV - Opens to provide a flow path from the HPCI pump to the reactor vessel via the feedwater system; closes for primary containment isolation.

RCIC-CV-26CV - Opens to provide a flow path from the RCIC pump to the reactor vessel via the feedwater system; closes for primary containment isolation.

Justification

These valves are normally closed to isolate the reactor coolant system and the HPCI and RCIC systems. Exercising these check valves to the open position during normal plant operation would require HPCI or RCIC injection to the reactor vessel. This would result in a perturbation of normal feedwater flow and unnecessary thermal cycling of the feedwater nozzles. It would also cause severe power fluctuations due to the relatively cold water from the Emergency Condensate Storage Tanks. Furthermore, these valves are located in the Steam Tunnel. During power operations, this area experiences temperatures of approximately 130 - 140°F, and high radioactivity. In general, plant personnel are prohibited from entering this area during power operation due to these conditions.

Testing during Cold Shutdowns is impractical. This testing would be performed from the Steam Tunnel and would require support from Radiological Protection, Operations, Mechanical Maintenance, and possibly Engineering. During a typical forced outage, entry into the Steam Tunnel would not be made. Therefore, for the sole purpose of performing this test, multiple departments would need to support the evolution. Radiological support would be required to obtain the necessary survey information in the steam tunnels and/or be in attendance with the personnel performing the testing. To exercise these testable check valves, the system is required to be removed from service such that pressure is equalized across the valves prior to exercise testing. In order to accomplish this, this test requires operations personnel to enter the steam tunnel in order to remove pipe caps on vent and test connections on either side of the check valves, connect hoses, and open these valves to equalize pressure.

In comparison, set up of this type is required with the performance of an Appendix J leak test, which is specifically allowed to be extended to a refueling outage per section 4.1.6 of NUREG 1482, revision 2. Then, Mechanical Maintenance personnel would perform the required mechanical exercising of the check valves, using appropriate torque wrenches. Following the testing, Operations would be required to restore the system. If any questions arose concerning the testing, which could occur, as described in section 4.1.7 of NUREG 1482, revision 2, Engineering Personnel could be required to get involved to analyze the data, possibly prolonging the cold shutdown, unnecessarily. A refueling outage would be of a significant duration that this would not be a concern. In addition, personnel safety concerns are heightened due to the lack of lighting in the steam tunnel during a forced outage. In conclusion, because of the required test setup and complexities described, this testing is impracticable to perform during cold shutdowns and may delay unit startup.

Alternative Test

These valves will be mechanically exercised, verifying open and closure capability, during refueling outages when the HPCI and RCIC systems are not required to be inservice.

Refueling Outage Justification ROJ-10

Valve Number	System	Class	Category
SW-MOV-MO89A	SW	3	B
SW-MOV-MO89B	SW	3	B

Function

These are the Loop A and Loop B outlet isolation for the Service Water booster pump cooling water to the RHR heat exchangers. These normally closed valves have an active safety function in the throttled position to provide a flow path for cooling water flow through the RHR heat exchangers during transient and accident conditions.

Justification

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 to perform at power due to the potential to cause RHR Service Water Booster Pump run out. Each Service Water Booster Pump is electrically interlocked with its respective RHR heat exchanger outlet valve (SW-MOV-MO89A/B). When the pump control switch is taken to START, its respective RHR heat exchanger outlet valve receives an open signal. When the valve reaches a position that ensures pump minimum flow requirements can be met, the pump receives a start signal. The RHR heat exchanger outlet valve is throttled to obtain the desired flow. Each RHR heat exchanger outlet valve is electrically interlocked to close when both associated RHR Service Water Booster pumps are shutdown. These valves are also utilized to maintain RHR-SW shell pressure higher than the RHR system pressure to prevent the potential release of radioactivity into the river.

It would also be impracticable to perform full stroke testing at a cold shutdown frequency since Service Water and Service Water Booster pumps are essential for providing cooling water to the RHR heat exchangers during this time period. Defeating the Service Water Booster pump interlock and windmilling the Service Water Booster pumps would not be a desirable activity. It would be more appropriate to perform this testing once the decay heat has lowered during a refueling outage.

For the reasons stated, above, and since this valve is verified to be capable of performing its safety function each quarter, it would be impractical to defeat the interlocks associated with this valve on a quarterly or cold shutdown frequency to obtain a full open stroke time test. It would be practical, however, on a once per refueling outage basis, to full stroke open these valves for trending either through the use of control room hand switches or MOV diagnostic equipment once decay heat has lowered. If hand switches are utilized, flow through the subsystem being tested should be manually isolated and interlock defeated to allow the full stroking of the valve.

Alternative Test

These valves will be exercised to their safety-related throttled position quarterly, but stroke times will not be measured. During refueling outages, these valves will be stroke time tested to the full open position through the use of the SW-MOV-MO89A/B hand switches with flow isolated and interlocks defeated. If desired, the stroke time may be obtained during MOV diagnostic testing.

Refueling Outage Justification ROJ-11

Valve Number	System	Class	Category
CS-CV-18CV	CS	1	A/C
CS-CV-19CV	CS	1	A/C
RHR-CV-26CV	RHR	1	A/C
RHR-CV-27CV	RHR	1	A/C

Function

These valves open for Core Spray or LPCI injection and close for primary containment isolation.

Justification

These valves are normally closed for primary containment isolation. They are also closed to isolate the related low pressure systems from the Reactor Recirculation system and the reactor vessel. Opening these valves during power operation is not possible due to the downstream side being exposed to reactor pressure. A drywell entry during cold shutdown would be necessary to facilitate testing, thereby requiring de-inerting, which could potentially delay restart. Also, cold shutdown conditions in the Drywell have previously resulted in high radiation fields near the RHR lines and other areas of the Drywell. Finally, personnel safety concerns due to the Core Spray lines being located in the upper drywell elevations with little to no lighting may also be an issue. The reasons presented are acceptable reasons for deferral to a refueling outage basis per NUREG 1482, rev. 2, sections 2.4.5 and 3.1.1.3.

Alternative Test

These valves will be mechanically exercised, verifying open and closure capability during refueling outages in accordance with ISTC-3522 and ISTC-5221.

Refueling Outage Justification ROJ-12 (Augmented)

Valve Number	System	Class	Category
CRD-CV-25CV	CRD	A	A/C
CRD-CV-26CV	CRD	A	A/C

Function

These valves close to prevent possible CRD bypass leakage from exiting secondary containment. They open to supply drive water and charging water to the Hydraulic Control Units (HCUs) and seal water to the Reactor Recirculation pumps.

Justification

It is impracticable to perform a closure test on these valves during power operations or cold shutdowns. These valves are located in the line from the CRD pumps supplying drive water and charging water to the control rod's HCUs.

During power operations, these valves are open since drive water is constantly supplied to the HCUs. Closure testing would require the CRD pumps to be secured and the portion of the system containing these valves to be isolated. Isolating the valves or securing the CRD pumps will terminate the constant drive water supply to the HCUs, causing all control rods to be inoperable. Also, without a continuous charging water supply, HCU accumulators would eventually depressurize and administrative controls require a scram initiation upon depressurization of two accumulators, which is a highly undesirable situation.

The interruption of the drive water flow would also interrupt CRD seal water cooling to the Reactor Recirculation pumps. The stopping of flow would impose a severe thermal transient on the RR pump seals, which could possibly lead to premature seal failure.

The method of testing these valves for closure would be through a local leak rate test, which involves the draining of the system, establishment of test boundaries, equipment setup, etc., which is more suitable during a refueling outage. This test method, alone, could delay a plant startup from a cold shutdown.

In conclusion, testing these valves during refueling outages is consistent with NUREG 1482, rev. 2, sections 2.4.5, and 3.1.1.4.

Alternative Test

The closure capability will be verified during refueling outages by performing a local leak rate test. The open direction test will be credited at least once each reactor refueling as is allowed per ISTC-3522(a).

Cold Shutdown Justification ROJ-13 (Augmented)

Valve Number	System	Class	Category
IA-CV-57CV	IA	A	C
IA-CV-58CV	IA	A	C
IA-CV-59CV	IA	A	C
IA-CV-60CV	IA	A	C

Function

These valves are required to close to maintain pressure in the associated air operated valve's accumulator in the event of a loss of the Instrument Air (IA) supply. These IA supplies are for various safety related H&V system AOV's.

Justification

It is impracticable to perform a closure test on these valves during power operations or cold shutdowns. IA-CV-57CV, -58CV, -59CV, AND 60CV are in the IA supply lines to the H&V supply and exhaust isolation dampers for the RRMG Set 1A and 1B. Isolation and testing of these valves potentially affects the operation of the RRMG Sets. This would be undesirable during power operations and during cold shutdowns when the recirculation pumps are required to be operational.

Also, the closure test for these check valves requires that the IA supply piping upstream of the check valves to the associated accumulators be isolated and depressurized. The accumulator pressure is then monitored for one hour via installed test equipment to verify that the check valve will hold. Depressurization of the accumulator below 70 psig with the respective H&V valve open will place the component in an inoperable condition. Due to the complexities of this test and the potential to delay a cold shutdown, it would be more appropriate to perform this testing during refueling outages.

These valves are ASME non-code class valves and are not within the scope of the IST Program.

Alternative Test

A reverse flow leakage test of these check valves will be performed during refueling outages by performing a pressure decay test. The open test will also be credited during refueling outages shutdown as is allowed per ISTC-3522(a).

ATTACHMENT 9

TECHNICAL POSITIONS

TECHNICAL POSITION INDEX	
Technical Position No.	**Description**
TP-01	Bi-directional Testing of Check Valves
TP-02	Sample Disassembly of HPCI Vacuum Breaker Check Valves
TP-03	Passive Valves without Test Requirements
TP-04	Fail Safe Testing of Valves
TP-05	Classification of Skid-Mounted Components
TP-06	Check Valves in Regular Use
TP-07	Categorization of IST Pumps (Group A or B)
TP-08	Vacuum Breaker Testing

Technical Position TP-01
(Page 1 of 3)

Bi-directional Testing of Check Valves with Non-Safety Positions

Purpose

The purpose of this Technical Position is to establish the station position for the verification of the non-safety direction exercise testing of check valves by normal plant operations.

Applicability

This Technical Position is applicable to those valves which are included in the Inservice Testing Program that are required to be exercise tested in their non-safety related direction of flow. This position applies to those check valves required to be tested in accordance with Subsection ISTC (ASME OM Code 2004 Edition through 2006 Addenda) and Appendix II. This Technical Position does not apply to testing of the safety function (direction) of check valves included in the Inservice Testing Program.

Background

The ASME OM Code 2004 Edition through 2006 Addenda section ISTC-3550, "Valves in Regular Use", states:

> "Valves that operate in the course of plant operation at a frequency that would satisfy the exercising requirements of this Subsection need not be additionally exercised, provided that the observations otherwise required for testing are made and analyzed during such operation and recorded in the plant record at intervals no greater than specified in ISTC-3510."

Section ISTC-3510 requires that check valves shall be exercised nominally every 3 months with exceptions (for extended periods) referenced.

Section ISTC-5221(a)(2) states:

> "Check valves that have a safety function in only the open direction shall be exercised by initiating flow and observing that the obturator has traveled to either the full open position or to the position required to perform its intended function(s) (see ISTC-1100), and verify closure."

Section ISTC-5221(a)(3) states:

> "Check valves that have a safety function in only the close direction shall be exercised by initiating flow and observing that the obturator has traveled [to] at least the partially open position,[3] and verify that on cessation or reversal of flow, the obturator has traveled to the seat."
>
> "[3]The partially open position should correspond to the normal or expected system flow."

Normal and/or expected system flow may vary with plant configuration and alignment. Cooper Nuclear Station Operations staff is trained in recognizing normal plant conditions. For check

Technical Position TP-01
(Page 2 of 3)

valves that have a non-safety function in the open position, Operator judgment has been deemed acceptable in determining whether or not the normal or expected flow rates for plant operation has been obtained. For check valves that have a non-safety related function in the closed position, Operator judgment is also deemed acceptable in determining whether or not flow has occurred at a normal or expected flow rate, in order to cause obturator travel.

Position

Typically, Cooper Nuclear Station will verify the non-safety position of check valves included in the Inservice Testing Program using a periodic activity within the plant surveillance or preventative maintenance program. In lieu of a dedicated surveillance or preventative maintenance activity to perform the non-safety direction testing, the following alternate verifications may be performed as follows:

1. An appropriate means shall be determined which establishes the method for determining the open/closed non-safety function of the check valve during normal operations. The position determination may be by direct indicator, or by other positive means such as changes in system pressure, flow rate, level, temperature, seat leakage, etc. This determination shall be documented in the respective Condition Monitoring Plan for the specific check valve group. For check valves included in the Inservice Testing Program and not included in the Condition Monitoring Plan, this determination shall be documented in the IST Bases Document for the specific check valve group.

2. Observation and analysis of plant processes that a check valve is satisfying its non-safety direction function may be used. For an example, consider a check valve that has a safety function only in the closed direction and normally provides a flow path to maintain plant operations. If this check valve does not open to pass flow when required, an alarm or indication would identify a problem to the operator. The operator would respond by taking the appropriate actions. A Condition Report would then be generated for the abnormal plant condition which would identify the check valve failure.

3. Observation and analysis of plant logs (i.e. Operations or Chemistry) and other records may be an acceptable method for verifying a check valve's non-safety direction function verification during normal plant operations.

The open/closed non-safety function shall be recorded at a frequency required by ISTC-3510, nominally every 3 months, (with exceptions as allowed), in plant records such as Cooper Nuclear Station Operating or Chemistry Logs, Electronic Rounds, chart recorders, automated data loggers, etc. The safety function direction testing requires a periodic Quality Record typically documented within the surveillance and/or preventative maintenance program. Records as indicated above in 1 through 3 are satisfactory for the non-safety direction testing. A condition report shall be generated for any issues regarding check valve operability.

Justification

This Technical Position establishes the acceptability of the methods used in determining the ability of a check valve to satisfy its non-safety function. Typically, Cooper Nuclear Station will verify the non-safety position of check valves included in the Inservice Testing Program using a

Technical Position TP-01
(Page 3 of 3)

periodic activity within the plant surveillance or preventative maintenance program. Alternatively, through normal plant system operation and operator actions, a valve's non-safety function is verified through either observation or analysis of plant records and logs. Additionally, the recording of parameters which demonstrate valve position is satisfied at a frequency in accordance with ISTC-3510. These actions collectively demonstrate the non-safety position of Inservice Testing Program check valves in regular use as required by ISTC-3550.

Technical Position TP-02
(Page 1 of 2)

Sample Disassembly of HPCI Vacuum Breaker Check Valves

Purpose

The purpose of this Technical Position is to establish the station position for testing the HPCI Vacuum Breaker Check Valves.

Applicability

This Technical Position is applicable to the HPCI Vacuum Breaker Check Valves, HPCI-CV-24CV, 25CV, 26CV, and 27CV.

Position

These valves are normally closed check valves with two in series cross connected to two in parallel (H pattern). The four HPCI valves are swing check valves. The valves are located in the suppression pool free space. In the closed position, they prevent steam from the exhaust line from entering the free space of the suppression chamber. Either two inboard valves or two outboard valves must be closed to perform this function. Two valves in series provide added assurance that steam will not enter the suppression chamber.

The valves open to prevent siphoning suppression pool water into the exhaust line due to steam condensing when the associated HPCI system is isolated. Each pair of valves is cross connected to the parallel pair of valves (H pattern) so that a single failure will not prevent the vacuum relief function. These valves are not required to be leak tight and are not equipped with position indication or pressure sensing devices. During power operation, the suppression chamber is inerted and inaccessible.

Due to the location and configuration of these valves (located on the open ended turbine exhaust lines) a typical closure or open test cannot be performed.

These vacuum breaker check valves are not capacity certified. Therefore, they may be tested in accordance with ISTC-5220 (as a check valve). In accordance with the requirements of ISTC-5221(c), a sample disassembly examination program is being utilized to satisfy IST testing for the HPCI vacuum breaker check valves.

These valves are grouped together because they perform the same function, have the same manufacturer, design, service conditions and have the same size, materials of construction and orientation. A different valve from this group will be disassembled, inspected and manually exercised during each refueling outage until the entire group has been tested. If the disassembled valve selected is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in the group will be disassembled, inspected, and manually exercised during the same outage.

Procedural requirements ensure the valve is re-installed correctly, so no open/closed testing is required following reassembly.

Technical Position TP-02
(Page 1 of 2)

Justification

All requirements of ISTC-5221(c) and ISTC-9200(c) are met.

Technical Position TP-03
(Page 1 of 1)

Passive Valves Without Test Requirements

Purpose

The purpose of this Technical Position is to establish the station position for valves which perform a passive safety function. However, no testing is required in accordance with ISTC.

Applicability

This Technical Position is applicable to valves that perform a passive function in accordance with ISTA-2000 and do not have inservice testing requirements per Table ISTA-3500-1. This position is typical of Category B, passive valves that do not have position indication.

> 'An example is a manual valve which must remain in its normal position during an accident, to perform its intended function.'

Typically, manual valves that perform a safety function are locked in their safety position and administratively controlled by Cooper Nuclear Station procedures. These valves would be considered passive. If they do not have remote position indicating systems and categorized as B, they would not be subjected to any test requirements in accordance with Table ISTC-3500-1.

Position

The Cooper Nuclear Station Inservice Testing Program, Valve Tables - Attachment 11, will not list valves that meet the following criteria.

- The valve is categorized B (seat leakage in the closed position is inconsequential for fulfillment of the valves' required function(s)) in accordance with ISTC-1300.
- The valve is considered passive (valve maintains obturator position and is not required to change obturator position to accomplish the required function(s)) in accordance with ISTA-2000.
- The valve does not have a remote position indicating system which detects and indicates valve position.

Justification

Valves that meet this position will not be listed in the Cooper Nuclear Station Inservice Testing Program, Valve Tables - Attachment 11, however, the basis for categorization and consideration of active/passive functions should be documented in the IST Program Basis Document.

Technical Position TP-04
(Page 1 of 1)

Fail Safe Testing of Valves

Purpose

The purpose of this Technical Position is to establish the station position for fail safe testing of valves in conjunction with stroke time exercising or position indication testing.

Applicability

This Technical Position is applicable to valves with fail-safe actuators required to be tested in accordance with ISTC-3560.

Background

The ASME OM Code 2004 through 2006 Addenda section ISTC-3560 requires;

> "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."

Section ISTC-3510 states;

> "Active Category A, Category B, and Category C check valves shall be exercised nominally every 3 months..."

Position

In cases where the valve operator moves the valve to the open or closed position following de-energizing the operator electrically, by venting air, or both, the resultant valve exercise will satisfy the fail-safe test requirements and an additional test specific for fail safe testing will not be performed.

Cooper Nuclear Station will also use remote position indication as applicable to verify proper fail-safe operation, provided that the indication system for the valve is periodically verified in accordance with ISTC-3700.

Justification

Fail-Safe Testing tests the ability of the fail-safe mechanism of the valves to go to its fail safe condition. Whether or not the actuation of this fail-safe mechanism is due to Operator Action of failure of either the valve's air or electric power source, the resultant action of the valve will be the same. Therefore, the verification of a valve's fail safe ability can be taken credit for with the performance of either a stroke time exercising or position indication test.

Technical Position TP-05
(Page 1 of 2)

Classification of Skid-Mounted Components

Purpose

The purpose of this technical position is to clarify requirements for classification of various skid-mounted components, and to clarify the testing requirements of these components.

Background

The ASME Code allows classification of some components as skid-mounted when their satisfactory operation is demonstrated by the satisfactory performance of the associated major components. Testing of the major component is sufficient to satisfy Inservice Testing requirements for skid-mounted components. In section 3.4 of NUREG 1482 Rev 1, the NRC supports the designation of components as skid mounted:

> "The staff has determined that testing the major component is an acceptable means to verify the operational readiness of the skid-mounted components and component subassemblies if the licensee discusses this approach in the IST program document. Licensees should consider and document the specific measurements and attributes of major component testing which relate to the assessment of skid-mounted component condition. In addition, various continuous and periodic observations of the major components (such as System Monitoring Walkdowns or Operator Logs) may also support assurance of skid-mounted component readinesss. This is acceptable for both Code class components and non-Code class components that are tested and tracked by the IST Program."

The 2004 Edition through the 2006 Addenda of the ASME Om Code, Subsection ISTA-2000 provides the following definition.

> *Skid mounted pumps and valves* – pumps and valves integral to or that support operation of major components, even though these pumps and valves may not be located directly on the skid. In general, these pumps and valves are supplied by the manufacturer of the major component. Examples include:
>
> (a) diesel fuel oil pumps and valves;
> (b) steam admission and trip throttle valves for high-pressure coolant injection turbine-driven pumps;
> (c) steam admission and trip throttle valves for auxiliary feedwater turbine driven pumps;
> (d) solenoid-operated valves provided to control an air-operated valve.

Technical Position TP-05
(Page 2 of 2)

Additionally the Subsections pertaining to pumps (ISTB) and valves (ISTC) include exclusions/exemptions for skid-mounted components;

ISTB-1200(c) Exclusions

Skid-mounted pumps that are tested as part of the major component and are justified by the Owner to be adequately tested.

ISTC-1200 Exemptions

Skid-mounted valves are excluded from this Subsection, provided they are tested as part of the major component and are justified by the Owner to be adequately tested.

Position

The 2004/2006a ASME OM Code definition of skid-mounted will be used for classification of components in the Cooper Nuclear Station Inservice Testing Program. In addition, for a component to be considered skid-mounted:

- The major component associated with the skid-mounted component must be surveillance tested at a frequency sufficient to meet ASME Code test frequency for the skid mounted component.

- Satisfactory operation of the skid-mounted component must be demonstrated by satisfactory operation of the major component. If the skid mounted component is a check valve, it does not have to be exercised in both directions if both direction testing is not required to indicate satisfactory operation.

- The IST Bases Document should describe the bases for classifying a component as skid-mounted, and the IST Program Plan should reference this technical position for the component, if listed.

Justification

Recognition and classification of components as skid-mounted eliminates the need for the redundant testing of the sub component(s) as the testing of major (parent) component satisfactory demonstrates operation of the "skid mounted" component(s).

Technical Position TP-06
(Page 1 of 2)

Check Valves in Regular Use

Purpose

The purpose of this Technical Position is to establish the station position for check valves that are in regular use during normal plant operations.

Applicability

This Technical Position is applicable to check valves that are capable of being demonstrated to be open during routine operations.

Background

The ASME OM Code 2004 through 2006 Addenda section ISTC-3550, "Valves in Regular Use", states:

> "Valves that operate in the course of plant operation at a frequency that would satisfy the exercising requirements of this Subsection need not be additionally exercised, provided that the observations otherwise required for testing are made and analyzed during such operation and recorded in the plant record at intervals no greater than specified in ISTC-3510."

Section ISTC-3510 requires that check valves shall be exercised nominally every 3 months with exceptions (for extended periods) referenced. Check valves that are a part of the IST Check Valve Condition Monitoring Program shall be tested per the frequency requirements of that program.

Normal and/or expected system flow may vary with plant configuration and alignment. The open "safety function" of a check valve typically requires a specified design accident flow rate. For these subject valves, the normal system flow is above the design accident flow rates. Since the Cooper Nuclear Station Operations staff is trained so as to be able to recognize normal plant conditions, Operator judgment has been deemed acceptable for the purpose of determining check valve open demonstration by observing either normal or expected flow rates for the plant operating condition.

Position

Cooper Nuclear Station will verify the open position of these subject check valves by observing plant logs, computer systems, strip chart recorders, etc., during normal plant operations. The open/closed safety function shall be recorded at a frequency required by ISTC-3510 [or ISTC-5222, Condition Monitoring Program, if applicable], nominally every 3 months, (with exceptions as provided), in plant records such as Cooper Nuclear Station Operating Logs, Electronic Rounds, chart recorders, automated data loggers, etc.

Technical Position TP-06
(Page 2 of 2)

Justification

Normal plant systems operation and operator actions provide for the observations and analysis that these subject valves are capable of satisfying their open safety function. Additionally, the recording of parameters which demonstrate valve position is satisfied at a frequency in accordance with ISTC-3510 or ISTC-5222. These actions collectively demonstrate the open safety function of Inservice Testing Program check valves in regular use as required by ISTC-3550.

Technical Position TP-07
(Page 1 of 3)

Categorization of IST Pumps (Group A or B)

Position

Cooper Nuclear Station has categorized the pumps required to be included in the Inservice Testing Program or Augmented (class "A") Inservice Testing Program as either Group A or B in accordance with the requirements of ISTB-2004/2006a.

Group A pumps are pumps that are operated continuously or routinely during normal operation, cold shutdown, or refueling operations. The following pumps are categorized as Group A at Cooper Nuclear Station:

Pump CIC	Class	Group	Type	Function
DGDO-P-DOTA	A	A	Centrifugal	Diesel Fuel Oil Transfer
DGDO-P-DOTA	A	A	Centrifugal	Diesel Fuel Oil Transfer
RW-P-Z1	A	A	Centrifugal	Elevated Release Point Sump
RW-P-Z2	A	A	Centrifugal	Elevated Release Point Sump
REC-P-A	3	A	Centrifugal	Reactor Equipment Cooling
REC-P-B	3	A	Centrifugal	Reactor Equipment Cooling
REC-P-C	3	A	Centrifugal	Reactor Equipment Cooling
REC-P-D	3	A	Centrifugal	Reactor Equipment Cooling
RHR-P-A	2	A	Centrifugal	Residual Heat Removal
RHR-P-B	2	A	Centrifugal	Residual Heat Removal
RHR-P-C	2	A	Centrifugal	Residual Heat Removal
RHR-P-D	2	A	Centrifugal	Residual Heat Removal
SW-P-A	3	A	Vertical	Service Water
SW-P-B	3	A	Vertical	Service Water
SW-P-C	3	A	Vertical	Service Water
SW-P-D	3	A	Vertical	Service Water
SW-P-BPA	3	A	Centrifugal	Service Water
SW-P-BPB	3	A	Centrifugal	Service Water
SW-P-BPC	3	A	Centrifugal	Service Water
SW-P-BPD	3	A	Centrifugal	Service Water

Technical Position TP-07
(Page 2 of 3)

Group B pumps are those pumps in standby systems that are not operated routinely except for testing. The following pumps are categorized as Group B at Cooper Nuclear Station:

Pump Number	Class	Group	Type	Function
CS-P-A	2	B	Centrifugal	Core Spray
CS-P-B	2	B	Centrifugal	Core Spray
HPCI-P-MP	2	B	Centrifugal	High Pressure Coolant Inj
HPCI-P-BP	2	B	Centrifugal	High Pressure Coolant Inj
RCIC-P-MP	2	B	Centrifugal	Reactor Core Iso Cooling
SLC-P-A	A	B	Positive Disp	Standby Liquid
SLC-P-B	A	B	Positive Disp	Standby Liquid

The following summarizes the Group A, B, and Comprehensive Pump Test requirements as specified by the ASME OM Code Subsection ISTB. This testing must be performed unless relief for alternate testing has been approved. The design flow rate is defined as the maximum accident flow rate for the pump.

Group A Pump Tests – Group A tests are performed quarterly for each pump categorized as A. Reference values are established within ±20% of pump design flow rate, if practicable. If not practicable, the reference point flow rate shall be established at the highest practical flow rate.

For centrifugal pumps, the pump is operated at a nominal motor speed for constant speed drives or at a speed adjusted to the reference point (±1%) for variable speed drives. The resistance of the system is varied until the flow rate equals the reference point. Then, differential pressure and vibration measurements are determined and compared to their reference values.

For positive displacement pumps, the pump is operated at a nominal motor speed for constant speed drives or at a speed adjusted to the reference point (±1%) for variable speed drives. The resistance of the system is varied until the discharge pressure equals the reference point. Then, flow and vibration measurements are determined and compared to their reference values.

Group B Pump Tests – Group B tests are performed quarterly for each pump categorized as B. Reference values are established within ±20% of pump design flow rate, if practicable. If not practicable, the reference point flow rate shall be established at the highest practical flow rate.

For centrifugal pumps, the pump is operated at a nominal motor speed for constant speed drives or at a speed adjusted to the reference point (±1%) for variable speed drives. Then, the differential pressure or flow rate is determined and compared to its reference value.

For positive displacement pumps, the pump is operated at a nominal motor speed for constant speed drives or at a speed adjusted to the reference point (±1%) for variable speed drives. Then, the flow rate is determined and compared to its reference value.

Technical Position TP-07
(Page 2 of 3)

Comprehensive Pump Tests – Comprehensive pump tests are performed biennially for all pumps in the Inservice Testing Program. Reference values are established within ±20% of pump design flow rate. The procedure to perform a comprehensive pump test is similar to the Group A test.

The following instrument accuracy requirements apply to each test type of test:

Parameter	**Group A**	**Group B**	**Comprehensive**
Pressure	+/- 2.0%	+/- 2.0%	+/- 0.5%
Flow Rate	+/- 2.0%	+/- 2.0%	+/- 2.0%
Speed	+/- 2.0%	+/- 2.0%	+/- 2.0%
Vibration	+/- 5.0%	+/- 5.0%	+/- 5.0%
Differential Pressure	+/- 2.0%	+/- 2.0%	+/- 0.5%

Technical Position TP-8

(Page 1 of 2)

Vacuum Breaker Testing

Purpose

The purpose of this Technical Position is to establish the station position for testing vacuum breakers.

Applicability

This Technical Position is applicable to vacuum breakers that are included in the Inservice Testing Program.

Position

In accordance with the requirements of ISTC-5230 for vacuum breaker valves, vacuum breakers shall meet the applicable inservice test requirements of ISTC-5220 and Mandatory Appendix I. ISTC-5220 is the requirement for the valve obturator movement of check valves and Mandatory Appendix I is the requirement for the Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants. The testing performed at Cooper will meet both requirements.

Check valves that are capacity certified and are functioning as a vacuum breaker, will be tested in accordance with Mandatory Appendix I. Per I-3370, Class 2 and 3 Vacuum Relief Valves shall be actuated to verify open and close capability, set-pressure, and performance of any pressure and position-sensing accessories. Seat tightness shall be in compliance with the owner's seat tightness criteria. The disposition after testing or maintenance shall be in accordance with I-3470 for class 2 and 3 vacuum relief valves.

Per I-1370, the frequency of testing Class 2 and 3 containment vacuum relief valves shall be at each refueling outage or every 2 years, whichever is sooner, unless historical data requires more frequent testing. This code required frequency recognizes that this testing may be able to be performed online by having the "or every 2 years" criteria and "unless historical data requires more frequent testing." Leak test frequencies are designated by the owner in accordance with Table ISTC-3500-1.

Per I-1380, those Class 2 and 3 vacuum relief valves, other than Primary Containment Vacuum Relief Valves, shall be tested every 2 years, unless performance data suggest the need for a more appropriate test interval.

Mandatory Appendix I requirements contain all the necessary requirements to adequately test IST vacuum relief valves. However, in order to satisfy ISTC-5220, as required by ISTC-5230, exercise testing in the open (FSO) and closed (FSC) positions have also been indicated within the Attachment 11 Inservice Testing Valve Table in addition to the VBT designation for the vacuum breaker test. The exercise testing requirements of ISTC-5220 (FSO/FSC) are being met within the testing performed per Mandatory Appendix I. No further testing is required.

Technical Position TP-8
(Page 2 of 2)

Justification

This position was only established to clearly define the basis for how the vacuum breakers are being tested at CNS and at what frequency. All code requirements are being met. As stated above, the vacuum breaker testing fully encompasses the exercise testing requirements of IST-5220. The required code frequencies for testing are clearly being met.

ATTACHMENT 10

INSERVICE TESTING PUMP TABLE

SYSTEM: CORE SPRAY (CS), P&ID No. 2045 Sheet 1

Pump CIC	P&ID Coor	ISI Class	Pump Group	Parameters				Notes
				Q	dP	V	N	
CS-P-A	F-3	2	B	Q	Q	2Y	(1)	CS Pump A RP-01, RP-05, RP-09, RG-01, TP-07
CS-P-B	D-3	2	B	Q	Q	2Y	(1)	CS Pump B RP-01, RP-05, RP-07, RP-09, RG-01, TP-07

NOTES:
(1) Pump is directly coupled to a constant speed synchronous or induction type driver.

SYSTEM: DIESEL GENERATOR FUEL OIL TRANSFER (DGDO), P&ID No. 2077 and 2011 Sheet 1

Pump CIC	P&ID Coor	ISI Class	Pump Group	Parameters				Notes
				Q	dP	V	N	
DGDO-P-EDF1	G-3	A	NA	NA	NA	NA	NA	Skid-Mounted, RG-01, TP-05
DGDO-P-EDF1	G-4	A	NA	NA	NA	NA	NA	Skid-Mounted, RG-01, TP-05
DGDO-P-DOTA	A-8	A	A	Q	Q	6M	(1)	DGDO Pump A, ARP-04, RG-01, TP-07
DGDO-P-DOTB	A-10	A	A	Q	Q	6M	(1)	DGDO Pump B, ARP-04, RG-01, TP-07

NOTES:
(1) Pump is directly coupled to a constant speed synchronous or induction type driver.

SYSTEM: HIGH PRESSURE COOLANT INJECTION (HPCI), P&ID No. 2044

Pump CIC	P&ID Coor	ISI Class	Pump Group	Parameters				Notes
				Q	dP	V	N	
HPCI-P-MP	E-4	2	B	Q	Q	2Y	Q	HPCI Pump Main (1) RP-03, RP-05, RP-09, RG-01, TP-07
HPCI-P-BP	E-3	2	B	Q	Q	2Y	Q	HPCI Pump Booster(1) RP-03, RP-05, RP-09, RG-01, TP-07

NOTES:
(1) HPCI main and booster pumps will be tested simultaneously.

SYSTEM: RADIOACTIVE WASTE (RW), P&ID No. 2005 Sheet 2

Pump CIC	P&ID Coor	ISI Class	Pump Group	Parameters				Notes
				Q	dP	V	N	
RW-P-Z1	G-10	A	A	Q (2)	NA	NA	(1)	Elevated Release Point Sump Pump, ARP-01, RG-01, TP-07
RW-P-Z2	G-10	A	A	Q (2)	NA	NA	(1)	Elevated Release Point Sump Pump, ARP-01, RG-01, TP-07

NOTES:

(1) Pump is directly coupled to a constant speed synchronous or induction type driver.

(2) The time (TM) to pump a specified quantity of water from the sump will be measured and trended.

SYSTEM: REACTOR CORE ISOLATION COOLING (RCIC), P&ID No. 2043

Pump CIC	P&ID Coor	ISI Class	Pump Group	Parameters				Notes
				Q	dP	V	N	
RCIC-P-MP	G-3	2	B	Q	Q	2Y	Q	RCIC Pump 1A RP-04, RP-09, RG-01, TP-07

SYSTEM: REACTOR EQUIPMENT COOLING (REC), P&ID No. 2031 Sheet 2

Pump CIC	P&ID Coor	ISI Class	Pump Group	Parameters				Notes
				Q	dP	V	N	
REC-P-A	G-1	3	A	Q	Q	Q	(1)	REC Pump 1A, Loop A RP-06. RP-08, RP-09, RG-01, TP-07
REC-P-B	G-2	3	A	Q	Q	Q	(1)	REC Pump 1B, Loop A RP-06, RP-08, RP-09, RG-01, TP-07
REC-P-C	G-3	3	A	Q	Q	Q	(1)	REC Pump 1C, Loop B RP-06, RP-08, RP-09, RG-01, TP-07
REC-P-D	G-3	3	A	Q	Q	Q	(1)	REC Pump 1D, Loop B RP-06, RP-08, RP-09, RG-01, TP-07

NOTES:

(1) Pump is directly coupled to a constant speed synchronous or induction type driver.

SYSTEM: RESIDUAL HEAT REMOVAL (RHR), P&ID No. 2040

Pump CIC	P&ID Coor	ISI Class	Pump Group	Parameters				Notes
				Q	dP	V	N	
RHR-P-A	G-4	2	A	Q	Q	Q	(1)	RHR Pump 1A, Loop A RP-02, RP-08, RP-09, RG-01, TP-07
RHR-P-B	G-9	2	A	Q	Q	Q	(1)	RHR Pump 1B, Loop B RP-02, RP-08, RP-09, RG-01, TP-07
RHR-P-C	H-4	2	A	Q	Q	Q	(1)	RHR Pump 1C, Loop A RP-02, RP-08, RP-09, RG-01, TP-07
RHR-P-D	H-9	2	A	Q	Q	Q	(1)	RHR Pump 1D, Loop B RP-02, RP-08, RP-09, RG-01, TP-07

NOTES:
(1) Pump is directly coupled to a constant speed synchronous or induction type driver.

SYSTEM: SERVICE WATER (SW), P&ID No. 2006 Sheets 1 and 4

Pump CIC	P&ID Coor	ISI Class	Pump Group	Parameters				Notes
				Q	dP	V	N	
SW-P-A	B-10	3	A	Q	Q	Q	(1)	SW Pump 1A, RP-08, RP-09, RG-01, TP-07
SW-P-B	B-9	3	A	Q	Q	Q	(1)	SW Pump 1B, RP-08, RP-09, RG-01, TP-07
SW-P-C	B-8	3	A	Q	Q	Q	(1)	SW Pump 1C, RP-08, RP-09, RG-01, TP-07
SW-P-D	B-7	3	A	Q	Q	Q	(1)	SW Pump 1D, RP-08, RP-09, RG-01, TP-07
SW-P-BPA	F-7	3	A	Q	Q	Q	(1)	SW Booster Pump 1A RP-05, RP-09, RG-01, TP-07
SW-P-BPB	C-7	3	A	Q	Q	Q	(1)	SW Booster Pump 1B RP-05, RP-09, RG-01, TP-07
SW-P-BPC	E-7	3	A	Q	Q	Q	(1)	SW Booster Pump 1C RP-05, RP-09, RG-01, TP-07
SW-P-BPD	A-7	3	A	Q	Q	Q	(1)	SW Booster Pump 1D RP-05, RP-09, RG-01, TP-07

NOTES:
(1) Pump is directly coupled to a constant speed synchronous or induction type driver.

SYSTEM: STANDBY LIQUID CONTROL (SLC), P&ID No. 2045 Sheet 2

Pump CIC	**P&ID Coor**	**ISI Class**	**Pump Group**	**Parameters**				**Notes**
				Q	**Pd**	**V**	**N**	
SLC-P-A	E-10	A	B	Q	Q	6M	(1)	SLC Pump 1A ARP-02, ARP-03, RG-01, TP-07
SLC-P-B	F-10	A	B	Q	Q	6M	(1)	SLC Pump 1A ARP-02, ARP-03, RG-01, TP-07

NOTES:

(1) Positive displacement pump

ATTACHMENT 11

INSERVICE TESTING VALVE TABLE

SYSTEM: CONTROL ROD DRIVE (CRD)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
CRD-AOV-CV32A	2039	J2	2	B	1	GB	AO	O	FSC FST PIT	Q Q 2Y	SOUTH SDIV INBOARD VENT ISOLATION VALVE, RG-01, TP-04
CRD-AOV-CV32B	2039	J4	2	B	1	GB	AO	O	FSC FST PIT	Q Q 2Y	NORTH SDIV INBOARD VENT ISOLATION VALVE, RG-01, TP-04
CRD-AOV-CV33	2039	H3	2	B	2	GB	AO	O	FSC FST PIT	Q Q 2Y	SOUTH SDIV INBOARD DRAIN ISOLATION VALVE, RG-01, TP-04
CRD-AOV-CV34	2039	H4	2	B	2	GB	AO	O	FSC FST PIT	Q Q 2Y	NORTH SDIV INBOARD DRAIN ISOLATION VALVE, RG-01, TP-04
CRD-AOV-CV35	2039	H3	2	B	2	GB	AO	O	FSC FST PIT	Q Q 2Y	SOUTH SDIV OUTBOARD DRAIN ISOLATION VALVE, RG-01, TP-04
CRD-AOV-CV36	2039	H4	2	B	2	GB	AO	O	FSC FST PIT	Q Q 2Y	NORTH SDIV OUTBOARD DRAIN ISOLATION VALVE, RG-01, TP-04
CRD-AOV-CV38A	2039	J3	2	B	1	GB	AO	O	FSC FST PIT	Q Q 2Y	SOUTH SDIV OUTBOARD VENT ISOLATION VALVE, RG-01, TP-04
CRD-AOV-CV38B	2039	J4	2	B	1	GB	AO	O	FSC FST PIT	Q Q 2Y	NORTH SDIV OUTBOARD VENT ISOLATION VALVE, RG-01, TP-04

SYSTEM: CONTROL ROD DRIVE (CRD)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
CRD-AOV-CV126 (TYP. OF 137)	2039	C10	2	B	1	DIA	AO	C	FSO FST	TS TS	SCRAM INLET, RV-04, RG-01
CRD-AOV-CV127 (TYP. OF 137)	2039	B10	2	B	3/4	DIA	AO	C	FSO FST	TS TS	SCRAM OUTLET, RV-04, RG-01
CRD-CV-13CV	2039	A9	1	A/C	3/4	CK-P	SA	O	LJ-1 CCL COF	OPB CVCM CVCM	CRD WATER TO REACTOR RECIRCULATION PUMP A, RG-01, TP-01, TP-06
CRD-CV-14CV	2039	B9	1	A/C	3/4	CK-P	SA	O	LJ-1 CCL COF	OPB CVCM CVCM	CRD WATER TO REACTOR RECIRCULATION PUMP A, RG-01, TP-01, TP-06
CRD-CV-15CV	2039	A8	1	A/C	3/4	CK-P	SA	O	LJ-1 CCL COF	OPB CVCM CVCM	CRD WATER TO REACTOR RECIRCULATION PUMP B, RG-01, TP-01, TP-06
CRD-CV-16CV	2039	B8	1	A/C	3/4	CK-P	SA	O	LJ-1 CCL COF	OPB CVCM CVCM	CRD WATER TO REACTOR RECIRCULATION PUMP B, RG-01, TP-01, TP-06
CRD-CV-25CV	2039	B4	A	A/C	1 ½	CK-S	SA	O	LT-2 FSC FSO	RF RF RF	CRD SYSTEM ISOLATION CHECK VALVE, RG-01, TP-01, ROJ-12
CRD-CV-26CV	2039	B4	A	A/C	1 ½	CK-S	SA	O	LT-2 FSC FSO	RF RF RF	CRD SYSTEM ISOLATION CHECK VALVE, RG-01, TP-01, ROJ-12

SYSTEM: CONTROL ROD DRIVE (CRD)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
CRD-CV-28CV	2039	H2	A	C	½	CK-P	SA	C	SKID	Q	SOUTH SDIV DRAIN VALVE AIR SUPPLY BYPASS CV, RG-01, TP-05
CRD-CV-29CV	2039	H5	A	C	½	CK-P	SA	C	SKID	Q	NORTH SDIV DRAIN VALVE AIR SUPPLY BYPASS CV, RG-01, TP-05
CRD-CV-30CV	2039	H3	A	C	½	CK-P	SA	C	SKID	Q	SOUTH SDIV VENT V AIR SUPPLY BYPASS CV, RG-01, TP-05
CRD-CV-31CV	2039	H4	A	C	½	CK-P	SA	C	SKID	Q	NORTH SDV VENT V AIR SUPPLY BYPASS CV, RG-01, TP-05
CRD-CV-32CV	2039	H3	A	C	½	CK-P	SA	C	SKID	Q	SOUTH SDIV DRAIN VALVE AIR SUPPLY BYPASS CV, RG-01, TP-05
CRD-CV-33CV	2039	H5	A	C	½	CK-P	SA	C	SKID	Q	NORTH SDIV DRAIN VALVE AIR SUPPLY BYPASS CV, RG-01, TP-05
CRD-CV-34CV	2039	J3	A	C	½	CK-P	SA	C	SKID	Q	SOUTH SDV VENT V AIR SUPPLY BYPASS CV, RG-01, TP-05
CRD-CV-35CV	2039	J4	A	C	½	CK-P	SA	C	SKID	Q	NORTH SDV VENT V AIR SUPPLY BYPASS CV, RG-01, TP-05
CRD-CV-CV114 (TYP. OF 137)	2039	B11	2	C	3/4	CK-B	SA	O	FSO	TS	SCRAM OUTLET CHECK VALVE, RV-04, RG-01, TP-05
CRD-CV-CV115 (TYP. OF 137)	2039	D9	2	C	½	CK-B	SA	O	FSC FSO	RF RF	SCRAM INLET CHECK VALVE, RG-01, TP-01, ROJ-06

SYSTEM: CONTROL ROD DRIVE (CRD)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
CRD-CV-138 (TYP. OF 137)	2039	C9	2	C	½	CK-B	SA	O	FSC	TS	COOLING/SCRAM HEADER CHECK VALVE, RV-04, RG-01, TP-05
CRD-SOV-SO120 (TYP. OF 137)	2039	C9	2	B	1/4	SOV	SO	C	FSC FST	TS TS	CRD WITHDRAWAL EXHAUST VALVE, RV-04, RG-01, TP-05
CRD-SOV-SO121 (TYP. OF 137)	2039	B10	2	B	1/4	SOV	SO	C	FSC FST	TS TS	CRD INSERT EXHAUST VALVE, RV-04, RG-01, TP-05
CRD-SOV-SO122 (TYP. OF 137)	2039	B10	2	B	1/4	SOV	SO	C	FSC FST	TS TS	CRD WITHDRAWAL VALVE, RV-04, RG-01, TP-05
CRD-SOV-SO123 (TYP. OF 137)	2039	B10	2	B	1/4	SOV	SO	C	FSC FST	TS TS	CRD INSERT VALVE, RV-04, RG-01, TP-05

SYSTEM: CORE SPRAY (CS)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
CS-CV-10CV	2045 SH 1	F5	2	C	12	CK-S	SA	C	FSO FSC	Q Q	CS PUMP A DISCHARGE CHECK RG-01, TP-01
CS-CV-11CV	2045 SH 1	C5	2	C	12	CK-S	SA	C	FSO FSC	Q Q	CS PUMP B DISCHARGE CHECK RG-01, TP-01
CS-CV-12CV	2045 SH 1	G7	A	C	2	CK-P	SA	C	COF CCF	CVCM CVCM	CS LOOP A OUTBOARD PRESSURE MAINTENANCE SUPPLY, RG-01, TP-01
CS-CV-13CV	2045 SH 1	G7	2	C	2	CK-P	SA	C	COF CCF CCD/ CCR	CVCM CVCM CVCM	CS LOOP A INBOARD PRESSURE MAINTENANCE SUPPLY, RG-01, TP-01
CS-CV-14CV	2045 SH 1	D7	A	C	2	CK-P	SA	C	COF CCF	CVCM CVCM	CS LOOP B OUTBOARD PRESSURE MAINTENANCE SUPPLY, RG-01, TP-01
CS-CV-15CV	2045 SH 1	D7	2	C	2	CK-P	SA	C	COF CCF CCD/ CCR	CVCM CVCM CVCM	CS LOOP B INBOARD PRESSURE MAINTENANCE SUPPLY, RG-01, TP-01
CS-CV-18CV	2045 SH 1	D10	1	A/C	10	CK-S	SA	C	LT-2 FSC FSO PIT	OPB RF RF RF	CS SYSTEM A TESTABLE CHECK ROJ-11, RV-05, RG-01

SYSTEM: CORE SPRAY (CS)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
CS-CV-19CV	2045 SH 1	B10	1	A/C	10	CK-S	SA	C	LT-2 FSC FSO PIT	OPB RF RF RF	CS SYSTEM B TESTABLE CHECK ROJ-11, RV-05, RG-01
CS-MOV-MO5A	2045 SH 1	E5	2	B	3	GT	MO	O	FSO FSC PIT	Q Q 2Y	CS PUMP A MINIMUM FLOW RECIRCULATION ISOLATION, RG-01
CS-MOV-MO5B	2045 SH 1	B5	2	B	3	GT	MO	O	FSO FSC PIT	Q Q 2Y	CS PUMP B MINIMUM FLOW RECIRCULATION ISOLATION, RG-01
CS-MOV-MO7A	2045 SH 1	F2	2	B	14	GT	MO	O	FSO FSC PIT	Q Q 2Y	CS PUMP A SUCTION, RG-01
CS-MOV-MO7B	2045 SH 1	C2	2	B	14	GT	MO	O	FSO FSC PIT	Q Q 2Y	CS PUMP B SUCTION, RG-01
CS-MOV-MO11A	2045 SH 1	F8	2	B	10	GT	MO	O	PIT	2Y	LOOP A INJECTION THROTTLE, RG-01
CS-MOV-MO11B	2045 SH 1	C8	2	B	10	GT	MO	O	PIT	2Y	LOOP B INJECTION THROTTLE, RG-01
CS-MOV-MO12A	2045 SH 1	F8	1	A	10	GT	MO	C	LJ-1 LT-2 FSO	OPB OPB CS	LOOP A INJECTION BLOCK CSJ-09, RV-05, RG-01

SYSTEM: CORE SPRAY (CS)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
									FSC PIT	CS 2Y	
CS-MOV-MO12B	2045 SH 1	C8	1	A	10	GT	MO	C	LJ-1 LT-2 FSO FSC PIT	OPB OPB CS CS 2Y	LOOP B INJECTION BLOCK CSJ-09, RV-05, RG-01
CS-MOV-MO26A	2045 SH 1	F7	2	B	10	GB	MO	C	PIT	2Y	CS PUMP A TEST LINE PASSIVE ISOLATION, RG-01
CS-MOV-MO26B	2045 SH 1	C7	2	B	10	GB	MO	C	PIT	2Y	CS PUMP B TEST LINE PASSIVE ISOLATION, RG-01
CS-RV-10RV	2045 SH 1	H3	2	C	3/4	RV	SA	C	RVT	APP I	CS PUMP A SUCTION RELIEF, RG-01
CS-RV-11RV	2045 SH 1	F6	2	C	2	RV	SA	C	RVT	APP I	CS PUMP A DISCHARGE RELIEF, RG-01
CS-RV-12RV	2045 SH 1	E3	2	C	3/4	RV	SA	C	RVT	APP I	CS PUMP B SUCTION RELIEF, RG-01
CS-RV-13RV	2045 SH 1	C6	2	C	2	RV	SA	C	RVT	APP I	CS PUMP B DISCHARGE RELIEF, RG-01

SYSTEM: DEMINERALIZED WATER SYSTEM (DW)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
DW-V-133	2029	G8	2	A	4	GT	MA	C	LJ-1	OPB	PASSIVE DRYWELL OUTBOARD SUPPLY VALVE
DW-V-219	2029	G8	2	A	4	GT	MA	C	LJ-1	OPB	PASSIVE DRYWELL INBOARD SUPPLY VALVE

SYSTEM: DIESEL GENERATOR DIESEL OIL (DGDO)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
DGDO-CV-10CV	2011 SH 1	A8	A	C	2	CK-P	SA	C	FSO	Q	DGDO TRANSFER PUMP A DISCHARGE, ARV-03, RG-01
DGDO-CV-11CV	2011 SH 1	A10	A	C	2	CK-P	SA	C	FSO	Q	DGDO TRANSFER PUMP B DISCHARGE, ARV-03, RG-01
DGDO-CV-12CV	2011 SH 1	A4	A	C	2	CK-P	SA	C	FSO	Q	DGDO DAY TANK 1 INLET, ARV-03, RG-01
DGDO-CV-13CV	2011 SH 1	B4	A	C	2	CK-P	SA	C	FSO	Q	DGDO DAY TANK 2 INLET, ARV-03, RG-01
DGDO-CV-14CV	2077	J3	A	C	1 1/4	CK-S	SA	C	SKID	Q	ENG DR FUEL P 1 SUPPLY, RG-01, TP-05
DGDO-CV-15CV	2077	J4	A	C	1 1/4	CK-S	SA	C	SKID	Q	ENG DR FUEL P 2 SUPPLY, RG-01, TP-05
DGDO-CV-16CV	2077	H3	A	C	1 1/4	CK-S	SA	C	SKID	Q	FUEL BOOSTER P 1 DISCH, RG-01, TP-05
DGDO-CV-17CV	2077	H4	A	C	1 1/4	CK-S	SA	C	SKID	Q	FUEL BOOSTER P 2 DISCH, RG-01, TP-05
DGDO-PRV-PRV101	2077	E3	A	C	3/4	PRV	SA	C	SKID	Q	DG1 FUEL INJECT HDR PRESS REG V, RG-01, TP-05
DGDO-PRV-PRV102	2077	E4	A	C	3/4	PRV	SA	C	SKID	Q	DG2 FUEL INJECT HDR PRESS REG V, RG-01, TP-05

SYSTEM: DIESEL GENERATOR DIESEL OIL (DGDO)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
DGDO-RV-10RV	2077	H2	A	C	3/4	RV	SA	C	RVT	APP I	DGDO PUMP 1 SUCTION RELIEF, ARV-02, RG-01
DGDO-RV-11RV	2077	H4	A	C	3/4	RV	SA	C	RVT	APP I	DGDO PUMP 2 SUCTION RELIEF, ARV-02, RG-01
DGDO-SOV-SSV5028	2077	H2	A	B	3/4	SOV	SO	O/C	FSO	Q	DGDO DAY TANK 1 INLET FUEL SAFETY VALVE, ARV-01, RG-01
DGDO-SOV-SSV5029	2077	H6	A	B	3/4	SOV	SO	O/C	FSO	Q	DGDO DAY TANK 2 INLET FUEL SAFETY VALVE, ARV-01, RG-01

SYSTEM: DIESEL GENERATOR STARTING AIR (DGSA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
DGSA-AOV-AV5	117.10 -IC-09	E3	A	B	2 ½	GB	AO	C	SKID	Q	DG-1 LEFT BANK STARTING AIR VALVE, RG-01, TP-05
DGSA-AOV-AV6	117.10 -IC-09	E3	A	B	2 ½	GB	AO	C	SKID	Q	DG-2 LEFT BANK STARTING AIR VALVE, RG-01, TP-05
DGSA-AOV-AV7	117.10 -IC-09	E1	A	B	2 ½	GB	AO	C	SKID	Q	DG-1 RIGHT BANK STARTING AIR VALVE, RG-01, TP-05
DGSA-AOV-AV8	117.10 -IC-09	E1	A	B	2 ½	GB	AO	C	SKID	Q	DG-2 RIGHT BANK STARTING AIR VALVE, RG-01, TP-05
DGSA-CV-10CV	2077	D7	A	C	2	CK-L	SA	C	FSC FSO	Q Q	STARTING AIR COMPRESSOR 1A DISCHARGE, RG-01, TP-01
DGSA-CV-11CV	2077	D9	A	C	2	CK-L	SA	C	FSC FSO	Q Q	STARTING AIR COMPRESSOR 1B DISCHARGE, RG-01, TP-01
DGSA-CV-12CV	2077	D10	A	C	2	CK-L	SA	C	FSC FSO	Q Q	STARTING AIR COMPRESSOR 2B DISCHARGE, RG-01, TP-01
DGSA-CV-13CV	2077	D12	A	C	2	CK-L	SA	C	FSC FSO	Q Q	STARTING AIR COMPRESSOR 2A DISCHARGE, RG-01, TP-01
DGSA-CV-14CV	2077	C8	A	C	2	CK-S	SA	C	CCL COF	CVCM CVCM	AIR RECEIVER 1A INLET, RG-01, TP-01
DGSA-CV-15CV	2077	C9	A	C	2	CK-S	SA	C	CCL COF	CVCM CVCM	AIR RECEIVER 1B INLET, RG-01, TP-01

SYSTEM: DIESEL GENERATOR STARTING AIR (DGSA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
DGSA-CV-16CV	2077	C10	A	C	2	CK-S	SA	C	CCL COF	CVCM CVCM	AIR RECEIVER 2A INLET, RG-01, TP-01
DGSA-CV-17CV	2077	C11	A	C	2	CK-S	SA	C	CCL COF	CVCM CVCM	AIR RECEIVER 2B INLET, RG-01, TP-01
DGSA-CV-18CV	2077	B7	A	C	3	CK-S	SA	C	FSO FSC	Q Q	AIR RECEIVER 1A OUTLET, RG-01
DGSA-CV-19CV	2077	B8	A	C	3	CK-S	SA	C	FSO FSC	Q Q	AIR RECEIVER 1B OUTLET, RG-01
DGSA-CV-20CV	2077	B11	A	C	3	CK-S	SA	C	FSO FSC	Q Q	AIR RECEIVER 2A OUTLET, RG-01
DGSA-CV-21CV	2077	B12	A	C	3	CK-S	SA	C	FSO FSC	Q Q	AIR RECEIVER 2B OUTLET, RG-01
DGSA-CV-30CV	117.10-IC-09	D3	A	C	1/4	CK-S	SA	O	SKID	Q	DG1 125 PSIG STRT AIR SUPPLY SHUTTLE V, RG-01, TP-05
DGSA-CV-31CV	117.10-IC-09	D3	A	C	1/4	CK-S	SA	O	SKID	Q	DG2 125 PSIG STRT AIR SUPPLY SHUTTLE V, RG-01, TP-05
DGSA-CV-32CV	117.10-IC-09	F5	A	C	1/4	CK-S	SA	C	SKID	Q	DG1 LEFT BANK AIR START SHUTTLE VALVE, RG-01, TP-05
DGSA-CV-33CV	117.10-IC-09	F1	A	C	1/4	CK-S	SA	C	SKID	Q	DG1 RIGHT BANK AIR START SHUTTLE VALVE, RG-01, TP-05

SYSTEM: DIESEL GENERATOR STARTING AIR (DGSA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
DGSA-CV-34CV	117.10-IC-09	F5	A	C	1/4	CK-S	SA	C	SKID	Q	DG2 LEFT BANK AIR START SHUTTLE VALVE, RG-01, TP-05
DGSA-CV-35CV	117.10-IC-09	F1	A	C	1/4	CK-S	SA	C	SKID	Q	DG2 RIGHT BANK AIR START SHUTTLE VALVE, RG-01, TP-05
DGSA-SOV-SPV1	117.10 -IC-09	F4	A	B	½	GB	SO	C	SKID	Q	SOLENOID PILOT VALVE FOR DGSA-AOV-AV5 (DG1 LEFT BANK), RG-01, TP-05
DGSA-SOV-SPV2	117.10 -IC-09	F4	A	B	½	GB	SO	C	SKID	Q	SOLENOID PILOT VALVE FOR DGSA-AOV-AV6 (DG2 LEFT BANK), RG-01, TP-05
DGSA-SOV-SPV3	117.10 -IC-09	F1	A	B	½	GB	SO	C	SKID	Q	SOLENOID PILOT VALVE FOR DGSA-AOV-AV7 (DG1 RIGHT BANK), RG-01, TP-05
DGSA-SOV-SPV4	117.10 -IC-09	F1	A	B	½	GB	SO	C	SKID	Q	SOLENOID PILOT VALVE FOR DGSA-AOV-AV8 (DG2 RIGHT BANK), RG-01, TP-05
DGSA-RV-14RV	2077	C7	A	RV	1	RV	SA	C	RVT	APP I	DGSA AIR RECEIVER 1A RELIEF, RG-01
DGSA-RV-15RV	2077	C9	A	RV	1	RV	SA	C	RVT	APP I	DGSA AIR RECEIVER 1B RELIEF, RG-01
DGSA-RV-16RV	2077	C10	A	RV	1	RV	SA	C	RVT	APP I	DGSA AIR RECEIVER 1C RELIEF,

SYSTEM: DIESEL GENERATOR STARTING AIR (DGSA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
											RG-01
DGSA-RV-17RV	2077	C12	A	RV	1	RV	SA	C	RVT	APP I	DGSA AIR RECEIVER 1D RELIEF, RG-01

SYSTEM: HIGH PRESSURE COOLANT INJECTION (HPCI)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
HPCI-AOV-AO42	2041	J6	2	B	1	GB	AO	O	FSC FST PIT	Q Q 2Y	STEAM LINE DRIPLEG DRAIN, RG-01, TP-04
HPCI-AOV-AO70	2044	E9	2	A	1	BAL	AO	C	LJ-1 FSC FST PIT	OPB Q Q 2Y	HPCI EXHAUST BOOTLEG DRAIN INBOARD, RG-01, TP-04
HPCI-AOV-AO71	2044	E9	2	A	1	BAL	AO	C	LJ-1 FSC FST PIT	OPB Q Q 2Y	HPCI EXHAUST BOOTLEG DRAIN OUTBOARD, RG-01, TP-04
HPCI-AOV-PCV50	2044	H3	2	B	2	GB	AO	O	PSO FSO FST	Q CS CS	HPCI AUXILIARY COOLING SUPPLY PRESSURE CONTROL, CSJ-02, RG-01, TP-04
HPCI-CV-10CV	2044	J3	2	C	16	CK-S	SA	C	COF CCL	CVCM CVCM	ECST SUPPLY TO HPCI PUMP, RG-01
HPCI-CV-11CV	2044	H10	2	C	16	CK-S	SA	C	COD CCD	CVCM CVCM	HPCI PUMP SUCTION FROM SUPPRESSION POOL, RG-01
HPCI-CV-13CV	2044	J5	2	C	4	CK-S	SA	C	COF CCD	CVCM CVCM	HPCI AUXILIARY COOLING RETURN, RG-01

SYSTEM: HIGH PRESSURE COOLANT INJECTION (HPCI)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
HPCI-CV-14CV	2044	H5	2	C	2	CK-P	SA	C	COF CCF	CVCM CVCM	HPCI CONDENSATE PUMP DISCHARGE TO AUXILIARY COOLING RETURN, RG-01, TP-01
HPCI-CV-15CV	2044	D8	2	A/C	20	CK-L	SA	C	LJ-1 COF CCL	OPB CVCM CVCM	HPCI TURBINE EXHAUST, RG-01
HPCI-CV-16CV	2044	F9	2	C	2	CK-P	SA	C	COD CCL	CVCM CVCM	HPCI TURBINE EXHAUST DRAIN TO SUPPRESSION POOL, RG-01, TP-01
HPCI-CV-17CV	2044	C6	2	C	4	CK-S	SA	C	COF CCL	CVCM CVCM	HPCI PUMP MINIMUM FLOW LINE, RG-01
HPCI-CV-18CV	2044	B8	2	C	2	CK-P	SA	C	COF CCF CCD/ CCR	CVCM CVCM CVCM	CONDENSATE SUPPLY TO HPCI SYSTEM, RG-01, TP-01
HPCI-CV-19CV	2044	B8	A	C	2	CK-P	SA	C	COF CCF	CVCM CVCM	CONDENSATE SUPPLY TO HPCI SYSTEM, RG-01, TP-01
HPCI-CV-24CV	2044	E11	2	C	3	CK-S	SA	C	FSO FSC	SD SD	HPCI VACUUM BREAKER, RG-01, TP-02
HPCI-CV-25CV	2044	E10	2	C	3	CK-S	SA	C	FSO FSC	SD SD	HPCI VACUUM BREAKER, RG-01, TP-02
HPCI-CV-26CV	2044	E11	2	C	3	CK-S	SA	C	FSO FSC	SD SD	HPCI VACUUM BREAKER, RG-01, TP-02

SYSTEM: HIGH PRESSURE COOLANT INJECTION (HPCI)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
HPCI-CV-27CV	2044	E10	2	C	3	CK-S	SA	C	FSO FSC	SD SD	HPCI VACUUM BREAKER, RG-01, TP-02
HPCI-CV-29CV	2044	B9	1	A/C	14	CK-S	SA	C	LJ-1 FSO FSC PIT	RF RF RF 2Y	INJECTION CHECK VALVE, ROJ-09, RG-01
HPCI-HOV-HOV10	2041	H5	2	B	10	STOP	HO	C	SKID	Q	TU STOP V, RG-01, TP-05
HPCI-MOV-MO14	2041	H5	2	B	10	GT	MO	C	FSO PIT	Q 2Y	STEAM SUPPLY TO TURBINE, RG-01
HPCI-MOV-MO15	2041	D5	1	A	10	GT	MO	O	LJ-1 FSC PIT	OPB Q/CS 2Y	STEAM SUPPLY INBOARD ISOLATION, CSJ-10, RG-01
HPCI-MOV-MO16	2041	D4	1	A	10	GT	MO	O	LJ-1 FSC PIT	OPB Q 2Y	STEAM SUPPLY OUTBOARD ISOLATION, RG-01
HPCI-MOV-MO17	2044	J2	2	B	16	GT	MO	O	FSO FSC PIT	Q Q 2Y	PUMP SUCTION FROM EMERGENCY CONDENSATE STORAGE TANK, RG-01
HPCI-MOV-MO19	2044	B8	2	B	14	GT	MO	C	FSO PIT	Q 2Y	HPCI INJECTION, RG-01
HPCI-MOV-MO20	2044	B7	2	B	14	GT	MO	O	PIT	2Y	HPCI PUMP DISCHARGE, RG-01

SYSTEM: HIGH PRESSURE COOLANT INJECTION (HPCI)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
HPCI-MOV-MO21	2044	D2	2	B	10	GB	MO	C	PIT	2Y	HPCI PUMP TEST BYPASS TO EMERGENCY CONDENSATE STORAGE TANK, PASSIVE, RG-01
HPCI-MOV-MO24	2044	D2	A	B	10	GT	MO	C	PIT	2Y	HPCI PUMP TEST BYPASS REDUNDANT SHUTOFF, PASSIVE, RG-01
HPCI-MOV-MO25	2044	C7	2	B	4	GB	MO	C	FSO FSC PIT	Q Q 2Y	HPCI PUMP MINIMUM FLOW BYPASS LINE ISOLATION, RG-01
HPCI-MOV-MO58	2044	G10	2	B	16	GT	MO	C	FSO FSC PIT	Q Q 2Y	HPCI PUMP SUCTION FROM SUPPRESSION POOL, RG-01
HPCI-RD-S241	2044	D5	2	D	16	RD	SA	C	RD	5Y	EXHAUST LINE RUPTURE DISK, RG-01
HPCI-RV-10RV	2044	J2	2	C	1	RV	SA	C	RVT	APP I	HPCI PUMP SUCTION RELIEF, RG-01
HPCI-RV-12RV	2044	H4	2	C	1	RV	SA	C	RVT	APP I	HPCI AUXILIARY COOLING WATER SUPPLY, RG-01
HPCI-SOV-SSV64	2044	G5	2	B	1	SOV	SOV	C	FSC FST	Q/PB Q	HPCI EXHAUST DRIP LEG DRAIN, RV-01, RG-01, TP-04
HPCI-SOV-SSV87	2044	G4	2	B	1	SOV	SOV	C	FSC FST	Q/PB Q	HPCI TURBINE DRIP LEG DRAIN, RG-01, RV-01, TP-04

SYSTEM: HIGH PRESSURE COOLANT INJECTION (HPCI)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
HPCI-TU-VGR	2041	H5	A	B	9	CTL	HO	C	SKID	Q	HPCI TU V GEAR ASSY W / PILOT, TP-05
HPCI-V-44	2044	D8	2	A/C	20	S-CK	MA	O	LJ-1 COF CCL	OPB CVCM CVCM	HPCI TURBINE EXHAUST TO SUPPRESSION POOL ISOLATION, RG-01
HPCI-V-50	2044	F9	2	C	2	S-CK	MA	O	COD CCD	CVCM CVCM	TURBINE DRAIN TO SUPPRESSION POOL ISOLATION, RG-01, TP-01

SYSTEM: HEATING AND VENTILATION (HV)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
HV-AOV-257AV	2020	D4	A	B	72 IN	BTF	AO	O	FSC FST PIT	Q Q 2Y	REACTOR BUILDING VENTILATION OUTBOARD SUPPLY, RG-01, TP-04
HV-AOV-259AV	2020	B12	A	B	72 IN	BTF	AO	O	FSC FST PIT	Q Q 2Y	REACTOR BUILDING VENTILATION INBOARD EXHAUST, RG-01, TP-04
HV-AOV-261AV	2020	B12	A	B	72 IN	BTF	AO	O	FSC FST PIT	Q Q 2Y	REACTOR BUILDING VENTILATION INBOARD EXHAUST, RG-01, TP-04
HV-AOV-263AV	2020	E9	A	B	72 IN	BTF	AO	O	FSC FST PIT	Q Q 2Y	REACTOR MG SET 1A VENTILATION OUTBOARD SUPPLY, RG-01, TP-04
HV-AOV-265AV	2020	E9	A	B	72 IN	BTF	AO	O	FSC FST PIT	Q Q 2Y	REACTOR MG SET 1B VENTILATION OUTBOARD SUPPLY, RG-01, TP-04
HV-AOV-267AV	2020	D11	A	B	72 IN	BTF	AO	O	FSC FST PIT	Q Q 2Y	REACTOR MG SET 1A VENTILATION INBOARD EXHAUST, RG-01, TP-04
HV-AOV-269AV	2020	E11	A	B	72 IN	BTF	AO	O	FSC FST PIT	Q Q 2Y	REACTOR MG SET 1B VENTILATION OUTBOARD EXHAUST, RG-01, TP-04

SYSTEM: HEATING AND VENTILATION (HV)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
HV-AOV-270AV	2019 SH 1	B2	A	B	20 IN	BTF	AO	O	FSC FST	Q Q	CONTROL RM HVAC INLET VALVE, RG-01, TP-04
HV-AOV-271AV	2019 SH 1	A1	A	B	12 IN	BTF	AO	C	FSO FST	Q Q	CONTROL RM HVAC EMERGENCY BYPASS, RG-01, TP-04
HV-AOV-272AV	2019 SH 1	B6	A	B	8 IN	BTF	AO	O	FSC FST	Q Q	CONTROL RM PANTRY EXHAUST ISOLATION, RG-01, TP-04
HV-MOV-258MV	2020	B12	A	B	48 IN	BTF	MO	O	FSC PIT	Q 2Y	REACTOR BUILDING VENTILATION OUTBOARD EXHAUST, RG-01
HV-MOV-260MV	2020	B12	A	B	48 IN	BTF	MO	O	FSC PIT	Q 2Y	REACTOR BUILDING VENTILATION OUTBOARD EXHAUST, RG-01
HV-MOV-262MV	2020	E10	A	B	48 IN	BTF	MO	O	FSC PIT	CS 2Y	RR MG SET 1A VENTILATION INBOARD SUPPLY, CSJ-08, RG-01
HV-MOV-264MV	2020	E10	A	B	48 IN	BTF	MO	O	FSC PIT	CS 2Y	RR MG SET 1B VENTILATION INBOARD SUPPLY, CSJ-08, RG-01
HV-MOV-266MV	2020	D11	A	B	48 IN	BTF	MO	O	FSC PIT	CS 2Y	RR MG SET 1A VENTILATION OUTBOARD EXHAUST, CSJ-08, RG-01
HV-MOV-268MV	2020	E11	A	B	48 IN	BTF	MO	O	FSC PIT	CS 2Y	RR MG SET 1B VENTILATION OUTBOARD EXHAUST, CSJ-08, RG-01
HV-MOV-272MV	2020	D4	A	B	72 IN	BTF	MO	O	FSC PIT	Q 2Y	REACTOR BUILDING VENTILATION INBOARD SUPPLY, RG-01

SYSTEM: INSTRUMENT AIR (IA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
IA-CV-17CV	2010 SH 2	E8	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MS-RV-71A ACCUMULATOR SUPPLY, ROJ-07, RG-01, TP-01
IA-CV-18CV	2010 SH 2	E8	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MS-RV-71B ACCUMULATOR SUPPLY, ROJ-07, RG-01, TP-01
IA-CV-19CV	2010 SH 2	D8	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MS-RV-71C ACCUMULATOR SUPPLY, ROJ-07, RG-01, TP-01
IA-CV-20CV	2010 SH 2	D9	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MS-RV-71E ACCUMULATOR SUPPLY, ROJ-07, RG-01, TP-01
IA-CV-21CV	2010 SH 2	E9	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MS-RV-71G ACCUMULATOR SUPPLY, ROJ-07, RG-01, TP-01
IA-CV-22CV	2010 SH 2	E9	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MS-RV-71H ACCUMULATOR SUPPLY, ROJ-07, RG-01, TP-01
IA-CV-28CV	2010 SH 2	F9	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MSIV-AO8OA SUPPLY ROJ-08, RG-01, TP-01

SYSTEM: INSTRUMENT AIR (IA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
IA-CV-29CV	2010 SH 2	F8	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MSIV-AO8OB SUPPLY ROJ-08, RG-01, TP-01
IA-CV-30CV	2010 SH 2	F8	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MSIV-AO8OC SUPPLY ROJ-08, RG-01, TP-01
IA-CV-31CV	2010 SH 2	F9	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MSIV-AO8OD SUPPLY ROJ-08, RG-01, TP-01
IA-CV-32CV	2010 SH 2	D12	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MSIV-AO86A SUPPLY ROJ-08, RG-01, TP-01
IA-CV-33CV	2010 SH 2	D12	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MSIV-AO86B SUPPLY ROJ-08, RG-01, TP-01
IA-CV-34CV	2010 SH 2	E12	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MSIV-AO86C SUPPLY ROJ-08, RG-01, TP-01
IA-CV-35CV	2010 SH 2	E12	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MSIV-AO86D SUPPLY ROJ-08, RG-01, TP-01
IA-CV-36CV	2010 SH 2	E8	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MS-RV-71D ACCUMULATOR SUPPLY, ROJ-07, RG-01, TP-01

SYSTEM: INSTRUMENT AIR (IA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
IA-CV-37CV	2010 SH 2	E10	A	A/C	½	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	MS-RV-71F ACCUMULATOR SUPPLY, ROJ-07, RG-01, TP-01
IA-CV-50CV	2010 SH 2	G5	A	A/C	1/4	CK-L	SA	O	LT-1 CCL COF	2Y CVCM CVCM	ACCUMULATOR AO-82 IA CHECK VALVE, RG-01, TP-01
IA-CV-51CV	2010 SH 2	G5	A	A/C	1/4	CK-L	SA	O	LT-1 CCL COF	2Y CVCM CVCM	ACCUMULATOR AO-83 IA CHECK VALVE, RG-01, TP-01
IA-CV-52CV	2010 SH 2	G6	A	A/C	1/4	CK-L	SA	O	LT-1 CCL COF	2Y CVCM CVCM	ACCUMULATOR AO94 IA CHECK VALVE, RG-01, TP-01
IA-CV-53CV	2010 SH 2	G6	A	A/C	1/4	CK-L	SA	O	LT-1 CCL COF	2Y CVCM CVCM	ACCUMULATOR AO95 IA CHECK VALVE, RG-01, TP-01
IA-CV-54CV	2010 SH 2	A7	A	A/C	1/4	CK-L	SA	O	LT-1 CCL COF	2Y CVCM CVCM	HV-AOV-257AV ACCUMULATOR CHECK, RG-01, TP-01
IA-CV-55CV	2010 SH 2	A6	A	A/C	1/4	CK-L	SA	O	LT-1 CCL COF	2Y CVCM CVCM	HV-AOV-259AV ACCUMULATOR CHECK, RG-01, TP-01

SYSTEM: INSTRUMENT AIR (IA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
IA-CV-56CV	2010 SH 2	A7	A	A/C	1/4	CK-L	SA	O	LT-1 CCL COF	2Y CVCM CVCM	HV-AOV-261AV ACCUMULATOR CHECK, RG-01, TP-01
IA-CV-57CV	2010 SH 2	B9	A	A/C	1/4	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	HV-AOV-263AV ACCUMULATOR CHECK, ROJ-13, RG-01, TP-01
IA-CV-58CV	2010 SH 2	B9	A	A/C	1/4	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	HV-AOV-265AV ACCUMULATOR CHECK, ROJ-13, RG-01, TP-01
IA-CV-59CV	2010 SH 2	B10	A	A/C	1/4	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	HV-AOV-267AV ACCUMULATOR CHECK, ROJ-13, RG-01, TP-01
IA-CV-60CV	2010 SH 2	B8	A	A/C	1/4	CK-L	SA	O	LT-1 FSC FSO	2Y RF RF	HV-AOV-269AV ACCUMULATOR CHECK, ROJ-13, RG-01, TP-01
IA-CV-65CV	2010 SH 2	F8	2	A/C	2	CK-L	SA	O	LJ-1 COF CCL	OPB CVCM CVCM	X-22 INBOARD ISOLATION, RG-01
IA-CV-78CV	2010 SH 2	F8	2	A/C	2	CK-L	SA	O	LJ-1 COF CCL	OPB CVCM CVCM	X-22 OUTBOARD ISOLATION, RG-01
IA-CV-111CV	2010 SH 1	E11	A	A/C	1/4	CK-L	SA	O	LT-1 CCL COF	2Y CVCM CVCM	IA-271AV ACCUMULATOR CHECK, RG-01, TP-01

SYSTEM: INSTRUMENT AIR (IA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
PC-V-559	2028	C8	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-560	2028	D8	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-561	2028	C8	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-562	2028	C8	2	A	1	GT	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-563	2028	C8	2	A	1	GT	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-564	2028	C8	2	A	1	GT	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-565	2028	D8	2	A	1	GT	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-566	2028	D8	2	A	1	GT	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-569	2027 SH 1	J7	2	A	1	GT	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-570	2027 SH 1	J7	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-571	2027 SH 1	J7	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-572	2027 SH 1	J7	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-573	2027 SH 1	J7	2	A	1	GT	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION

SYSTEM: INSTRUMENT AIR (IA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
PC-V-574	2027 SH 1	J7	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-575	2027 SH 1	J7	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-576	2027 SH 1	J7	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-577	2027 SH 1	J9	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-578	2027 SH 1	J9	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-579	2027 SH 1	J9	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-580	2027 SH 1	J9	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-581	2027 SH 2	J9	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-582	2027 SH 2	J3	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-583	2027 SH 2	J3	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-584	2027 SH 2	J3	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION

SYSTEM: INSTRUMENT AIR (IA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
PC-V-585	2027 SH 2	J4	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-586	2027 SH 2	J4	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-587	2027 SH 2	J4	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-588	2027 SH 2	J4	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-589	2027 SH 2	J5	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION
PC-V-590	2027 SH 2	J5	2	A	½	GB	MA	C	LJ-1	OPB	PASSIVE MANUAL ISOLATION

SYSTEM: MAIN STEAM (MS)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
MS-AOV-AO80A	2041	B5	1	A	24	GB	AO	O	LJ-1 PSC FSC FST PIT	RF Q CS CS 2Y	MSIV A INBOARD ISOLATION CSJ-03, RG-01
MS-AOV-AO80B	2041	B5	1	A	24	GB	AO	O	LJ-1 PSC FSC FST PIT	RF Q CS CS 2Y	MSIV B INBOARD ISOLATION CSJ-03, RG-01
MS-AOV-AO80C	2041	B7	1	A	24	GB	AO	O	LJ-1 PSC FSC FST PIT	RF Q CS CS 2Y	MSIV C INBOARD ISOLATION CSJ-03, RG-01
MS-AOV-AO80D	2041	B7	1	A	24	GB	AO	O	LJ-1 PSC FSC FST PIT	RF Q CS CS 2Y	MSIV D INBOARD ISOLATION CSJ-03, RG-01

SYSTEM: MAIN STEAM (MS)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
MS-AOV-AO86A	2041	B4	1	A	24	GB	AO	O	LJ-1 PSC FSC FST PIT	RF Q CS CS 2Y	MSIV A OUTBOARD ISOLATION CSJ-03, RG-01
MS-AOV-AO86B	2041	A4	1	A	24	GB	AO	O	LJ-1 PSC FSC FST PIT	RF Q CS CS 2Y	MSIV B OUTBOARD ISOLATION CSJ-03, RG-01
MS-AOV-AO86C	2041	A8	1	A	24	GB	AO	O	LJ-1 PSC FSC FST PIT	RF Q CS CS 2Y	MSIV C OUTBOARD ISOLATION CSJ-03, RG-01
MS-AOV-AO86D	2041	B8	1	A	24	GB	AO	O	LJ-1 PSC FSC FST PIT	RF Q CS CS 2Y	MSIV D OUTBOARD ISOLATION CSJ-03, RG-01
MS-AOV-738AV	2028	C9	1	B	½	GB	AO	C	PIT	2Y	RPV HEAD VENT DRAIN TO SUMP, PASSIVE ISOLATION, RG-01
MS-AOV-739AV	2028	C9	1	B	½	GB	AO	C	PIT	2Y	RPV HEAD VENT DRAIN TO SUMP, PASSIVE ISOLATION, RG-01

SYSTEM: MAIN STEAM (MS)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
MS-CV-20CV	2028	C11	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71A RV DISCHARGE VACUUM BREAKER VB 71 A1, RG-01, TP-08
MS-CV-21CV	2028	C11	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71A RV DISCHARGE VACUUM BREAKER VB 71 A2, RG-01, TP-08
MS-CV-22CV	2028	C11	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71B RV DISCHARGE VACUUM BREAKER VB 71 B1, RG-01, TP-08
MS-CV-23CV	2028	C11	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71B RV DISCHARGE VACUUM BREAKER VB 71 B2, RG-01, TP-08
MS-CV-24CV	2028	D11	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71C RV DISCHARGE VACUUM BREAKER VB 71 C1, RG-01, TP-08
MS-CV-25CV	2028	D11	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71C RV DISCHARGE VACUUM BREAKER VB 71 C2, RG-01, TP-08
MS-CV-26CV	2028	D11	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71D RV DISCHARGE VACUUM BREAKER VB 71 D1, RG-01, TP-08
MS-CV-27CV	2028	D11	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71D RV DISCHARGE VACUUM BREAKER VB 71 D2, RG-01, TP-08

SYSTEM: MAIN STEAM (MS)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
MS-CV-28CV	2028	D9	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71E RV DISCHARGE VACUUM BREAKER VB 71 E1, RG-01, TP-08
MS-CV-29CV	2028	D9	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71E RV DISCHARGE VACUUM BREAKER VB 71 E2, RG-01, TP-08
MS-CV-30CV	2028	D9	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71F RV DISCHARGE VACUUM BREAKER VB 71 F1, RG-01, TP-08
MS-CV-31CV	2028	D9	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71F RV DISCHARGE VACUUM BREAKER VB 71 F2, RG-01, TP-08
MS-CV-32CV	2028	E9	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71G RV DISCHARGE VACUUM BREAKER VB 71 G1, RG-01, TP-08
MS-CV-33CV	2028	E9	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71G RV DISCHARGE VACUUM BREAKER VB 71 G2, RG-01, TP-08
MS-CV-34CV	2028	E9	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71H RV DISCHARGE VACUUM BREAKER VB 71 H1, RG-01, TP-08

SYSTEM: MAIN STEAM (MS)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
MS-CV-35CV	2028	E9	3	C	10	CK-S	SA	C	VBT FSO FSC	RF 2Y 2Y	71H RV DISCHARGE VACUUM BREAKER VB 71 H2, RG-01, TP-08
MS-MOV-MO74	2041	C7	1	A	3	GT	MO	O	LJ-1 FSC PIT	OPB Q/CS 2Y	MS LINE DRAIN INBOARD ISOLATION, CSJ-10, RG-01
MS-MOV-MO77	2041	C11	1	A	3	GT	MO	O/C	LJ-1 FSC PIT	OPB Q 2Y	MS LINE DRAIN OUTBOARD ISOLATION, RG-01
MS-RV-70ARV	2028	C10	1	C	6	RV	SA	C	RVT	APP I	SAFETY VALVE MS LINE A, RV-02, RG-01
MS-RV-70BRV	2028	E9	1	C	6	RV	SA	C	RVT	APP I	SAFETY VALVE MS LINE D, RV-02, RG-01
MS-RV-70CRV	2028	E9	1	C	6	RV	SA	C	RVT	APP I	SAFETY VALVE MS LINE D, RV-02, RG-01
MS-RV-71ARV	2028	C11	1	B/C	6	RV	AO	C	RVT FSO FSC PIT	APP I RF RF RF	SAFETY RELIEF VALVE MS LINE A, RV-03, RG-01
MS-RV-71BRV	2028	C11	1	B/C	6	RV	AO	C	RVT FSO FSC PIT	APP I RF RF RF	SAFETY RELIEF VALVE MS LINE A, RV-03, RG-01

SYSTEM: MAIN STEAM (MS)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
MS-RV-71CRV	2028	D11	1	B/C	6	RV	AO	C	RVT FSO FSC PIT	APP I RF RF RF	SAFETY RELIEF VALVE MS LINE B, RV-03, RG-01
MS-RV-71DRV	2028	D11	1	B/C	6	RV	AO	C	RVT FSO FSC PIT	APP I RF RF RF	SAFETY RELIEF VALVE MS LINE B, RV-03, RG-01
MS-RV-71ERV	2028	D9	1	B/C	6	RV	AO	C	RVT FSO FSC PIT	APP I RF RF RF	SAFETY RELIEF VALVE MS LINE C, RV-03, RG-01
MS-RV-71FRV	2028	D9	1	B/C	6	RV	AO	C	RVT FSO FSC PIT	APP I RF RF RF	SAFETY RELIEF VALVE MS LINE C, RV-03, RG-01
MS-RV-71GRV	2028	E9	1	B/C	6	RV	AO	C	RVT FSO FSC PIT	APP I RF RF RF	SAFETY RELIEF VALVE MS LINE D, RV-03, RG-01
MS-RV-71HRV	2028	E9	1	B/C	6	RV	AO	C	RVT FSO FSC PIT	APP I RF RF RF	SAFETY RELIEF VALVE MS LINE D, RV-03, RG-01

SYSTEM: NEUTRON MONITORING TRAVERSING INCORE PROBE (NMT)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
NM-CV-CV2	2083	J2	2	A/C	3/8	CK-P	SA	C	LJ-1 COF CCL	OPB CVCM CVCM	N2 PURGE ISOLATION, RG-01, TP-01, TP-06
NM-CV-CV4	2083	J2	2	A/C	3/8	CK-P	SA	C	LJ-1 COF CCL	OPB CVCM CVCM	N2 PURGE ISOLATION, RG-01, TP-01, TP-06
NMT-NVA-104AX	2083	J2	2	D	3/8	SHR	EX	O	EX	2Y	TIP A SHEAR VALVE, RG-01
NMT-NVA-104BX	2083	J2	2	D	3/8	SHR	EX	O	EX	2Y	TIP B SHEAR VALVE, RG-01
NMT-NVA-104CX	2083	J2	2	D	3/8	SHR	EX	O	EX	2Y	TIP C SHEAR VALVE, RG-01
NMT-NVA-104DX	2083	J2	2	D	3/8	SHR	EX	O	EX	2Y	TIP D SHEAR VALVE, RG-01
NMT-NVA-104A	2083	J2	2	A	3/8	BAL	SO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	TIP A BALL VALVE, RG-01, TP-04
NMT-NVA-104B	2083	J2	2	A	3/8	BAL	SO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	TIP B BALL VALVE, RG-01, TP-04

SYSTEM: NEUTRON MONITORING TRAVERSING INCORE PROBE (NMT)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
NMT-NVA-104C	2083	J2	2	A	3/8	BAL	SO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	TIP C BALL VALVE, RG-01, TP-04
NMT-NVA-104D	2083	J2	2	A	3/8	BAL	SO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	TIP D BALL VALVE, RG-01, TP-04

SYSTEM: NUCLEAR BOILER INSTRUMENTATION (NBI) AND VARIOUS OTHER EXCESS FLOW CHECK VALVES

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
NBI-AOV-736AV	2028	C9	1	B	½	GB	AO	O	PIT	2Y	RPV FLANGE LEAKOFF PASSIVE ISOLATION, RG-01
NBI-AOV-737AV	2028	C9	1	B	½	GB	AO	C	PIT	2Y	RPV FLANGE LEAKOFF PASSIVE ISOLATION, RG-01
NBI-CV-10BCV	2026 SH 1	B5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	UPPER CHECK FOR LI-61, RG-01, TP-01
NBI-CV-11BCV	2026 SH 1	B5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	CONDENSING CHAMBER 2A UPPER TO 25-5 RACK, RG-01, TP-01
NBI-CV-12BCV	2026 SH 1	C5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	CONDENSING CHAMBER 2A LOWER TO 25-5 RACK, RG-01, TP-01
NBI-CV-13BCV	2026 SH 1	C5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	CONDENSING CHAMBER 3A TO LITS-73A, RG-01, TP-01
NBI-CV-14BCV	2026 SH 1	D5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	CONDENSING CHAMBER 3A TO 25-5 & 25-5-1 RACK, RG-01, TP-01
NBI-CV-15BCV	2026 SH 1	D5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	LT-52A; LIS-83A & C; LT-61; DPT-65; LIS-101A & B, RG-01, TP-01
NBI-CV-16BCV	2026 SH 1	D5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	LOW SIDE, FT-64T, RG-01, TP-01
NBI-CV-17BCV	2026 SH 1	D5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	LOW SIDE FT-64R; FT-63D, RG-01, TP-01

SYSTEM: NUCLEAR BOILER INSTRUMENTATION (NBI) AND VARIOUS OTHER EXCESS FLOW CHECK VALVES

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
NBI-CV-18BCV	2026 SH 1	E5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	HIGH SIDE FT-63D, RG-01, TP-01
NBI-CV-19BCV	2026 SH 1	G5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	ABOVE CORE PLATE PRESS, RG-01, TP-01
NBI-CV-20BCV	2026 SH 1	F5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	BELOW CORE PLATE TO INSTRUMENT RACK 25-51, RG-01, TP-01
NBI-CV-21BCV	2026 SH 1	C8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	CONDENSING CHAMBER 2B UPPER TO 25-6 RACK, RG-01, TP-01
NBI-CV-22BCV	2026 SH 1	B8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	CONDENSING CHAMBER 2B UPPER TO 25-6 RACK, RG-01, TP-01
NBI-CV-23BCV	2026 SH 1	C8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	CONDENSING CHAMBER 3B LT-70; LITS-73B, RG-01, TP-01
NBI-CV-24BCV	2026 SH 1	D8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	CONDENSING CHAMBER 3B TO 25-6 & 25-6-1 RACKS, RG-01, TP-01
NBI-CV-25BCV	2026 SH 1	D8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	LOW SIDE LIS-83B; LT-52B; LIS-101C & D, RG-01, TP-01
NBI-CV-26BCV	2026 SH 1	D8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	LOW SIDE FT-64L, RG-01, TP-01
NBI-CV-27BCV	2026 SH 1	D8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	LOW SIDE FT-63C; FT-64N, RG-01, TP-01
NBI-CV-28BCV	2026	E8	1	C	1	CK-B	SA	O	CCL	CVCM	HIGH SIDE FT-63C, RG-01, TP-01

SYSTEM: NUCLEAR BOILER INSTRUMENTATION (NBI) AND VARIOUS OTHER EXCESS FLOW CHECK VALVES

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
	SH 1								COF	CVCM	
NBI-CV-29BCV	2026 SH 1	F8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	BELOW CORE PLATE TO INSTRUMENT RACK 25-52, RG-01, TP-01
NBI-CV-30BCV	2026 SH 1	H5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-63B; FT-64B LOW SIDE, RG-01, TP-01
NBI-CV-31BCV	2026 SH 1	H5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-63B; HIGH SIDE, RG-01, TP-01
NBI-CV-32BCV	2026 SH 1	H5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64D; LOW SIDE, RG-01, TP-01
NBI-CV-33BCV	2026 SH 1	H5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64F; LOW SIDE, RG-01, TP-01
NBI-CV-34BCV	2026 SH 1	H5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64K; LOW SIDE, RG-01, TP-01
NBI-CV-35BCV	2026 SH 1	H5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64M; LOW SIDE, RG-01, TP-01
NBI-CV-36BCV	2026 SH 1	H5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64V; LOW SIDE, RG-01, TP-01
NBI-CV-37BCV	2026 SH 1	H5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64X; LOW SIDE, RG-01, TP-01
NBI-CV-38BCV	2026 SH 1	J5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64Z; LOW SIDE, RG-01, TP-01

SYSTEM: NUCLEAR BOILER INSTRUMENTATION (NBI) AND VARIOUS OTHER EXCESS FLOW CHECK VALVES

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
NBI-CV-39BCV	2026 SH 1	J5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64A; FT-63A LOW SIDE, RG-01, TP-01
NBI-CV-40BCV	2026 SH 1	J5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-63A HIGH SIDE, RG-01, TP-01
NBI-CV-41BCV	2026 SH 1	J5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64C LOW SIDE, RG-01, TP-01
NBI-CV-42BCV	2026 SH 1	J5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64E LOW SIDE, RG-01, TP-01
NBI-CV-43BCV	2026 SH 1	J5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64J LOW SIDE, RG-01, TP-01
NBI-CV-44BCV	2026 SH 1	J5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64S LOW SIDE, RG-01, TP-01
NBI-CV-45BCV	2026 SH 1	J5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64U LOW SIDE, RG-01, TP-01
NBI-CV-46BCV	2026 SH 1	J5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64W LOW SIDE, RG-01, TP-01
NBI-CV-47BCV	2026 SH 1	J5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-64Y LOW SIDE, RG-01, TP-01
NBI-CV-48BCV	2028	C8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	VESSEL FLANGE LEAKOFF LINE, RG-01, TP-01
NBI-CV-49BCV	2026		3	C	½	CK-S	SA	C	FSO	RF	REFERENCE LEG LOOP A

SYSTEM: NUCLEAR BOILER INSTRUMENTATION (NBI) AND VARIOUS OTHER EXCESS FLOW CHECK VALVES

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
	SH 1	C2							FSC	RF	INJECTION, ROJ-01, RG-01, TP-01
NBI-CV-50BCV	2026 SH 1	C3	3	C	½	CK-S	SA	C	FSO FSC	RF RF	REFERENCE LEG LOOP A INJECTION, ROJ-01, RG-01, TP-01
NBI-CV-51BCV	2026 SH 1	C11	3	C	½	CK-S	SA	C	FSO FSC	RF RF	REFERENCE LEG LOOP B INJECTION, ROJ-01, RG-01, TP-01
NBI-CV-52BCV	2026 SH 1	C11	3	C	½	CK-S	SA	C	FSO FSC	RF RF	REFERENCE LEG LOOP B INJECTION, ROJ-01, RG-01, TP-01
NBI-CV-55CV	2026 SH 1	G11	3	A/C	3/8	CK-S	SA	O	LT2 FSC FSO	RF RF RF	REFERENCE LEG LOOP 3A OUTBOARD INJECTION, ROJ-02, RG-01,TP-01
NBI-CV-56CV	2026 SH 1	H11	3	A/C	3/8	CK-S	SA	O	LT2 FSC FSO	RF RF RF	REFERENCE LEG LOOP 3B OUTBOARD INJECTION, ROJ-02, RG-01, TP-01
NBI-SOV-SSV738	2026 SH 1	H11	2	B	½	SOV	SOV	C	FSO FST PIT	RF RF 2Y	REFERENCE LEG LOOP A INJECTION, ROJ-01, RG-01, TP-04
NBI-SOV-SSV739	2026 SH 1	C12	2	B	½	SOV	SOV	C	FSO FST PIT	RF RF 2Y	REFERENCE LEG LOOP B INJECTION, ROJ-01, RG-01, TP-04
CS-CV-16BCV	2045 SH 1	A8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	DPIS-43A LOW SIDE EXCESS FLOW, RG-01, TP-01
CS-CV-17BCV	2045	A8	1	C	1	CK-B	SA	O	CCL	CVCM	DPIS-43B LOW SIDE EXCESS FLOW,

SYSTEM: NUCLEAR BOILER INSTRUMENTATION (NBI) AND VARIOUS OTHER EXCESS FLOW CHECK VALVES

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
	SH 1								COF	CVCM	RG-01, TP-01
HPCI-CV-10BCV	2041	E4	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	HIGH SIDE HPCI-DPIS-76; -77; PS-68A; PS-68C, RG-01, TP-01
HPCI-CV-11BCV	2041	E4	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	LOW SIDE HPCI-DPIS-76; DPIS-77; PS-68B; PS-68D, RG-01, TP-01
MS-CV-10BCV	2041	C4	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-51A; DPIS-116A, B, C, & D HIGH SIDE, RG-01, TP-01
MS-CV-11BCV	2041	C4	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-51A; DPIS-116A, B, C, & D LOW SIDE, RG-01, TP-01
MS-CV-12BCV	2041	C4	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-51B; DPIS-117A, B, C, & D LOW SIDE, RG-01, TP-01
MS-CV-13BCV	2041	C4	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-51B; DPIS-117A, B, C, & D HIGH SIDE, RG-01, TP-01
MS-CV-14BCV	2041	C8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-51C; DPIS-118A, B, C, & D HIGH SIDE, RG-01, TP-01
MS-CV-15BCV	2041	C8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-51D; DPIS-119A, B, C, & D HIGH SIDE, RG-01, TP-01
MS-CV-16BCV	2041	C8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-51C; DPIS-118A, B, C, & D LOW SIDE, RG-01, TP-01
MS-CV-17BCV	2041	C8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-51D; DPIS-119A, B, C, & D LOW SIDE, RG-01, TP-01

SYSTEM: NUCLEAR BOILER INSTRUMENTATION (NBI) AND VARIOUS OTHER EXCESS FLOW CHECK VALVES

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RCIC-CV-10BCV	2041	E8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	RCIC-DPIS-84 HIGH SIDE EFCV, RG-01, TP-01
RCIC-CV-11BCV	2041	E8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	RCIC-DPIS-84 LOW SIDE EXCESS FLOW CHECK VALVE, RG-01, TP-01
RCIC-CV-12BCV	2041	E8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	RCIC-DPIS-83 HIGH SIDE EFCV, RG-01, TP-01
RCIC-CV-13BCV	2041	E8	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	RCIC-DPIS-83 LOW SIDE EXCESS FLOW CHECK VALVE, RG-01, TP-01
RR-CV-10CV	2027 SH 1	D5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	PS-128A SENSING LINE, RG-01, TP-01
RR-CV-11CV	2027 SH 1	D5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	PS-128A SENSING LINE, RG-01, TP-01
RR-CV-12CV	2027 SH 1	C5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	DPT-111A LOW SIDE, RG-01, TP-01
RR-CV-13CV	2027 SH 1	C5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	DPT-111A HIGH SIDE, RG-01, TP-01
RR-CV-15CV	2027 SH 1	F5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	PT-25A SENSING LINE, RG-01, TP-01
RR-CV-16CV	2027 SH 1	F5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	PT-24A SENSING LINE, RG-01, TP-01
RR-CV-17CV	2027	C5	1	C	1	CK-B	SA	O	CCL	CVCM	FT-110A AND B HIGH SIDE, RG-01,

SYSTEM: NUCLEAR BOILER INSTRUMENTATION (NBI) AND VARIOUS OTHER EXCESS FLOW CHECK VALVES

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
	SH 1								COF	CVCM	TP-01
RR-CV-18CV	2027 SH 1	C5	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-110A AND B LOW SIDE, RG-01, TP-01
RR-CV-27CV	2027 SH 2	C6	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	DPT-111B LOW SIDE, RG-01, TP-01
RR-CV-28CV	2027 SH 2	C6	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	DPT-111B HIGH SIDE, RG-01, TP-01
RR-CV-30CV	2027 SH 2	G6	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	PT-25B REACTOR RECIRC PUMP 1B SEAL CAVITY LINE, RG-01, TP-01
RR-CV-31CV	2027 SH 2	G6	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	PT-24B SENSING LINE, RG-01, TP-01
RR-CV-32CV	2027 SH 2	B6	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-110C AND D HIGH SIDE, RG-01, TP-01
RR-CV-33CV	2027 SH 2	B6	1	C	1	CK-B	SA	O	CCL COF	CVCM CVCM	FT-110C AND D LOW SIDE, RG-01, TP-01

SYSTEM: PRIMARY CONTAINMENT (PC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
PC-AOV-237AV	2022 SH 1	F9	2	A	24	BTF	AO	C	LJ-1 FSC FST PIT	RF Q Q 2Y	SUPPRESSION CHAMBER INLET OUTBOARD ISOLATION, RG-01, TP-04
PC-AOV-238AV	2022 SH 1	E8	2	A	24	BTF	AO	C	LJ-1 FSC FST PIT	RF Q Q 2Y	DRYWELL INLET OUTBOARD ISOLATION, RG-01, TP-04
PC-AOV-243AV	2022 SH 1	G10	2	A	20	BTF	AO	C	LJ-1 FSO FST PIT	RF Q Q 2Y	SUPPRESSION CHAMBER VACUUM RELIEF, RG-01, TP-04
PC-AOV-244AV	2022 SH 1	H10	2	A	20	BTF	AO	C	LJ-1 FSO FST PIT	RF Q Q 2Y	SUPPRESSION CHAMBER VACUUM RELIEF, RG-01, TP-04
PC-AOV-245AV	2022 SH 1	F1	2	A	24	BTF	AO	C	LJ-1 FSC FST PIT	RF Q Q 2Y	SUPPRESSION CHAMBER EXHAUST OUTBOARD ISOLATION, RG-01, TP-04
PC-AOV-246AV	2022 SH 1	C2	2	A	24	BTF	AO	C	LJ-1 FSC FST PIT	RF Q Q 2Y	DRYWELL EXHAUST OUTBOARD ISOLATION, RG-01, TP-04

SYSTEM: PRIMARY CONTAINMENT (PC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
PC-AOV-247AV	2022 SH 1	D3	2	A	0.5	GL	AO	C	LJ-1 FSC FST	OPB Q Q	DRYWELL EXHAUST OUTBOARD ISOLATION, RG-01, TP-04
PC-AOV-248AV	2022 SH 1	D3	2	A	0.5	GL	AO	C	LJ-1 FSC FST	OPB Q Q	DRYWELL EXHAUST OUTBOARD ISOLATION, RG-01, TP-04
PC-AOV-NRV20	2027 SH 1	H7	2	A/C	20	CK-S	AO	C	LT-2 PIT VBT FSC FSO	2Y 2Y RF 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08
PC-AOV-NRV21	2027 SH 1	H7	2	A/C	20	CK-S	AO	C	LT-2 PIT VBT FSC FSO	2Y 2Y RF 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08
PC-AOV-NRV22	2027 SH 1	H7	2	A/C	20	CK-S	AO	C	LT-2 VBT PIT FSC FSO	2Y RF 2Y 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08
PC-AOV-NRV23	2027 SH 1	H7	2	A/C	20	CK-S	AO	C	LT-2 VBT PIT FSC	2Y RF 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08

SYSTEM: PRIMARY CONTAINMENT (PC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
									FSO	2Y	
PC-AOV-NRV24	2027 SH 1	H9	2	A/C	20	CK-S	AO	C	LT-2 VBT PIT FSC FSO	2Y RF 2Y 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08
PC-AOV-NRV25	2027 SH 1	H9	2	A/C	20	CK-S	AO	C	LT-2 VBT PIT FSC FSO	2Y RF 2Y 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08
PC-AOV-NRV26	2027 SH 2	H3	2	A/C	20	CK-S	AO	C	LT-2 VBT PIT FSC FSO	2Y RF 2Y 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08
PC-AOV-NRV27	2027 SH 2	H3	2	A/C	20	CK-S	AO	C	LT-2 VBT PIT FSC FSO	2Y RF 2Y 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08
PC-AOV-NRV28	2027 SH 2	H4	2	A/C	20	CK-S	AO	C	LT-2 VBT PIT FSC FSO	2Y RF 2Y 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08

SYSTEM: PRIMARY CONTAINMENT (PC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
PC-AOV-NRV29	2027 SH 2	H4	2	A/C	20	CK-S	AO	C	LT-2 VBT PIT FSC FSO	2Y RF 2Y 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08
PC-AOV-NRV30	2027 SH 2	H5	2	A/C	20	CK-S	AO	C	LT-2 VBT PIT FSC FSO	2Y RF 2Y 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08
PC-AOV-NRV31	2027 SH 2	H6	2	A/C	20	CK-S	AO	C	LT-2 VBT PIT FSC FSO	2Y RF 2Y 2Y 2Y	SUPPRESSION CHAMBER TO DRYWELL VACUUM BREAKER, RG-01, TP-08
PC-CV-13CV	2022 SH 1	G10	2	A/C	20	CK-D	SA	C	LJ-1 VBT FSO FSC	RF 2Y 2Y 2Y	SUPPRESSION CHAMBER VACUUM RELIEF, RG-01, TP-08
PC-CV-14CV	2022 SH 1	H10	2	A/C	20	CK-D	SA	C	LJ-1 VBT FSO FSC	RF 2Y 2Y 2Y	SUPPRESSION CHAMBER VACUUM RELIEF, RG-01, TP-08
PC-CV-21CV	2022 SH 2	E1	2	A/C	1/4	CK-S	SA	O/C	LJ-1 COF	OPB CVCM	N2 SUPPLY TO H_2O_2 MONITORS, RG-01, TP-01

SYSTEM: PRIMARY CONTAINMENT (PC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
									CCL	CVCM	
PC-CV-22CV	2022 SH 2	D3	2	A/C	1/4	CK-S	SA	O/C	LJ-1 COF CCL	OPB CVCM CVCM	H2 CAL SUPPLY TO H_2O_2 MONITORS, RG-01, TP-01
PC-CV-23CV	2022 SH 2	C3	2	A/C	1/4	CK-S	SA	O/C	LJ-1 COF CCL	OPB CVCM CVCM	O2 SUPPLY TO H_2O_2 MONITORS, RG-01, TP-01
PC-CV-25CV	2022 SH 2	E5	2	A/C	1/4	CK-S	SA	O/C	LJ-1 COF CCL	OPB CVCM CVCM	N2 SUPPLY TO H_2O_2 MONITORS, RG-01, TP-01
PC-CV-26CV	2022 SH 2	D6	2	A/C	1/4	CK-S	SA	O/C	LJ-1 COF CCL	OPB CVCM CVCM	H2 CAL SUPPLY TO H_2O_2 MONITORS, RG-01, TP-01
PC-CV-27CV	2022 SH 2	C6	2	A/C	1/4	CK-S	SA	O/C	LJ-1 COF CCL	OPB CVCM CVCM	O2 SUPPLY TO H_2O_2 MONITORS, RG-01, TP-01
PC-CV-33CV	2027 SH 1	A5	2	A/C	3/8	CK-S	SA	C	LJ-1 COF CCL	OPB CVCM CVCM	N2 SUPPLY TO RR-AOV-741AV, RG-01, TP-01
PC-CV-34CV	2027 SH 1	A4	2	A/C	3/8	CK-S	SA	C	LJ-1 COF CCL	OPB CVCM CVCM	N2 SUPPLY TO RR-AOV-741AV, RG-01, TP-01
PC-CV-35CV	2028	D8	2	A/C	3/8	CK	SA	C	LJ-1	OPB	X-45D PASSIVE ISOLATION

SYSTEM: PRIMARY CONTAINMENT (PC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
PC-CV-36CV	2028	D7	2	A/C	3/8	CK	SA	C	LJ-1	OPB	X-45D PASSIVE ISOLATION
PC-MOV-230MV	2022 SH 1	F2	2	A	24	BTF	MO	C	LJ-1 FSC PIT	RF Q 2Y	SUPPRESSION CHAMBER EXHAUST INBOARD ISOLATION, RG-01
PC-MOV-231MV	2022 SH 1	C2	2	A	24	BTF	MO	C	LJ-1 FSC PIT	RF Q 2Y	DRYWELL EXHAUST INBOARD ISOLATION, RG-01
PC-MOV-232MV	2022 SH 1	E8	2	A	24	BTF	MO	C	LJ-1 FSC PIT	RF Q 2Y	DRYWELL INLET INBOARD ISOLATION, RG-01
PC-MOV-233MV	2022 SH 1	E8	2	A	24	BTF	MO	C	LJ-1 FSC PIT	RF Q 2Y	SUPPRESSION CHAMBER INLET INBOARD ISOLATION, RG-01
PC-MOV-305MV	2022 SH 1	G2	2	A	2	GT	MO	C	LJ-1 FSC PIT	OPB Q 2Y	PC-MOV-23OMV BYPASS, RG-01
PC-MOV-306MV	2022 SH 1	C2	2	A	2	GT	MO	C	LJ-1 FSC PIT	OPB Q 2Y	PC-MOV-231MV BYPASS, RG-01
PC-MOV-1301MV	2084	C9	2	A	1	GT	MO	O	LJ-1 FSC PIT	OPB Q 2Y	SUPPRESSION CHAMBER ISOLATION SYSTEM B, RG-01
PC-MOV-1302MV	2084	C8	2	A	1	GT	MO	O	LJ-1	OPB	SUPPRESSION CHAMBER

SYSTEM: PRIMARY CONTAINMENT (PC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
									FSC PIT	Q 2Y	ISOLATION SYSTEM B, RG-01
PC-MOV-1303MV	2084	E2	2	A	1	GT	MO	C	LJ-1 FSC PIT	OPB Q 2Y	SUPPRESSION CHAMBER ISOLATION SYSTEM A, RG-01
PC-MOV-1304MV	2084	E3	2	A	1	GT	MO	C	LJ-1 FSC PIT	OPB Q 2Y	SUPPRESSION CHAMBER ISOLATION SYSTEM A, RG-01
PC-MOV-1305MV	2084	C2	2	A	1	GT	MO	C	LJ-1 FSC PIT	OPB Q 2Y	DRYWELL ISOLATION SYSTEM A, RG-01
PC-MOV-1306MV	2084	C3	2	A	1	GT	MO	C	LJ-1 FSC PIT	OPB Q 2Y	DRYWELL ISOLATION SYSTEM A, RG-01
PC-MOV-1308MV	2084	G9	2	A	1	GT	MO	C	LJ-1 FSC PIT	OPB Q 2Y	BLEED ISOLATION FOR SUPPRESSION CHAMBER, RG-01
PC-MOV-1310MV	2084	B9	2	A	1	GT	MO	C	LJ-1 FSC PIT	OPB Q 2Y	BLEED ISOLATION FOR DRYWELL, RG-01
PC-MOV-1311MV	2084	C8	2	A	1	GT	MO	O	LJ-1 FSC PIT	OPB Q 2Y	DRYWELL DILUTION SUPPLY ISOLATION SYSTEM B, RG-01

SYSTEM: PRIMARY CONTAINMENT (PC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
PC-MOV-1312MV	2084	C9	2	A	1	GT	MO	O	LJ-1 FSC PIT	OPB Q 2Y	DRYWELL DILUTION SUPPLY ISOLATION SYSTEM B, RG-01

SYSTEM: RADIATION MONITORING (RMV)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RMV-AOV-10AV	2022 SH 1	D3	2	A	3/4	GB	AO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	RM-4 CONTAINMENT ISOLATION, INBOARD, RG-01, TP-04
RMV-AOV-11AV	2022 SH 1	D2	2	A	3/4	GB	AO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	RM-4 CONTAINMENT ISOLATION, OUTBOARD, RG-01, TP-04
RMV-AOV-12AV	2022 SH 1	E3	2	A	3/4	GB	AO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	RM-4 CONTAINMENT ISOLATION, INBOARD, RG-01, TP-04
RMV-AOV-13AV	2022 SH 1	E2	2	A	3/4	GB	AO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	RM-4 CONTAINMENT ISOLATION, OUTBOARD, RG-01, TP-04

SYSTEM: RADIOACTIVE WASTE (RW)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RW-AOV-AO82	2038	G5	2	A	3	GT	AO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	DRYWELL FLOOR DRAIN SUMP DISCHARGE, RG-01, TP-04
RW-AOV-AO83	2038	G5	2	A	3	GT	AO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	DRYWELL FLOOR DRAIN SUMP DISCHARGE, RG-01, TP-04
RW-AOV-AO94	2028	G11	2	A	3	GT	AO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	DRYWELL EQUIPMENT DRAIN SUMP DISCHARGE, RG-01, TP-04
RW-AOV-AO95	2028	G12	2	A	3	GT	AO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	DRYWELL EQUIPMENT DRAIN SUMP DISCHARGE, RG-01, TP-04
RW-CV-58CV	2005 SH 2	F10	A	C	2	CK-S	SA	C	FSO FSC	Q Q	Z SUMP PUMP A DISCHARGE CHECK, RG-01
RW-CV-59CV	2005 SH 2	F10	A	C	2	CK-S	SA	C	FSO FSC	Q Q	Z SUMP PUMP B DISCHARGE CHECK, RG-01
OG-CV-8CV	2037	D9	A	C	1/2	CK-P	SA	C	COF CCD	CVCM CVCM	OFFGAS HOLD-UP DRAIN LINE VENT, RG-01, TP-01

SYSTEM: RADIOACTIVE WASTE (RW)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
OG-CV-12CV	2037	D9	A	C	1/2	CK-P	SA	C	COF CCD	CVCM CVCM	OFFGAS HOLD-UP DRAIN LINE VENT, RG-01, TP-01

SYSTEM: REACTOR CORE ISOLATION COOLING (RCIC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RCIC-AOV-AO34	2041	H10	2	B	1	GB	AO	O	FSC FST PIT	Q Q 2Y	RCIC STEAM LINE DRIPLEG DRAIN RG-01, TP-04
RCIC-CV-10CV	2043	H5	2	C	6	CK-S	SA	C	COF CCL	CVCM CVCM	ECST SUPPLY TO RCIC PUMP, RG-01
RCIC-CV-11CV	2043	H10	2	C	6	CK-S	SA	C	COD CCD	CVCM CVCM	RCIC SUPPLY FROM SUPPRESSION CHAMBER, RG-01
RCIC-CV-12CV	2043	G9	2	C	2	CK-S	SA	C	COF CCL	CVCM CVCM	VACUUM PUMP DISCHARGE TO SUPPRESSION CHAMBER, RG-01, TP-01
RCIC-CV-13CV	2043	D5	2	C	2	CK-P	SA	C	COF CCL	CVCM CVCM	MINIMUM FLOW LINE, RG-01
RCIC-CV-15CV	2043	D8	2	A/C	8	CK-S	SA	C	LJ-1 COF CCL	OPB CVCM CVCM	RCIC TURBINE EXHAUST TO SUPPRESSION CHAMBER, RG-01
RCIC-CV-16CV	2043	F9	2	C	2	CK-S	SA	C	COF CCL	CVCM CVCM	VACUUM PUMP DISCHARGE TO SUPPRESSION CHAMBER, RG-01, TP-01
RCIC-CV-18CV	2043	A8	2	C	2	CK-P	SA	C	COF CCF	CVCM CVCM	CONDENSATE SUPPLY TO RCIC PRESSURE MAINTENANCE, RG-01,

SYSTEM: REACTOR CORE ISOLATION COOLING (RCIC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NOR M POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
									CCD/ CCR	CVCM	TP-01
RCIC-CV-19CV	2043	A8	A	C	2	CK-P	SA	C	COF CCF	CVCM CVCM	CONDENSATE SUPPLY TO RCIC PRESSURE MAINTENANCE, RG-01, TP-01
RCIC-CV-20CV	2043	H8	A	C	2	CK-P	SA	C	COD CCD	CVCM CVCM	RCIC CONDENSATE PUMP DISCHARGE, RG-01, TP-01
RCIC-CV-21CV	2043	H7	2	C	2	CK-P	SA	C	COD CCD	CVCM CVCM	RCIC CONDENSATE PUMP DISCHARGE, RG-01
RCIC-CV-22CV	2043	F9	2	C	1 ½	CK-L	SA	C	COD CCD	CVCM CVCM	RCIC VACUUM BREAKER, RG-01
RCIC-CV-23CV	2043	F10	2	C	1 ½	CK-L	SA	C	COD CCD	CVCM CVCM	RCIC VACUUM BREAKER, RG-01
RCIC-CV-24CV	2043	F9	2	C	1 ½	CK-L	SA	C	COD CCD	CVCM CVCM	RCIC VACUUM BREAKER, RG-01
RCIC-CV-25CV	2043	F10	2	C	1 ½	CK-L	SA	C	COD CCD	CVCM CVCM	RCIC VACUUM BREAKER, RG-01
RCIC-CV-26CV	2043	B8	1	A/C	4	CK-S	SA	O	LJ-1 FSO FSC	RF RF RF	INJECTION CHECK VALVE, ROJ-09, RG-01

SYSTEM: REACTOR CORE ISOLATION COOLING (RCIC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
									PIT	2Y	
RCIC-HOV-HO11	2041	G8	A	B	2 ½	GL	HO	C	SKID	Q	RCIC TU GOV V, RG-01, TP-05
RCIC-MOV-MO14	2041	G8	2	B	2 x 3	GL	HO	C	SKID	Q	RCIC TU TRIP & THROTTLE V, RG-01, TP-05
RCIC-MOV-MO15	2041	D7	1	A	3	GT	MO	O	LJ-1 FSC PIT	OPB Q/CS 2Y	RCIC STEAM INBOARD ISOLATION, CSJ-10, RG-01
RCIC-MOV-MO16	2041	D9	1	A	3	GT	MO	O	LJ-1 FSC PIT	OPB Q 2Y	RCIC STEAM OUTBOARD ISOLATION, RG-01
RCIC-MOV-MO18	2043	H4	2	B	6	GT	MO	O	FSO FSC PIT	Q Q 2Y	RCIC SUPPLY FROM CONDENSATE STORAGE, RG-01
RCIC-MOV-MO20	2043	B7	2	B	4	GT	MO	O	PIT	2Y	RCIC PUMP DISCHARGE, RG-01
RCIC-MOV-MO21	2043	B8	2	B	4	GT	MO	C	FSO PIT	Q 2Y	RCIC INJECTION TO REACTOR, RG-01
RCIC-MOV-MO27	2043	C7	2	B	2	GB	MO	C	FSO FSC PIT	Q Q 2Y	RCIC PUMP MINIMUM FLOW RECIRCULATION TO SUPPRESSION CHAMBER, RG-01

SYSTEM: REACTOR CORE ISOLATION COOLING (RCIC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NOR M POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RCIC-MOV-MO30	2043	D1	2	B	4	GB	MO	C	PIT	2Y	RCIC TEST RETURN ROOT, PASSIVE, RG-01
RCIC-MOV-MO33	2043	E1	A	B	4	GT	MO	C	PIT	2Y	RCIC TEST RETURN SHUTOFF, PASSIVE, RG-01
RCIC-MOV-MO41	2043	H10	2	B	6	GT	MO	C	FSO FSC PIT	Q Q 2Y	RCIC SUPPLY FROM SUPPRESSION CHAMBER, RG-01
RCIC-MOV-MO131	2041	G9	2	B	3	GB	MO	C	FSO PIT	Q 2Y	RCIC STEAM SUPPLY TO RCIC TURBINE, RG-01
RCIC-MOV-MO132	2043	E4	2	B	2	GB	MO	C	FSO PIT	Q 2Y	AUXILIARY COOLING SUPPLY, RG-01
RCIC-RD-S240	2043	D6	2	D	8	RD	SA	C	RD	5Y	EXHAUST LINE RUPTURE DISC, RG-01
RCIC-RV-10RV	2043	G5	2	C	1	RV	SA	C	RVT	APP I	RCIC PUMP SUCTION RELIEF, RG-01
RCIC-RV-11RV	2043	G6	2	C	1	RV	SA	C	RVT	APP I	RCIC AUXILIARY COOLING SYSTEM, RG-01
RCIC-V-37	2043	D9	2	A/C	8	S-CK	MA	O	LJ-1 COF CCL	OPB CVCM CVCM	RCIC TURBINE EXHAUST TO SUPPRESSION CHAMBER ISOLATION, RG-01

SYSTEM: REACTOR EQUIPMENT COOLING (REC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
REC-CV-10CV	2031 SH 2	F2	3	C	8	CK-T	SA	O	FSO FSC	Q Q	REC-P-A DISCHARGE, RG-01
REC-CV-11CV	2031 SH 2	F3	3	C	8	CK-T	SA	O	FSO FSC	Q Q	REC-P-B DISCHARGE, RG-01
REC-CV-12CV	2031 SH 2	F4	3	C	8	CK-T	SA	O	FSO FSC	Q Q	REC-P-C DISCHARGE, RG-01
REC-CV-13CV	2031 SH 2	F5	3	C	8	CK-T	SA	O	FSO FSC	Q Q	REC-P-D DISCHARGE, RG-01
REC-CV-16CV	2031 SH 2	H2	3	C	12	CK-S	SA	O	COF CCF	CVCM CVCM	NON-CRITICAL HEADER RETURN TO REC PUMPS, RG-01, TP-01, TP-06
REC-MOV-694MV	2031 SH 2	H2	3	B	4	GT	MO	O	PIT	2Y	PASSIVE CRITICAL LOOP RETURN CROSSTIE, RG-01
REC-MOV-695MV	2031 SH 2	C5	3	B	4	GT	MO	O	PIT	2Y	PASSIVE CRITICAL LOOP SUPPLY CROSSTIE, RG-01
REC-MOV-697MV	2031 SH 2	H3	3	B	6	GT	MO	O	FSO PIT	Q 2Y	NORTH CRITICAL LOOP RETURN, RG-01
REC-MOV-698MV	2031 SH 2	H1	3	B	6	GT	MO	O	FSO PIT	Q 2Y	SOUTH CRITICAL LOOP RETURN, RG-01
REC-MOV-700MV	2031 SH 2	B2	3	B	10	GT	MO	O	FSC PIT	Q 2Y	NON-CRITICAL LOOP SUPPLY SHUTOFF, RG-01

SYSTEM: REACTOR EQUIPMENT COOLING (REC)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
REC-MOV-702MV	2031 SH 2	A4	2	A	8	GT	MO	O	LJ-1 FSC PIT	OPB Q 2Y	DRYWELL SUPPLY ISOLATION VALVE, RG-01
REC-MOV-709MV	2031 SH 1	G3	2	A	8	GT	MO	O	LJ-1 FSC PIT	OPB Q 2Y	DRYWELL RETURN ISOLATION VALVE, RG-01
REC-MOV-711MV	2031 SH 2	D4	3	B	6	GT	MO	O	FSC FSO PIT	Q Q 2Y	NORTH CRITICAL LOOP SUPPLY, RG-01
REC-MOV-712MV	2031 SH 2	D1	3	B	12	BFL	MO	O	FSC PIT	Q 2Y	REC HEAT EXCHANGER A OUTLET, RG-01
REC-MOV-713MV	2031 SH 2	C1	3	B	12	BFL	MO	O	FSC PIT	Q 2Y	REC HEAT EXCHANGER B OUTLET, RG-01
REC-MOV-714MV	2031 SH 2	C5	3	B	6	GT	MO	O	FSC FSO PIT	Q Q 2Y	SOUTH CRITICAL LOOP SUPPLY, RG-01
REC-MOV-1329MV	2031 SH 2	B3	3	B	8	GT	MO	O	FSC PIT	Q 2Y	AUXILIARY RADIOACTIVE WASTE BUILDING SUPPLY, RG-01

SYSTEM: REACTOR FEEDWATER (RF)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RF-CV-13CV	2044	B9	1	A/C	18	CK-S	SA	O	LJ-1 FSC FSO	RF RF OP	FEEDWATER LINE B TO REACTOR OUTBOARD, ROJ-03, RG-01, TP-01
RF-CV-14CV	2044	C10	1	A/C	18	CK-S	SA	O	LJ-1 FSO FSC	RF OP RF	FEEDWATER LINE B TO REACTOR INBOARD, ROJ-03, RG-01
RF-CV-15CV	2043	A9	1	A/C	18	CK-S	SA	O	LJ-1 FSC FSO	RF RF OP	FEEDWATER LINE A TO REACTOR OUTBOARD, ROJ-03, RG-01, TP-01
RF-CV-16CV	2043	C10	1	A/C	18	CK-S	SA	O	LJ-1 FSO FSC	RF OP RF	FEEDWATER LINE A TO REACTOR INBOARD, ROJ-03, RG-01

SYSTEM: REACTOR RECIRCULATION (RR)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RR-AOV-740AV	2027 SH 1	A3	1	A	3/4	GB	AO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	SP-1 OUTBOARD ISOLATION, RG-01, TP-04
RR-AOV-741AV	2027 SH 1	A7	1	A	3/4	GB	AO	O	LJ-1 FSC FST PIT	OPB Q Q 2Y	SP-1 INBOARD ISOLATION, RG-01, TP-04
RR-MOV-MO53A	2027 SH 1	B7	1	B	28	GT	MO	O	FSC PIT	CS 2Y	RR PUMP A DISCHARGE CSJ-04, RG-01
RR-MOV-MO53B	2027 SH 1	C4	1	B	28	GT	MO	O	FSC PIT	CS 2Y	RR PUMP B DISCHARGE CSJ-04, RG-01

SYSTEM: REACTOR WATER CLEANUP (RWCU)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RWCU-CV-15CV	2042 SH 1	C4	1	A/C	4	CK-S	SA	O	LJ-1 FSC FSO	RF RF RF	RWCU RETURN TO REACTOR VESSEL, ROJ-04, RG-01, TP-01, TP-06
RWCU-MOV-MO15	2042 SH 1	E2	1	A	6	GT	MO	O	LJ-1 FSC PIT	OPB RF 2Y	RWCU SUPPLY INBOARD ISOLATION, ROJ-05, RG-01
RWCU-MOV-MO18	2042 SH 1	B4	1	A	6	GT	MO	O	LJ-1 FSC PIT	OPB RF 2Y	RWCU SUPPLY OUTBOARD ISOLATION, ROJ-05, RG-01

SYSTEM: RESIDUAL HEAT REMOVAL (RHR)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RHR-CV-10CV	2040 SH 1	F3	2	C	3	CK-S	SA	C	COD CCD	CVCM CVCM	RHR PUMP A MINIMUM FLOW, RG-01
RHR-CV-11CV	2040 SH 2	F8	2	C	3	CK-S	SA	C	COD CCD	CVCM CVCM	RHR PUMP B MINIMUM FLOW, RG-01
RHR-CV-12CV	2040 SH 1	H6	2	C	3	CK-S	SA	C	COD CCD	CVCM CVCM	RHR PUMP C MINIMUM FLOW, RG-01
RHR-CV-13CV	2040 SH 2	H7	2	C	3	CK-S	SA	C	COD CCD	CVCM CVCM	RHR PUMP D MINIMUM FLOW, RG-01
RHR-CV-14CV	2040 SH 1	F5	2	C	16	CK-T	SA	C	FSO FSC	Q Q	RHR PUMP A DISCHARGE, RG-01
RHR-CV-15CV	2040 SH 1	F8	2	C	16	CK-T	SA	C	FSO FSC	Q Q	RHR PUMP B DISCHARGE, RG-01
RHR-CV-16CV	2040 SH 1	H5	2	C	16	CK-T	SA	C	FSO FSC	Q Q	RHR PUMP C DISCHARGE, RG-01
RHR-CV-17CV	2040 SH 1	H8	2	C	16	CK-T	SA	C	FSO FSC	Q Q	RHR PUMP D DISCHARGE, RG-01
RHR-CV-18CV	2040 SH 2	A9	A	C	4	CK-S	SA	C	COF CCF	CVCM CVCM	RHR LOOP B OUTBOARD PRESSURE MAINTENANCE SUPPLY, RG-01, TP-01
RHR-CV-19CV	2040	A9	2	C	4	CK-S	SA	C	COF	CVCM	RHR LOOP B INBOARD PRESSURE

SYSTEM: RESIDUAL HEAT REMOVAL (RHR)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
	SH 2								CCF CCD/ CCR	CVCM CVCM	MAINTENANCE SUPPLY, RG-01, TP-01
RHR-CV-24CV	2040 SH 2	C7	A	C	4	CK-S	SA	C	COF CCF	CVCM CVCM	RHR LOOP A OUTBOARD PRESSURE MAINTENANCE SUPPLY, RG-01, TP-01
RHR-CV-25CV	2040 SH 1	C7	2	C	4	CK-S	SA	C	COF CCF CCD/ CCR	CVCM CVCM CVCM	RHR LOOP A INBOARD PRESSURE MAINTENANCE SUPPLY, RG-01, TP-01
RHR-CV-26CV	2040 SH 1	B10	1	A/C	24	CK-S	SA	C	LT-2 FSO FSC PIT	OPB RF RF RF	LOOP A INJECTION LINE TESTABLE CHECK, PRESSURE ISOLATION VALVE, ROJ-11, RV-05, RG-01
RHR-CV-27CV	2040 SH 1	B4	1	A/C	24	CK-S	SA	C	LT-2 FSO FSC PIT	OPB RF RF RF	LOOP B INJECTION LINE TESTABLE CHECK, PRESSURE ISOLATION VALVE, ROJ-11, RV-05, RG-01
RHR-MOV-MO12A	2040 SH 1	E3	2	B	16	GT	MO	O	FSO PIT	Q 2Y	RHR HEAT EXCHANGER A OUTLET, RG-01
RHR-MOV-MO12B	2040 SH 2	F10	2	B	16	GT	MO	O	FSO PIT	Q 2Y	RHR HEAT EXCHANGER B OUTLET, RG-01
RHR-MOV-MO13A	2040 SH 1	F10	2	B	20	GT	MO	O	FSO FSC	Q Q	RHR PUMP A SUCTION FROM SUPPRESSION CHAMBER, RG-01

SYSTEM: RESIDUAL HEAT REMOVAL (RHR)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
									PIT	2Y	
RHR-MOV-MO13B	2040 SH 2	F4	2	B	20	GT	MO	O	FSO FSC FIT	Q Q 2Y	RHR PUMP B SUCTION FROM SUPPRESSION CHAMBER, RG-01
RHR-MOV-MO13C	2040 SH 1	F10	2	B	20	GT	MO	O	FSO FSC PIT	Q Q 2Y	RHR PUMP C SUCTION FROM SUPPRESSION CHAMBER, RG-01
RHR-MOV-MO13D	2040 SH 2	F3	2	B	20	GT	MO	O	FSO FSC PIT	Q Q 2Y	RHR PUMP D SUCTION FROM SUPPRESSION CHAMBER, RG-01
RHR MOV-MO15A	2040 SH 1	F9	2	B	20	GT	MO	C	FSC PIT	Q 2Y	RHR PUMP A SDC SUCTION, RG-01
RHR-MOV-MO15B	2040 SH 2	F4	2	B	20	GT	MO	C	FSC PIT	Q 2Y	RHR PUMP B SDC SUCTION, RG-01
RHR-MOV-MO15C	2040 SH 1	G8	2	B	20	GT	MO	C	FSC PIT	Q 2Y	RHR PUMP C SDC SUCTION, RG-01
RHR-MOV-MO15D	2040 SH 2	G5	2	B	20	GT	MO	C	FSC PIT	Q 2Y	RHR PUMP D SDC SUCTION, RG-01
RHR-MOV-MO16A	2040 SH 1	E7	2	B	4	GT	MO	O	FSO FSC PIT	Q Q 2Y	PUMP A AND C MINIMUM FLOW, RG-01
RHR-MOV-MO16B	2040	E7	2	B	4	GT	MO	O	FSO	Q	PUMP B AND D MIMINUM FLOW,

SYSTEM: RESIDUAL HEAT REMOVAL (RHR)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
	SH 2								FSC PIT	Q 2Y	RG-01
RHR-MOV-MO17	2040 SH 1	C8	1	A	20	GT	MO	C	LJ-1 LT-2 FSC PIT	OPB PB CS 2Y	RHR SDC SUPPLY OUTBOARD PRESSURE ISOLATION VALVE, CSJ-05, RV-05, RG-01
RHR-MOV-MO18	2040 SH 1	C10	1	A	20	GT	MO	C	LT-2 FSC PIT	OPB CS 2Y	RHR SDC SUPPLY INBOARD PRESSURE ISOLATION VALVE, CSJ-05, RV-05, RG-01
RHR-MOV-MO20	2040 SH 1	H3	2	B	20	GT	MO	C	PIT	2Y	RHR PASSIVE CROSSHEADER SHUTOFF, RG-01
RHR-MOV-MO25A	2040 SH 1	B8	1	A	24	GT	MO	C	LJ-1 LT-2 FSO FSC PIT	OPB PB Q Q 2Y	RHR LOOP A INJECTION INBOARD ISOLATION, RV-05, RG-01
RHR-MOV-MO25B	2040 SH 2	B5	1	A	24	GT	MO	C	LJ-1 LT-2 FSO FSC PIT	OPB PB Q Q 2Y	RHR LOOP B INJECTION INBOARD ISOLATION, RV-05, RG-01
RHR-MOV-MO26A	2040	A7	2	B	10	GT	MO	C	FSO	Q	DRYWELL SPRAY LOOP A

SYSTEM: RESIDUAL HEAT REMOVAL (RHR)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
	SH 1								FSC PIT	Q 2Y	OUTBOARD ISOLATION, RG-01
RHR-MOV-MO26B	2040 SH 2	B6	2	B	10	GT	MO	C	FSO FSC PIT	Q Q 2Y	DRYWELL SPRAY LOOP B OUTBOARD ISOLATION, RG-01
RHR-MOV-MO27A	2040 SH 1	B8	2	B	24	ANG	MO	O	FSO PIT	Q 2Y	LOOP A INJECTION OUTBOARD THROTTLE, RG-01
RHR-MOV-MO27B	2040 SH 2	B6	2	B	24	ANG	MO	O	FSO PIT	Q 2Y	LOOP B INJECTION OUTBOARD THROTTLE, RG-01
RHR-MOV-MO31A	2040 SH 1	A8	2	A	10	GT	MO	C	LJ-1 FSO FSC PIT	OPB Q Q 2Y	DRYWELL SPRAY LOOP A INBOARD ISOLATION, RG-01
RHR-MOV-MO31B	2040 SH 2	B5	2	A	10	GT	MO	C	LJ-1 FSO FSC PIT	OPB Q Q 2Y	DRYWELL SPRAY LOOP B INBOARD ISOLATION, RG-01
RHR-MOV-MO34A	2040 SH 1	E7	2	B	18	GB	MO	C	FSO FSC PIT	Q Q 2Y	SUPPRESSION CHAMBER COOLING LOOP A INBOARD THROTTLE, RG-01
RHR-MOV-MO34B	2040 SH 2	E6	2	B	18	GB	MO	C	FSO FSC PIT	Q Q 2Y	SUPPRESSION CHAMBER COOLING LOOP B INBOARD THROTTLE, RG-01

SYSTEM: RESIDUAL HEAT REMOVAL (RHR)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RHR-MOV-MO38A	2040 SH 1	D9	2	A	6	GB	MO	C	LJ-1 FSO FSC PIT	OPB Q Q 2Y	SUPPRESSION CHAMBER SPRAY LOOP A INBOARD THROTTLE, RG-01
RHR-MOV-MO38B	2040 SH 2	D6	2	A	6	GB	MO	C	LJ-1 FSO FSC PIT	OPB Q Q 2Y	SUPPRESSION CHAMBER SPRAY LOOP B INBOARD THROTTLE, RG-01
RHR-MOV-MO39A	2040 SH 1	D6	2	B	18	GT	MO	C	FSO FSC PIT	Q Q 2Y	SUPPRESSION CHAMBER COOLING LOOP A OUTBOARD ISOLATION, RG-01
RHR-MOV-MO39B	2040 SH 2	D7	2	B	18	GT	MO	C	FSO FSC PIT	Q Q 2Y	SUPPRESSION CHAMBER COOLING LOOP B OUTBOARD ISOLATION, RG-01
RHR-MOV-MO57	2040 SH 2	H2	2	B	4	GB	MO	C	LT-2 FSC PIT	RF Q 2Y	RHR DISCHARGE TO RADWASTE INBOARD THROTTLE, RG-01
RHR-MOV-MO65A	2040 SH 1	F3	2	B	16	GT	MO	O	PIT	2Y	RHR HEAT EXCHANGER A INLET, RG-01
RHR-MOV-MO65B	2040 SH 2	F10	2	B	16	GT	MO	O	PIT	2Y	RHR HEAT EXCHANGER B INLET, RG-01
RHR-MOV-MO66A	2040 SH 1	F4	2	B	20	GB	MO	O	FSO FSC PIT	Q Q 2Y	RHR HEAT EXCHANGER A BYPASS THROTTLE, RG-01

SYSTEM: RESIDUAL HEAT REMOVAL (RHR)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RHR-MOV-MO66B	2040 SH 2	F9	2	B	20	GB	MO	O	FSO FSC PIT	Q Q 2Y	RHR HEAT EXCHANGER B BYPASS THROTTLE, RG-01
RHR-MOV-MO67	2040 SH 2	H2	2	B	4	GT	MO	C	LT-2 FSC PIT	RF Q 2Y	RHR DISCHARGE TO RADWASTE OUTBOARD SHUTOFF, RG-01
RHR-MOV-MO166A	2041	H2	2	A	1	GB	MO	C	LJ-1	OPB	RHR HEAT EXCHANGER A VENT PASSIVE
RHR-MOV-MO166B	2041	H3	2	A	1	GB	MO	C	LJ-1	OPB	RHR HEAT EXCHANGER B VENT PASSIVE
RHR-MOV-MO167A	2041	H2	2	A	1	GB	MO	C	LJ-1	OPB	RHR HEAT EXCHANGER A VENT PASSIVE
RHR-MOV-MO167B	2041	H3	2	A	1	GB	MO	C	LJ-1	OPB	RHR HEAT EXCHANGER B VENT PASSIVE
RHR-MOV-MO274A	2040 SH 1	B10	1	A	2	GB	MO	C	LT-2 PIT	OPB 2Y	RHR-CV-26CV PASSIVE BYPASS PRESSURE ISOLATION VALVE, RV-05, RG-01
RHR-MOV-MO274B	2040 SH 2	B4	1	A	2	GB	MO	C	LT-2 PIT	OPB 2Y	RHR-CV-27CV PASSIVE BYPASS PRESSURE ISOLATION VALVE, RV-05, RG-01
RHR-MOV-920MV	2041	D1	2	B	3	GT	MO	C	FSC PIT	CS 2Y	STEAM SUPPLY TO AOG UPSTREAM SHUTOFF, CSJ-06,

SYSTEM: RESIDUAL HEAT REMOVAL (RHR)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
											RG-01
RHR-MOV-921MV	2041	D1	A	B	3	GT	MO	C	FSC PIT	CS 2Y	STEAM SUPPLY TO AOG DOWNSTREAM SHUTOFF, CSJ-06, RG-01
RHR-RV-10RV	2040 SH 1	F8	2	C	1	RV	SA	C	RVT	APP I	RHR PUMP A SUCTION RELIEF, RG-01
RHR-RV-11RV	2040 SH 2	F5	2	C	1	RV	SA	C	RVT	APP I	RHR PUMP B SUCTION RELIEF, RG-01
RHR-RV-12RV	2040 SH 1	H8	2	C	1	RV	SA	C	RVT	APP I	RHR PUMP C SUCTION RELIEF, RG-01
RHR-RV-13RV	2040 SH 2	H5	2	C	1	RV	SA	C	RVT	APP I	RHR PUMP D SUCTION RELIEF, RG-01
RHR-RV-14RV	2040 SH 1	C4	2	C	1	RV	SA	C	RVT	APP I	RHR LOOP A SUPPLY RELIEF, RG-01
RHR-RV-15RV	2040 SH 2	C9	2	C	1	RV	SA	C	RVT	APP I	RHR LOOP B SUPPLY RELIEF, RG-01

SYSTEM: RESIDUAL HEAT REMOVAL (RHR)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
RHR-RV-17RV	2040 SH 1	F8	2	C	1	RV	SA	C	RVT	APP I	SHUTDOWN COOLING SUPPLY RELIEF, RG-01
RHR-RV-20RV	2041	G2	2	A/C	1	RV	SA	C	RVT LJ-1	APP I OPB	RHR HEAT EXCHANGER A SHELL SIDE RELIEF, RG-01
RHR-RV-21RV	2041	G2	2	A/C	1	RV	SA	C	RVT LJ-1	APP I OPB	RHR HEAT EXCHANGER B SHELL SIDE RELIEF, RG-01

SYSTEM: SERVICE WATER (SW)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
SW-AOV-854AV	2036 SH 1	F11	3	B	2	BAL	AO	C	PIT	2Y	SW PASSIVE RAD MONITOR SAMPLE RETURN, RG-01
SW-AOV-855AV	2036 SH 1	F10	3	B	2	BAL	AO	C	PIT	2Y	SW PASSIVE RAD MONITOR SAMPLE RETURN, RG-01
SW-AOV-TCV451A	2036 SH 1	E7	3	B	12	GB	AO	O/T	PSO FSO FST PIT	Q Q/CS Q/CS 2Y	REC HEAT EXCHANGER A OUTLET TEMPERATURE CONTROL VALVE, CSJ-07, RG-01, TP-04
SW-AOV-TCV451B	2036 SH 1	F7	3	B	12	GB	AO	O/T	PSO FSO FST PIT	Q Q/CS Q/CS 2Y	REC HEAT EXCHANGER B OUTLET TEMPERATURE CONTROL VALVE, CSJ-07, RG-01, TP-04
SW-AOV-TCV452A	KSV-47-8	D2	3	B	2 ½	GL	AO	O	SKID	Q	DG1 TURBO INTER COOL TCV, TP-05, RG-01
SW-AOV-TCV452B	KSV-47-8	D2	3	B	2 ½	GL	AO	O	SKID	Q	DG2 TURBO INTER COOL TCV, TP-05, RG-01
SW-AOV-2797AAV	KSV-47-8	H5	3	B	6	BTF	AO	O	SKID	Q	DG1 SUPPLY, TP-05, RG-01
SW-AOV-2797BAV	KSV-47-8	H5	3	B	6	BTF	AO	O	SKID	Q	DG2 SUPPLY, TP-05, RG-01
SW-CV-ARA	2036	E5	3	C	6	CK	SC	C	COD	CVCM	SW AIR RELEASE, RG-01, TP-01

SYSTEM: SERVICE WATER (SW)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
	SH 1								CCL	CVCM	
SW-CV-ARB	2036 SH 1	C5	3	C	6	CK	SC	C	COD CCL	CVCM CVCM	SW AIR RELEASE, RG-01, TP-01
SW-CV-10CV	2006 SH 1	A11	3	C	20	CK-D	SA	O	FSO FSC	Q Q	SW PUMP A DISCHARGE, RG-01
SW-CV-11CV	2006 SH 1	A8	3	C	20	CK-D	SA	O	FSO FSC	Q Q	SW PUMP B DISCHARGE, RG-01
SW-CV-12CV	2006 SH-1	A10	3	C	20	CK-D	SA	O	FSO FSC	Q Q	SW PUMP C DISCHARGE, RG-01
SW-CV-13CV	2006 SH 1	A7	3	C	20	CK-D	SA	O	FSO FSC	Q Q	SW PUMP D DISCHARGE, RG-01
SW-CV-19CV	2006 SH 4	F9	3	C	14	CK-T	SA	C	FSO FSC	Q Q	RHR SW BOOSTER PUMP A DISCHARGE, RG-01
SW-CV-20CV	2006 SH 4	C9	3	C	14	CK-T	SA	C	FSO FSC	Q Q	RHR SW BOOSTER PUMP B DISCHARGE, RG-01
SW-CV-21CV	2006 SH 4	D9	3	C	14	CK-T	SA	C	FSO FSC	Q Q	RHR SW BOOSTER PUMP C DISCHARGE, RG-01
SW-CV-22CV	2006 SH 4	A9	3	C	14	CK-T	SA	C	FSO FSC	Q Q	RHR SW BOOSTER PUMP D DISCHARGE, RG-01
SW-CV-27CV	2036 SH 1	C1	3	C	14	CK-D	SA	O	COF CCD	CVCM CVCM	REC HEAT EXCHANGER B SUPPLY, RG-01, TP-01

SYSTEM: SERVICE WATER (SW)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
SW-CV-28CV	2036 SH 1	D2	3	C	14	CK-D	SA	O	COF CCD	CVCM CVCM	REC HEAT EXCHANGER A SUPPLY, RG-01, TP-01
SW-CV-35CV	2077	D1	3	C	10	CK-S	SA	O	FSO FSC	Q Q	DG1 SUPPLY, RG-01
SW-CV-36CV	2077	D2	3	C	10	CK-S	SA	O	FSO FSC	Q Q	DG1 SUPPLY, RG-01
SW-CV-37CV	2077	D5	3	C	10	CK-S	SA	O	FSO FSC	Q Q	DG2 SUPPLY, RG-01
SW-CV-38CV	2077	D5	3	C	10	CK-S	SA	O	FSO FSC	Q Q	DG2 SUPPLY, RG-01
SW-CV-86CV	2006 SH 1	D10	3	C	0.5	CK-P	SA	O	COF CCL	CVCM CVCM	SW PUMP A & C CHEMICAL INJECTION, RG-01, TP-01
SW-CV-87CV	2006 SH 1	E10	3	C	0.5	CK-P	SA	O	COF CCL	CVCM CVCM	SW PUMP A & C CHEMICAL INJECTION, RG-01, TP-01
SW-CV-88MV	2006 SH 1	C10	3	C	0.5	CK-P	SA	O	COF CCL	CVCM CVCM	SW PUMP B & D CHEMICAL INJECTION, RG-01, TP-01
SW-CV-89MV	2006 SH 1	C10	3	C	0.5	CK-P	SA	O	COF CCL	CVCM CVCM	SW PUMP B & D CHEMICAL INJECTION, RG-01, TP-01
SW-MOV-36MV	2006 SH 1	E10	3	B	24	BTF	MO	O	FSC PIT	Q 2Y	SW LOOP CRITICAL HEADER ISOLATION, RG-01
SW-MOV-37MV	2006	E10	3	B	24	BTF	MO	O	FSC	Q	SW PUMPS CROSSTIE, RG-01

SYSTEM: SERVICE WATER (SW)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
	SH 1								PIT	2Y	
SW-MOV-MO89A	2036 SH 1	C7	3	B	18	GB	MO	C	PSO FSO PIT	Q RF 2Y	RHR HEAT EXCHANGER A SW OUTLET, ROJ-10, RG-01
SW-MOV-MO89B	2036 SH 1	C10	3	B	18	GB	MO	C	PSO FSO PIT	Q RF 2Y	RHR HEAT EXCHANGER B SW OUTLET, ROJ-10, RG-01
SW-MOV-650MV	2036 SH 1	E3	3	B	18	BTF	MO	O	FSO FSC PIT	Q Q 2Y	REC HEAT EXCHANGER A OUTLET, RG-01
SW-MOV-651MV	2036 SH 1	C3	3	B	18	BTF	MO	O	FSO FSC PIT	Q Q 2Y	REC HEAT EXCHANGER B OUTLET, RG-01
SW-MOV-886MV	2036 SH 1	D1	3	B	4	GT	MO	C	FSO PIT	Q 2Y	EMERGENCY SUPPLY TO REC NORTH CRITICAL LOOP, RG-01
SW-MOV-887MV	2036 SH 1	D1	3	B	4	GT	MO	C	FSO PIT	Q 2Y	EMERGENCY SUPPLY TO REC SOUTH CRITICAL LOOP, RG-01
SW-MOV-888MV	2036 SH 1	E4	3	B	4	GT	MO	C	FSO PIT	Q 2Y	EMERGENCY RETURN FROM REC NORTH CRITICAL LOOP, RG-01
SW-MOV-889MV	2036 SH 1	C4	3	B	4	GT	MO	C	FSO PIT	Q 2Y	EMERGENCY RETURN FROM REC SOUTH CRITICAL LOOP, RG-01
SW-RV-12RV	2006	G8	3	C	3/4	RV	SA	C	RVT	APP I	SWBP 1A SEAL WATER RELIEF,

SYSTEM: SERVICE WATER (SW)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
	SH 4										RG-01
SW-RV-13RV	2006 SH 4	C8	3	C	3/4	RV	SA	C	RVT	APP I	SWBP 1C SEAL WATER RELIEF, RG-01
SW-RV-14RV	2006 SH 4	E8	3	C	3/4	RV	SA	C	RVT	APP I	SWBP 1B SEAL WATER RELIEF, RG-01
SW-RV-15RV	2006 SH 4	B8	3	C	3/4	RV	SA	C	RVT	APP I	SWBP 1D SEAL WATER RELIEF, RG-01
SW-V-640	2006 SH 4	E7	3	B	1	BAL	MA	O	FSC	2Y	SWBP C SEAL WATER RIVERWELL SHUTOFF, RG-01
SW-V-649	2006 SH 4	G7	3	B	1	BAL	MA	O	FSC	2Y	SWBP A SEAL WATER RIVERWELL SHUTOFF, RG-01
SW-V-656	2006 SH 4	B7	3	B	1	BAL	MA	O	FSC	2Y	SWBP D SEAL WATER RIVERWELL SHUTOFF, RG-01
SW-V-665	2006 SH 4	D7	3	B	1	BAL	MA	O	FSC	2Y	SWBP B SEAL WATER RIVERWELL SHUTOFF, RG-01
SW-V-1422	2006 SH 4	F8	3	C	3/4	GB	MA	C	FSO	2Y	SWBP A GLAND WATER SUPPLY, RG-01
SW-V-1424	2006 SH 4	G8	3	C	3/4	GB	MA	C	FSO	2Y	SWBP A GLAND WATER FLOW CONTROL, RG-01
SW-V-1426	2006 SH 4	C8	3	C	3/4	GB	MA	C	FSO	2Y	SWBP B GLAND WATER SUPPLY, RG-01

SYSTEM: SERVICE WATER (SW)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
SW-V-1428	2006 SH 4	D8	3	C	3/4	GB	MA	C	FSO	2Y	SWBP B GLAND WATER FLOW CONTROL, RG-01
SW-V-1430	2006 SH 4	E8	3	C	3/4	GB	MA	C	FSO	2Y	SWBP C GLAND WATER SUPPLY, RG-01
SW-V-1432	2006 SH 4	E8	3	C	3/4	GB	MA	C	FSO	2Y	SWBP C GLAND WATER FLOW CONTROL, RG-01
SW-V-1434	2006 SH 4	B8	3	C	3/4	GB	MA	C	FSO	2Y	SWBP D GLAND WATER SUPPLY, RG-01
SW-V-1436	2006 SH 4	B8	3	C	3/4	GB	MA	C	FSO	2Y	SWBP D GLAND WATER FLOW CONTROL, RG-01

SYSTEM: STANDBY GAS TREATMENT (SGT)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
SGT-AOV-249AV	2037	C2	A	B	12	BTF	AO	C	FSO FSC FST PIT	Q Q Q 2Y	SGT UNIT A INLET, RG-01, TP-04
SGT-AOV-250AV	2037	G2	A	B	12	BTF	AO	C	FSO FSC FST PIT	Q Q Q 2Y	SGT UNIT B INLET, RG-01, TP-04
SGT-AOV-251AV	2037	C6	A	B	12	BTF	AO	C	FSO FST PIT	Q Q 2Y	SGT UNIT A DISCHARGE, RG-01, TP-04
SGT-AOV-252AV	2037	G6	A	B	12	BTF	AO	C	FSO FST PIT	Q Q 2Y	SGT UNIT B DISCHARGE. RG-01, TP-04
SGT-AOV-255AV	2037	A4	A	B	10	BTF	AO	C	PIT	2Y	SGT UNIT A PASSIVE BYPASS, RG-01
SGT-AOV-256AV	2037	E4	A	B	10	BTF	AO	C	PIT	2Y	SGT UNIT B PASSIVE BYPASS, RG-01
SGT-AOV-270AV	2037	C1	A	B	10	BTF	AO	C	FSO FST PIT	Q Q 2Y	SGT UNIT A DILUTION AIR SHUTOFF, RG-01, TP-04
SGT-AOV-271AV	2037	G1	A	B	10	BTF	AO	C	FSO	Q	SGT UNIT B DILUTION AIR

SYSTEM: STANDBY GAS TREATMENT (SGT)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
									FST PIT	Q 2Y	SHUTOFF, RG-01, TP-04
SGT-AOV-DPCV546A	2037	C7	A	B	10	BTF	AO	C	FSO FST PIT	Q Q 2Y	SGT UNIT A DISCHARGE DIFFERENTIAL PRESSURE CONTROL, RG-01, TP-04
SGT-AOV-DPCV546B	2037	E7	A	B	10	BTF	AO	C	FSO FST PIT	Q Q 2Y	SGT UNIT B DISCHARGE DIFFERENTIAL PRESSURE CONTROL, RG-01, TP-04
SGT-CV-14CV	2037	C6	A	C	10	CK-D	SA	C	FSO FSC	CS CS	SGT UNIT A FAN EXHAUST, CSJ-01, RG-01
SGT-CV-15CV	2037	G6	A	C	10	CK-D	SA	C	FSO FSC	CS CS	SGT UNIT B FAN EXHAUST, CSJ-01, RG-01

SYSTEM: STANDBY LIQUID CONTROL (SLC)[1]

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
SLC-CV-10CV	2045 SH 2	E9	A	C	1½	CK-L	SA	C	COF CCR	CVCM CVCM	SLC PUMP A DISCHARGE CHECK, RG-01
SLC-CV-11CV	2045 SH 2	F9	A	C	1½	CK-L	SA	C	COF CCR	CVCM CVCM	SLC PUMP B DISCHARGE CHECK, RG-01
SLC-CV-12CV	2045 SH 2	E8	1	A/C	1½	CK-L	SA	C	LJ-1 COF CCL	OPB CVCM CVCM	SLC INJECTION LINE OUTBOARD CHECK, RG-01
SLC-CV-13CV	2045 SH 2	E7	1	A/C	1½	CK-L	SA	C	LJ-1 COF CCL	OPB CVCM CVCM	SLC INJECTION LINE INBOARD CHECK , RG-01
SLC-RV-10RV	2045 SH 2	D10	A	C	3/4	RV	SA	C	RVT	APP I [2]	SLC PUMP A DISCHARGE RELIEF, RG-01
SLC-RV-11RV	2045 SH 2	G9	A	C	3/4	RV	SA	C	RVT	APP I [2]	SLC PUMP B DISCHARGE RELIEF, RG-01
SLC-SQBV-14A	2045 SH 2	E8	A	D	1½	SHR	CH	C	EX	2Y	SLC EXPLOSIVE VALVE A, RG-01
SLC-SQBV-14B	2045 SH 2	E8	A	D	1½	SHR	CH	C	EX	2Y	SLC EXPLOSIVE VALVE A, RG-01

SYSTEM: STATION AIR (SA)

VALVE CIC	P&ID	P&ID COOR	ISI CLASS	IST CAT	VALVE SIZE	VALVE TYPE	ACT TYPE	NORM POS	TEST RQMT	TEST FREQ	NOTES/DESCRIPTION
SA-V-647	2010 SH 3	G4	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE DRYWELL OUTBOARD SUPPLY ISOLATION
SA-V-648	2010 SH 3	G4	2	A	1	GB	MA	C	LJ-1	OPB	PASSIVE DRYWELL INBOARD SUPPLY ISOLATION

1. License Amendment 234 to the CNS Facility Operating License requires that the SLC system be maintained in the Augmented IST Program for the Alternate Source Term Function

2. License Amendment 176 to the CNS Facility Operating License requires that the control of the SLC relief valve testing (and as-left set point) be maintained in the Augmented IST Program. This amendment requires that the USAR describe the as-left set point (1540 +/- 1%) and that future changes be evaluated per 10CFR50.59. The as-found criteria is 1478 to 1602 psig per USAR section III-9.4.

Enclosure 2

Cooper Nuclear Station Fifth Interval Inservice Examination and Testing Program for Snubbers

Nebraska Public Power District

Cooper Nuclear Station
Fifth Interval
Inservice Examination &
Testing Program for
Snubbers

Revision 0

Cooper Nuclear Station
PO BOX 98
Brownville, NE 68321-0098

Commercial Operation Date: July 1, 1974

Snubber Engineer: Thomas V. Robinson **Date:** 2-24-16

Program Backup / Supervisor: [signature] **Date:** 2-26-16

EP & C Manager: [signature] **Date:** 2/29/16

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1.0 INTRODUCTION

1.1 Purpose

This document establishes the Cooper Nuclear Station (CNS) Fifth 120-Month Interval Inservice Testing (IST) Program requirements for the American Society of Mechanical Engineers (ASME) Code Class 1, 2, and 3 dynamic restraints (snubbers). The Snubber Program requirements include Visual Examinations, Functional testing, and Service Life Monitoring.

The CNS Fifth 120-Month Interval Snubber Inservice Testing Program Plan will be applicable during the following time period.

Begin: 03/01/2016 **End:** 02/28/2026

The objective of the Snubber Program is to provide reasonable assurance that the snubbers within this plan are capable of performing their intended function(s) during normal operations and seismic events.

1.2 Scope

The IST Program scope for dynamic restraints applies to the Class 1, 2, and 3 dynamic restraints that meet the scope statements outlined in the ASME OM Code of record. The CNS Code of record for the Fifth 120-Month Interval is the 2004 Edition through the 2006 addenda of the ASME OM Code.

This document is based on the following Subsections of the 2004 Edition through the 2006 Addenda of the ASME OM Code.

- Subsection ISTA, "*General Requirements*"

  ISTA-1100 states that "These requirements apply to"

  > (c) "dynamic restraints (snubbers) used in systems that perform one or more of the three functions identified in subpara. ISTA-1100(a) [shutting down a reactor to the safe shutdown condition, in maintaining the safe shutdown condition, or in mitigating the consequences of an accident], or to ensure the integrity of the reactor coolant pressure boundary"

- Subsection ISTD, "Preservice and inservice Examination and Testing of dynamic Restraints (Snubbers) in Light-Water Reactor Nuclear Power Plants."

Cooper Nuclear Station was designed and licensed to operate with the Hot Shutdown condition defined as the "safe" shutdown condition.

CNS currently has a total of 208 snubbers in this program, 155 Mechanical snubbers and 53 hydraulic snubbers. These snubbers and their locations are listed in CNS Maintenance Procedure, 7.2.34.1, "Snubber Examination".

2.0 VISUAL EXAMINATIONS

2.1 General

The examination boundary shall include the snubber assembly from pin to pin, inclusive (ISTD-3110).

Typical preservice or inservice examination checklist items to be considered are listed in Nonmandatory Appendix B of the ASME OM Code.

2.2 Preservice Examinations

For new and modified systems, preservice examinations shall be performed after placing the systems in service. These examinations should be identified within the modification package implementing the new and/or modified system. The preservice examination requirements of ISTD-4100 shall be met.

2.3 Inservice Examinations

Snubbers shall be visually examined on the required schedule and evaluated to determine their operational readiness (ISTD-4200).

The inservice examination shall be a visual examination to identify physical damage, leakage, corrosion, or degradation that may have been caused by environmental exposure or operating conditions. External characteristics that may indicate operational readiness of the snubber shall be examined. An examination checklist shall be used (ISTD-4210).

Snubber installations shall meet all the requirements of ISTD-4231 (restrained movement), ISTD-4232 (thermal movement), and ISTD-4233 (design-specific characteristics).

CNS is utilizing approved Code Case OMN-13 (2004 Edition), "Requirements for Extending Snubber Inservice Visual Examination Interval at LWR Power Plants," as listed in Table 1 of Regulatory Guide 1.192, Revision 1 (August 2014), "Operation and Maintenance Code Case Acceptability, ASME OM Code." This Code Case allows for the extension of visual examinations beyond the frequencies specified in ISTD for mechanical and hydraulic snubbers to at least once every 10 years. All requirements of this NRC approved version of OMN-13 must be met.

Snubbers at CNS are examined in accordance with CNS procedures 7.2.34.1 or 7.2.34.2.

A snubber that requires further evaluation or is classified as unacceptable during inservice examination may be tested in accordance with the requirements ISTD-5210.

3.0 FUNCTIONAL TESTING REQUIREMENTS

3.1 Preservice Operational Readiness Testing

Preservice Operational readiness testing shall be performed on all snubbers. Testing may be performed at the manufacturer's facility (ISTD-5110).

Test parameters shall meet the requirements of ISTD-5120. If a failure occurs, corrective action shall meet the requirements of ISTD-5130.

3.2 Inservice Operational Readiness Testing

Snubbers shall be tested for operational readiness during each fuel cycle. Functional tests at CNS are completed in accordance with the 10% Testing Sample Plan (ISTD-5300). Test parameters are in accordance with ISTD-5210.

The CNS snubber population consists of hydraulic and mechanical snubbers. These snubbers are separated into Design Test Plan Groups (DTPG) by snubber type (hydraulic versus mechanical) and size in accordance with ISTD-5252 (see below).

DTPG	Population Description	Number of Snubbers	Sample Plan
1	PSA-3 Mechanical Snubbers	18	10%
2	PSA-10 Mechanical Snubbers	89	10%
3	PSA-35 Mechanical Snubbers	48	10%
4	ANVIL/Grinnell Hydraulic Snubbers	53	10%

Testing shall be performed during normal operation, or during system or plant outages (ISTD-5200). However, snubber testing may begin no earlier than 60 days before a scheduled refueling outage (ISTD-5240).

The initial sample shall be 10% of the DTPG, composed according to either ISTD-5311(a) or ISTD-5311(b).

Snubbers that do not meet test requirements specified in ISTD-5210 or ISTD-5230 shall be evaluated to determine the cause of the failure (ISTD-5271). Failure mode groupings (FMGs) should be determined in accordance with ISTD-5272, as applicable. The FMG boundaries shall be applied per ISTD-5273 and utilized with the 10% sample plan per ISTD-5300.

Snubbers will generally be tested at CNS in accordance with CNS procedures 7.2.34.7 and 7.2.34.8. However, snubbers can be functionally tested by vendors, if necessary.

4.0 SERVICE LIFE MONITORING REQUIREMENTS

Initial snubber service life shall be predicted based on manufacturer's recommendation or design review (ISTD-6100).

Service life shall be evaluated at least once each fuel cycle, and increased or decreased, if warranted (ISTD-6200). This is typically done by reviewing the examination and functional test results at the completion of the refueling outage campaign.

Snubbers shall be replaced or reconditioned, as required, to ensure that the service life is not exceeded before the next scheduled system or plant outage.

If necessary, technical justification shall be documented for extending the service life to or beyond the next scheduled system or plant outage.

Causes for any examination or testing failures shall be determined and considered in establishing or re-establishing service life.

5.0 CNS PROCEDURES

5.1 Engineering Procedure 3.39, "Snubber Program"
5.2 Maintenance Procedure 7.2.34.1, "Snubber Examination"
5.3 Maintenance Procedure 7.2.34.2, "Pipe Snubbers Removal and Installation"
5.4 Maintenance Procedure 7.2.34.3, "Grinnell Figure 200/201 Hydraulic Snubber Maintenance"
5.5 Maintenance Procedure 7.2.34.4, "Pacific Scientific PSA-3 and PSA-10 Snubber Maintenance"
5.6 Maintenance Procedure 7.2.34.5, "Pacific Scientific PSA-35 Snubber Maintenance"
5.7 Maintenance Procedure 7.2.34.7, "Grinnell Figure 200/201 Hydraulic Snubber Functional Test"
5.8 Maintenance Procedure 7.2.34.8, "Pacific Scientific Snubber Functional Test"
5.9 Administrative Procedure 0.30, "ASME Section XI Repair/Replacement and Temporary Code and Non-Code Repair Procedure"
5.10 Surveillance Procedure 6.SNUB.601, "Snubber Operability"
5.11 Surveillance Procedure 6.SNUB.602, "Snubber Service Life Evaluation"