Summary of Changes for Revision 6
of the Inservice Testing Program
Plan for Pumps and Valves
Braidwood Nuclear Power Station
Units 1 and 2

Section 3.0 - Table of Contents

1. Revised to reflect program changes.

Section 3.1 - Program Description

1. No change.

Section 3.2 - Program References

1. Added SE (Safety Evaluation Report) of September 14, 1993.

Section 3.3 - Pump Tables

A. Pump Table Description

1. No change.

B. Pump Tables

1. Added Class 3 to the "Code" field of the BAT pumps.
2. Deleted relief request PR-5 from applicable pumps.
3. Deleted Note 6 from SX04P pumps.

Section 3.4 - Pump Notes

1. Deleted Note 6 re: SX04P implementation.

Section 3.5 - Pump Technical Approaches and Positions

1. No change.

Section 3.6 - Pump Relief Requests

1. Added SE approval to all relief requests.
2. Deleted old PR-02 and replaced with approved PR-02a relief request.

Summary of Changes for Revision 6
of the Inservice Testing Program
Plan for Pumps and Valves
Braidwood Nuclear Power Station
Units 1 and 2

Section 4.0 - Table of Contents

1. Deleted Note 32.
2. Added Notes 37 through 40.
3. Added Technical Approach and Position VA-06 and VA-07.
4. VR-15 was separated into four parts for clarity.
5. Deleted VR-17 and made it VA-06.
6. Added VR-28.

Section 4.1 - Program Description

1. No change.

Section 4.2 - Program References

1. Added reference to SE dated Sept. 14, 1993.

Section 4.3 - Valve Tables

A. Valve Table Description

1. No change.

B. Valve Tables

1. 0AB8473 and 1/2AB8487 - added Class 3.
2. 1/2CC9463A/B - changed Ct/Bt at CS to OP, deleted Xt at OP.
3. 0CC9464 - changed Ct/Bt at CS to OP, deleted Xt at OP.
4. 1/2CC9415 - added valves to program to test at cold shutdown in both directions per Note 40.
5. 1/2CC9437A/B - added open direction to ST.
6. 1/2CC9473A/B - added closed direction to ST.
7. 1/2CC9459B; 1/2CC9467B - added manual valves to program per NRC inspection at Byron to cycle in both direction on a U-2 cold shutdown frequency.
8. 1/2CS007A/B - added closed direction to ST.
9. 1/2CS011A/B - added CT @ RR per VR-28 and XT @ OP.
10. 1/2CS019A/B - added closed direction to ST.
11. 1/2CS020A/B - added BT @ OP.

Summary of Changes for Revision 6
of the Inservice Testing Program
Plan for Pumps and Valves
Braidwood Nuclear Power Station
Units 1 and 2

B. Valve Tables (continued)

12. 1/2CV112D/E - added closed direction to ST.
13. 1/2CV8110 - added open direction to ST.
14. 1/2CV8111 - added open direction to ST.
15. 1/2CV8114 - added open direction to ST.
16. 1/2CV8116 - added open direction to ST.
17. 1/2CV8152 - added open direction to ST.
18. 1/2CV8160 - added open direction to ST.
19. 1/2CV8440 - added these valves to program based on Westinghouse letter and UFSAR change to active.
20. 1/2CV8481A - changed VR-15 to VR-15A.
21. 1/2CV8481B - changed VR-15 to VR-15A.
22. 1/2CV8546 - changed VR-15 to VR-15A.
23. 1/2FW036A-D - added these valves to program per UFSAR change to active.
24. 1/2FW079A-D - added these valves to program per UFSAR change to active
25. 1/2IA066 - added open direction to ST.
26. 1/2IA091 - added open direction and CT.
27. 1/2MS013A-D - added closed direction to Rt.
28. 1/2MS014A-D - added closed direction to Rt.
29. 1/2MS015A-D - added closed direction to Rt.
30. 1/2MS016A-D - added closed direction to Rt.
31. 1/2MS017A-D - added closed direction to Rt.
32. 1/2MS018A-D - added open direction to ST.
33. 1/2MS019A-D - added these manual valves to program based on EOP review.
34. 1/2OG057A - added the open direction to ST.
35. 1/2OG079 - added the open direction to ST.
36. 1/2OG080 - added the open direction to ST.
37. 1/2OG081 - added the open direction to ST.
38. 1/2OG082 - added the open direction to ST.
39. 1/2OG083 - added the open direction to ST.
40. 1/2OG084 - added the open direction to ST.
41. 1/2OG085 - added the open direction to ST.
42. 1/2PS228A/B - added the open direction to ST.
43. 1/2PS229A/B - added the open direction to ST.
44. 1/2PS230A/B - added the open direction to ST.

B. Valve Tables (continued)

45. 1/2RH8701A/B, 1/2RH8702A/B - added closed direction to ST.
46. 1/2RH8708A/B - added closed direction to RT.
47. 1/2RH8705A/B - changed VR-15 to VR-15B, deleted normally open position.
48. 1/2RH8716A/B - added these valves to the program per NRC inspection at Braidwood.
49. 1/2RH610 - added valves to program per NRC inspection at Byron.
50. 1/2RH611 - added valves to program per NRC inspection at Byron.
51. 1/2RY455A, 1/2RY456 - added close direction to ST.
52. 1/2RY8010A,B,C - added close direction to RT.
53. 1/2SI8801A/B - added close direction to ST.
54. 1/2SI8802A/B - added close direction to ST.
55. 1/2SI8806 - added close direction to ST.
56. 1/2SI8809A - added open direction to ST.
57. 1/2SI8809B - added open direction to ST.
58. 1/2SI8811A/B - added close direction to ST.
59. 1/2SI8815 - changed VR-15 to VR-15A.
60. 1/2SI8818A-D - changed Bt to CS and removed valves from VR-15 in response to SE Item 8.
61. 1/2SI8819A-D - changed VR-15 to VR-15C.
62. 1/2SI8821A/B - added open direction to ST.
63. 1/2SI8835 - added open direction to ST.
64. 1/2SI8840 - added close direction to ST.
65. 1/2SI8841A/B - changed from VR-15 to VR-15D.
66. 1/2SI8900A-B - changed VR-15 to VR-15A.
67. 1/2SI8905A-D - changed VR-15 to VR-15C.
68. 1/2SI8924 - added open direction to ST.
69. 1/2SI8948A--D - added Xt at CS.
70. 1/2SI8949A,C - changed from VR-15 to VR-15D.
71. 1/2SI8949B,D - changed VR-15 to VR-15C.
72. 1/2SI8958A/B - added Bt at OP per Note 27.
73. 1/2SX016A/B - added close direction to ST.
74. 1/2SX027A/B - added close direction to ST.
75. 1/2SX101A - added close direction to St; deleted VR-17 and added VA-06.
76. 1/2SX116A - added these check valves based on NRC inspection at Byron.
77. 1/2SX116B - added these check valves based on NRC inspection at Byron.
78. 0SX007 - added contol valve per review of NRC inspection at Byron.
79. 0SX146 - added isolation valve per review of NRC inspection at Byron.
80. 0SX147 - added isolation valve per review of NRC inspection at Byron.

Summary of Changes for Revision 6
of the Inservice Testing Program
Plan for Pumps and Valves
Braidwood Nuclear Power Station
Units 1 and 2

Section 4.4 - Valve Notes

1. Footnote added to Note 6 regarding RH8705 valves not being PIV.
2. Changed Note 27 to reflect SI8958 closure function.
3. Changed Note 28 to reflect CV8840 closure testing in cold shutdowns when all four RCPs are off.
4. Deleted last sentence of Note 30.
5. Deleted Note 32.
6. Added Note 37 regarding cold shutdown testing of the RH8716s.
7. Added Note 38 re: FW036A-D testing at CS.
8. Added Note 39 re: FW079A-D testing at CS.
9. Added Note 40 re: CC9415 CS testing.

Section 4.5 - Valve Technical Approaches and Positions

1. Added VA-06 re: SX101A SOV testing using non-intrusives (was VR-17) as an acceptable alternative to the Code at OP.
2. Added VA-07 re: testing certain CC manual valves on a U-2 cold shutdown frequency.

Section 4.6 - Valve Relief Requests

1. The approval status of each relief request was updated showing the current approval status.
2. VR-5 - was updated to address the SE dated Sept. 14, 1993 Item 6 anomaly re: partial stroking in cold shutdowns.
3. VR-15 - separated this relief request into four parts:
   15A - CV cold leg injection check valves.
   15B - Pressure relief check valves.
   15C - SI cold leg and SI/RH hot leg injection check valves.
   15D - SI/RH hot leg injection check valves.
   Also, the SI8818s were removed from this relief request based on the SE dated Sept. 14, 1993 Item 8 anomaly.
4. VR-17 - relief request deleted based on VA-06.
5. VR-19 revised to reflect SE dated Sept. 14, 1993 Item 7 anomaly re: AF001 test frequency.
6. VR-20 - revised to incorporate SE dated Sept. 14, 1993 Item 4 anomaly re: OM-10 corrective actions during cold shutdowns and refueling.
7. VR-28 - Added this relief request for the CS011s based on the the reasons given in the request.

SECTION 3.0

INSERVICE TESTING

PROGRAM PLAN FOR PUMPS

BRAIDWOOD STATION UNITS 1 AND 2

TABLE OF CONTENTS

SECTION 3.1

PROGRAM DESCRIPTION

PROGRAM DESCRIPTION

The Pump Inservice Testing (IST) Program Plan for Braidwood Nuclear Power Station Units 1 and 2, is implemented in accordance with the requirements of Subsection IWP of Section XI of the ASME Boiler and Pressure Vessel Code, 1983 Edition, through the Summer of 1983 Addenda. Where these requirements are determined to be impractical, specific relief is requested. Additional pump relief requests may be necessary and these will be identified during subsequent inservice tests. The pumps subject to IST testing are those pumps which are identified in accordance with the scope of ASME Section XI, subsection IWP-1100: "IWP-1100 SCOPE... This Subsection provides the rules and requirements for inservice testing of Class 1, 2, and 3 centrifugal and displacement type pumps that are installed in light-water cooled nuclear power plants, that are required to bring and maintain the plant in cold shutdown condition or mitigates the consequences of an accident, and that are provided with an emergency power source. The results of these tests are to be used in assessing operational readiness of the pumps during their service life."

The only exceptions are the diesel driven auxiliary feedwater pumps (1AF01PB and 2AF01PB), which are not supplied by an emergency power source. The diesel oil transfer pumps (1/2 DO01PA, 1/2DO01PB, 1/2DO01PC and 1/2DO01PD) are classified non-ASME Class G.

Pump reference values shall be determined from the results of a pre-service test, which may be run during pre-operational testing, or from the results of the first inservice test run during power operation. Reference values shall be at points of operation readily duplicated during subsequent inservice testing. Additional reference values may be necessary and these will be taken in accordance with IWP-3111 and 3112:

1. After a pump has been replaced,

2. When a reference value or set of values may have been affected by repair or routine servicing of a pump, or

3. If it is necessary or desirable for some other reason than 1 or 2 above.

Per NRC Generic Letter 89-04, Attachment 1, Position #8, whenever pump data is determined to be within the Required Action Range, the pump is inoperable, and the Technical Specification LCO Action statement time starts.

In the event a pump must be declared inoperable as a result of inservice testing, limitations on plant operation will be as stated in the Technical Specifications.

Section XI of the ASME Boiler and Pressure Vessel Code shall not be construed to supersede the requirements of any Technical Specification.

SECTION 3.2

PROGRAM REFERENCES

PROGRAM REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Domestic Licensing of Production and Utilization Facilities, particularly Section 50.55a, Codes and Standards.
2. ASME Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, 1983 Edition, Summer 1983 Addenda.
3. ASME/ANSI OM-1987, Operation and Maintenance of Nuclear Power Plants, including 1989 Addenda, Part 6, Inservice Testing of Pumps in Light Water Reactor Power Plants.
4. U.S. Nuclear Regulatory Commission, Generic Letter 89-04, Guidance on Developing Acceptable Inservice Testing Programs.
5. Braidwood Station UFSAR, Section 3.9.6.1, Inservice Testing of Pumps.
6. Braidwood Station Technical Specification, 4.0.5, ASME XI Program Requirements.
7. Braidwood Station Technical Staff Procedure, BwVP 200-1, ISI Requirements for Pumps.
8. NRC Safety Evaluation Reports (SER's):
    a. SER dated October 15, 1991 for Revision 4/4a.
    b. SER dated September 14, 1993 for Revision 5/5a.

SECTION 3.3

PUMP TABLES

PUMP TABLE DESCRIPTION

The following information is included in the summary tables:

The first four columns include the unique Braidwood Station Equipment Piece Number, the Pump Name, the Code Class (1, 2, 3, N for non-Code, and T for tracking purposes only), and the system P & ID for the pump listed.

Speed: Speed will be measured by a tachometer for variable speed drives.

Inlet Pressure: Inlet pressure will be measured via permanently installed gauges or other means, provided the equipment accuracy meets the requirements of IWP-4150. This is to be measured both before pump startup and during the test.

Differential Pressure: Differential pressures will be measured using calibrated differential pressure gauges or by recording the difference between calibrated inlet and outlet pressure gauges.

Flow Rate: Flow rates will be measured using permanently installed instrumentation or other means, provided that equipment accuracy meets the requirements of IWP-4150. Also, refer to relief request PR-05.

Vibration: Vibration measurement shall be made using portable or hand held instruments at locations marked on the pumps, relief request PR-01.

Bearing Temperature: Bearing temperature is not measured per PR-02.

Test Interval: An inservice test shall be run on each pump nominally every 3 months during normal plant operation, in accordance with IWP-3400, except during periods when the pump is not required to be operable.

Lubrication Level: Lubrication level will be observed through sight glasses for the pumps listed in the program, when provided.

Remarks: Any applicable note(s) are referenced here.

Revision Number: The current revision of the program is listed.

Table Page: The table pages are numbered sequentially and show the total number of pages.

		C L A S S	TEST PARAMETERS									
PUMP NUMBER	PUMP NAME		P&ID	SPEED	INLET PRESS	DIFF PRESS	FLOW RATE	VIBRATION	BEARING TEMP	TEST INTERVAL	LUBRICATION LEVEL	REMARKS
0AB03P	Boric Acid Transfer Pump	3/T	M-65	No	No	PA-1	PA-1	PA-1	PA-1	[illegible]arterly	Yes	
1AB03P	Boric Acid Transfer Pump	3/T	M-65	No	No	PA-1	PA-1	PA-1	PA-1	[illegible]xterly	Yes	
2AB03P	Boric Acid Transfer Pump	3/T	M-65	No	No	PA-1	PA-1	PA-1	PA-1	Quarterly	Yes	
1AF01PA	Auxiliary Feedwater Pump (Motor)	3	M-37	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
1AF01PB	Auxiliary Feedwater Pump (Diesel)	3	M-37	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
2AF01PA	Auxiliary Feedwater Pump (Motor)	3	M-122	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
2AF01PB	Auxiliary Feedwater Pump (Diesel)	3	M-122	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
0CC01P	Component Cooling Pump	3	M-66	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3
1CC01PA	Component Cooling Pump	3	M-66	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3
1CC01PB	Component Cooling Pump	3	M-66	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3
2CC01PA	Component Cooling Pump	3	M-66	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3

		CLASS	TEST PARAMETERS									
PUMP NUMBER	PUMP NAME		P&ID	SPEED	INLET PRESS	DIFF PRESS	FLOW RATE	VIBRATION	BEARING TEMP	TEST INTERVAL	LUBRICATION LEVEL	REMARKS
2CC01PB	Component Cooling Pump	3	M-66	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3
1CS01PA	Containment Spray Pump	2	M-46	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	No	Note 2
1CS01PB	Containment Spray Pump	2	M-46	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	No	Note 2
2CS01PA	Containment Spray Pump	2	M-129	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	No	Note 2
2CS01PB	Containment Spray Pump	2	M-129	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	No	Note 2
1CV01PA	Centrifugal Charging Pump	2	M-64	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
1CV01PB	Centrifugal Charging Pump	2	M-64	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
2CV01PA	Centrifugal Charging Pump	2	M-138	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
2CV01PB	Centrifugal Charging Pump	2	M-138	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
1DO01PA	Diesel Oil Transfer Pump	3	M-50	No	Yes	PR-8	Yes	PR-1	PR-2	Quarterly	No	Note 2

		C L A S S	TEST PARAMETERS									
PUMP NUMBER	PUMP NAME		P&ID	SPEED	INLET PRESS	DIFF PRESS	FLOW RATE	VIBRATION	BEARING TEMP	TEST INTERVAL	LUBRICATION LEVEL	REMARKS
1DO01PB	Diesel Oil Transfer Pump	3	M-50	No	Yes	PR-6	Yes	PR-1	PR-2	Quarterly	No	Note 2
1DO01PC	Diesel Oil Transfer Pump	3	M-50	No	Yes	PR-6	Yes	PR-1	PR-2	Quarterly	No	Note 2
2DO01PA	Diesel Oil Transfer Pump	3	M-130	No	Yes	PR-6	Yes	PR-1	PR-2	Quarterly	No	Note 2
2DO01PB	Diesel Oil Transfer Pump	3	M-130	No	Yes	PR-6	Yes	PR-1	PR-2	Quarterly	No	Note 2
2DO01PC	Diesel Oil Transfer Pump	3	M-130	No	Yes	PR-6	Yes	PR-1	PR-2	Quarterly	No	Note 2
1DO01PD	Diesel Oil Transfer Pump	3	M-130	No	Yes	PR-6	Yes	PR-1	PR-2	Quarterly	Yes	
1RH01PA	Residual Heat Removal Pump	2	M-62	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
1RH01PB	Residual Heat Removal Pump	2	M-62	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
2RH01PA	Residual Heat Removal Pump	2	M-137	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
2RH01PB	Residual Heat Removal Pump	2	M-137	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	No	Note 2

		C L A S S	TEST PARAMETERS									
PUMP NUMBER	PUMP NAME		P&ID	SPEED	INLET PRESS	DIFF PRESS	FLOW RATE	VIBRATION	BEARING TEMP	TEST INTERVAL	LUBRICATION LEVEL	REMARKS
1SI01PA	Safety Injection Pump	2	M-61	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
1SI01PB	Safety injection Pump	2	M-61	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
2SI01PA	Safety Injection Pump	2	M-61	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
2SI01PB	Safety Injection Pump	2	M-61	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
1SX01PA	Essential Service Water Pump	3	M-42	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3
1SX01PB	Essential Service Water Pump	3	M-42	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3
2SX01PA	Essential Service Water Pump	3	M-42	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3
2SX01PB	Essential Service Water Pump	3	M-42	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3
1SX04P	1B AFW SX Booster Pump	3	M-42-3	Yes	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
2SX04P	2B AFW SX Booster Pump	3	M-126-1	Yes	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	
0WO01PA	Control Room Chilled Water Pump	3	M-118	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3
0WO01PB	Control Room Chilled Water Pump	3	M-118	No	Yes	Yes	Yes	PR-1	PR-2	Quarterly	Yes	Note 3

M. SMITH

SECTION 3.4

PUMP NOTES

PUMP NOTES

NOTE 1

-Deleted-

NOTE 2

The Diesel Oil Transfer (1DO01PA-D and 2DO01PA-D), Residual Heat Removal (1RH01PA/B and 2RH01PA/B) and Containment Spray (1CS01PA/B and 2CS01PA/B), pumps cannot be measured for lubrication level. These pumps are lubricated by the fluid pumped and hence have no indication for lubrication level.

NOTE 3

The Component Cooling Water pumps (0CC01P, 1CC01PA/B and 2CC01PA/B), Essential Service Water Pumps (1SX01PA/B and 2SX01PA/B), and the Control Room Chilled Water Pumps (0WO01PA/B) are in systems which are in continuous operation. The idle inlet pressure for these pumps cannot be obtained without interrupting normal system operation and causing system transients. The idle inlet pressure will be recorded only if the pump to be tested is not in operation at the start of the test. Proper pump operation is assured by continuous pump operation as well as quarterly monitoring of the remaining ISI pump parameters.

NOTE 4

-Deleted-

NOTE 5

Not Used at Braidwood - Byron ONLY

NOTE 6

-Deleted-

NOTE 7

Not Used at Braidwood - Byron ONLY

SECTION 3.5

PUMP TECHNICAL APPROACHES AND POSITIONS

IST Technical Approach and Position
No. PA-01

A. Component Identification:

1. Description: Performance Testing of the Boric Acid (AB) Transfer Pumps

2. Component Numbers: 0AB03P, 1/2AB03P

3. References: (a) Engineering Correspondence (CHRON #161733) dated January 17, 1991

4. Code Class: 3/T (Tracking purposes ONLY))

B. Requirements:

The ASME Section XI Code requires safety related pumps performing a specific function in shutting down the reactor or in mitigating the consequences of an accident, and that are provided with an emergency power supply be included in the inservice testing program (IST). However, the AB pumps do not have an "emergency" power supply, so consequently, they are not required to be included in the program. Braidwood was licensed as a "hot shutdown" plant. This means it was only required to be capable of hot shutdown using non-safety related systems or repair to postulated damaged equipment. For this reason the electrical support for the emergency boration function is Safety Category II. Also, the RWST (Refueling Water Storage Tank) is a seismic Category I structure as described in the UFSAR Table 3.2-1 and is designed to withstand design basis accidents, including tornados. The RWST is required for ECCS (Emergency Core Cooling Systems) operation.

The AB pumps are tested per the Technical Specification requirement that requires an 18 month flow verification of 30 gpm to the RCS. Also, the AB pumps are monitored per the station's vibration monitoring program requirements.

C. Position:

The AB pumps fall outside the scope of the ASME Section XI and the IST program. However, because of the operating significance of these pumps, and based on correspondence and discussions with NRR and CECo Engineering, Braidwood Station has decided to list the AB pumps in the program for tracking purposes only. They will be tested in a like fashion to the ASME Section XI program. The hydraulic limits used will be similar to those specified in ASME/ANSI OMa-1988, Part 6. Meaning that the differential pressure limits will be plus or minus 10 percent of its reference value (flow rate will be a set value). There will be no alert limits placed on differential pressure. The AB pumps will be trended to monitor for degradation or abnormal/erratic operation. Also, the vibration readings and limits will be similar to those in ASME/ANSI OMa-1988, Part 6.

SECTION 3.6

PUMP RELIEF REQUESTS

RELIEF REQUEST NO. PR-01

1. PUMP NUMBER: All pumps in the program plan.

2. NUMBER OF ITEMS: 44 pumps.

3. ASME CODE CLASS: 2 & 3

4. ASME CODE, SECTION XI REQUIREMENTS:

   In reference to Table IWP-3100-2, "Allowable Ranges of Test Quantities", pump vibration is to be measured in and compared to values given in mils displacement.

5. BASIS FOR RELIEF:

   The measurement of pump vibration is required so that developing problems can be detected and repairs initiated prior to a pump becoming inoperable. Measurement of vibration only in displacement quantities does not take into account frequency which is also an important factor in determining the severity of the vibration.

6. ALTERNATE TESTING:

   The ASME Code minimum standards require measurement of the vibration amplitude in mils (displacement). Braidwood Station proposes an alternate program of measuring vibration velocity (inches per second) which is more comprehensive than that required by Section XI. This technique is an industry-accepted method which is much more meaningful and sensitive to small changes that are indicative of developing mechanical problems. These velocity measurements detect not only high amplitude vibration, that indicate a major mechanical problem such as misalignment or unbalance, but also the equally harmful low amplitude, high frequency vibration due to bearing wear that usually goes undetected by simple displacement measurements.

   The allowable ranges of vibration and their associated action levels will be patterned after the requirements established in ANSI/ASME OMa-1988, Part 6. These ranges will be used in whole to assess equipment operational readiness for all components.

   The acceptable performance range for all components will be ≤ 2.5 times the reference value, not to exceed .325 inches per second. The alert range, at which time the testing frequency would be doubled, will be > 2.5 to 6 times the reference value, not to exceed .70 inches per second. Any vibrating velocity greater than 6 times the reference value or greater than .70 inches per second will require corrective actions to be performed on the affected component.

   Vibration measurements for all pumps will be obtained and recorded in velocity, inches per second, and will be broadband unfiltered peak measurements. The monitored locations for vibration analysis will be marked so as to permit subsequent duplication in both location and plane.

RELIEF REQUEST NO. PR-01

The frequency response range of the vibration transducers and their readout system shall be capable of frequency responses from one-third minimum pump shaft rotational speed to at least one thousand hertz.

The Vertical Line Shaft Pumps in the program will have vibration measurements taken on the upper motor bearing housing in three orthogonal directions, one of which is the axial direction.

7. JUSTIFICATION:

Measurements of vibration in mils displacement are not sensitive to small changes that are indicative of developing mechanical problems. Therefore, the proposed alternate method of measuring vibration amplitude in inches/second provides added assurance of the continued operability of the pumps. Also, there are no positive displacement pumps or centrifugal pumps which rotate at less than 600 RPM in Braidwood's IST program.

8. APPLICABLE TIME PERIOD:

This relief is requested once per quarter during the first inspection interval.

9. APPROVAL STATUS:

a. Relief granted per NRC Generic Letter 89-04.

b. Added the 1/2 SX04P Booster Pumps, Rev. 5a.

c. Approved per SER dated September 14, 1993.

RELIEF REQUEST NO. PR-02

1. PUMP NUMBER: All pumps in the program plan.

2. NUMBER OF ITEMS: 44 pumps

3. ASME CODE CLASS: 2 & 3

4. ASME CODE, SECTION XI REQUIREMENTS:

   Per IWP-3100, Inservice Test Procedure pump bearing temperatures are required to be measured to detect any change in the mechanical characteristics of a bearing. IWP-3500(b) requires three successive readings taken at ten minute intervals that do not vary more than 3%.

5. BASIS FOR RELIEF:

   a. The CC, CS, DO, RH, SX and WO pump bearings are not provided with permanent temperature detectors or thermal wells. Therefore, gathering data on bearing temperature is impractical. The only temperature measurements possible are from the bearing housing. Measurement of housing temperature on these pumps does not provide positive information on bearing condition or degradation.

   b. Even those cases where bearing temperature monitoring equipment is available, bearing temperature measurements will not provide significant additional information regarding bearing condition other than that already obtained by measuring vibration. Measurement of vibration provides more concise and consistent information with respect to pump and bearing condition. The usage of vibration measurements can provide information as to a change in the balance of rotating parts, misalignment of bearings, worn bearings, changes in internal hydraulic forces and general pump integrity prior to the condition degrading to the point where the component is jeopardized. Bearing temperature does not always predict such problems.

   c. An increase in bearing temperature most often does not occur until the bearing has deteriorated to a point where additional pump damage may occur. Bearing temperatures are also affected by the temperature of the medium being pumped, thus the hydraulic and vibration readings are more consistent. Also, the Code specifically exempts temperature measurement for pump bearings in the main flow path (i.e., the diesel oil transfer pumps).

RELIEF REQUEST NO. PR-02

6. ALTERNATE TESTING:

Quarterly measurement of hydraulic parameters and vibration readings provide a more positive method of monitoring pump condition and bearing degradation.

7. JUSTIFICATION:

By measuring pump hydraulic parameters and vibration velocity, (as described in PR-01), pump operability and the trending of mechanical degradation is assured. Also, since these parameters (i.e., hydraulic parameters and vibration) are measured quarterly, the pump mechanical condition will be more accurately determined than would be possible by measuring bearing temperature on a yearly basis.

8. APPLICABLE TIME PERIOD:

This relief is requested once per year, during the first inspection interval.

9. APPROVAL STATUS:

a. Approved per Rev. 5a SER dated September 14, 1993.

RELIEF REQUEST NO. PR-03

-Deleted-

RELIEF REQUEST NO. PR-04

-Deleted-

RELIEF REQUEST NO. PR-05

Deleted per Rev. 5a SER response dated December 13, 1993.

RELIEF REQUEST NO. PR-06

1. PUMP NUMBER: 1DO01PA, 1DO01PB, 1DO01PC, 1DO01PD, 2DO01PA, 2DO01PB, 2DO01PC, 2DO01PD,

2. NUMBER OF ITEMS: 8 pumps

3. ASME CODE CLASS: 3

4. ASME CODE, SECTION XI REQUIREMENTS:

   Per IWP-3100, differential pressure shall be measured on all pumps that are tested.

5. BASIS FOR RELIEF:

   These pumps are positive displacement Diesel Oil Transfer Pumps. The pump differential pressure is not a factor affecting pump performance, but rather dependent only on the inlet pressure to the pump. As the pump discharge pressure is constant, and the inlet pressure varies with tank level, the differential pressure is not a valid operational parameter.

6. ALTERNATE TESTING:

   Pump discharge pressure for positive displacement pumps is a valid operational parameter. This will be used to evaluate the Diesel Oil Transfer Pumps performance.

7. JUSTIFICATION:

   Using pump discharge pressure in lieu of pump differential pressure will provide meaningful pump performance data for evaluation of operational readiness of the Diesel Oil Transfer Pumps.

8. APPLICABLE TIME PERIOD:

   This relief is requested once per quarter during the first inspection interval.

9. APPROVAL STATUS:

   a. Relief granted per NRC Generic Letter 89-04.

   b. Approved per SER dated October 15, 1991 as PR-4.

RELIEF REQUEST NO. PR-07

Not Used at Braidwood - Byron ONLY

SECTION 4.0

INSERVICE TESTING

PROGRAM PLAN FOR VALVES

BRAIDWOOD STATION UNITS 1 AND 2

TABLE OF CONTENTS

TABLE OF CONTENTS

SECTION 4.1

PROGRAM DESCRIPTION

PROGRAM DESCRIPTION

The Inservice Testing (IST) Program for Class 1, 2, & 3 valves meets the requirements of Subsection IWV of the ASME Section XI Code, 1983 Edition, through the Summer of 1983 Addenda. Where code requirements are determined to be impractical, specific requests for relief are written, referenced, and included with the tables. Additional valve relief requests may be necessary and these will be identified and submitted during subsequent program revisions. Per NRC Generic Letter 89-04, the status of relief requests as stated in the SER is unchanged. Any modifications to Braidwood's Station relief requests approved in the SER which are covered by one of the eleven positions discussed in NRC Generic Letter 89-04, Attachment 1, must be performed in accordance with the guidelines given in the Generic Letter. Pre-approval is granted for all relief requests submitted which are consistent with the eleven positions given. New relief requests dealing with a position <u>not</u> covered by NRC Generic Letter 89-04, Attachment 1, must receive NRC approval prior to implementation. The table lists all code Class 1, 2, & 3 valves which have been assigned a specific code category as directed by Subsection IWV of Section XI. The table is organized according to operating system and listed in valve number order using P&ID references to further categorize.

The valves subject to ISI testing are those valves which are identified in accordance with the scope of ASME Section XI, Subsection IWV-1100:

> "This Subsection provides the rules and requirements for inservice testing to assess operational readiness of certain Class 1, 2, and 3 valves (and their actuating and position indicating systems) in light-water cooled nuclear power plants, which are required to perform a specific function in shutting down a reactor to the cold shutdown condition or in mitigating the consequences of an accident."

Exceptions to this scope are those valves which are exempt, but added to the program based on NRC mandates. These valves are identified in the program notes and relief requests.

After installation and prior to service, all valves identified in this program were tested as required by Subsection IWV-3100 of Section XI of the ASME Code. These tests were conducted under conditions similar to those to be experienced during subsequent inservice tests. When a valve or its control system has been replaced or undergone maintenance that could affect its performance, it will be retested prior to its return to service, to demonstrate that all performance parameters are within acceptable limits.

As required by NRC Generic Letter 89-04, Attachment 1, Position 5, the limiting value of full-stroke time will be based on the valve reference or average stroke time of the valve when it is known to be in good condition and operating properly. This limiting value is based on a reasonable deviation from this reference stroke time based on valve size, valve type, actuator type, system design, dual unit/dual train design, etc. The deviation should not be so restrictive that it results in a valve being declared inoperable due to reasonable stroke time variations. However, the deviation used to establish the limit should be such that corrective action would be taken for a valve that may not perform its intended function. New or additional reference values may be required if:

1) A valve has been replaced,
2) When a reference value or set of values may have been affected by repair or routine servicing of a valve, or
3) If it is necessary or desirable for some reason other than 1) or 2) above.

NRC Generic Letter 89-04, Attachment 1, Positions 1-3 discuss full stroke, alternatives to full stroke, and backflow testing of check valves, respectively. A valid full stroke test is one in which verification of maximum required accident condition flow through the valve is obtained. The minimum acceptable flow value for a specific valve is determined from Technical Specifications, UFSAR, manufacturers data, engineering calculations, etc. An alternative to full stroke testing includes, but is not limited to, a sample disassembly and inspection program of valves grouped by similarity of design (manufacturer, size, model number, materials of construction, etc.) and service conditions (including valve orientation). This sample disassembly and inspection program will be performed during refueling outages. A backflow test verifies that the disc travels to the seat promptly on cessation or reversal of flow, for check valves which perform a safety function in the closed direction. For category A/C check valves (valves that have a specified leak rate limit and are self-actuated in response to a system characteristic), the backflow test is satisfied by performing the leak-rate test.

Per NRC Generic Letter 89-04, Attachment 1, Position #8, whenever valve data is determined to be within the Required Action Range, the valve is inoperable, and the Technical Specification LCO Action Statement time starts. In the event a valve must be declared inoperable as a result of inservice testing, limitations on plant operations will be as stated in the Technical Specifications.

Section XI of the ASME Boiler and Pressure Vessel Code shall not be construed to supersede the requirements of the Technical Specifications.

SECTION 4.2

PROGRAM REFERENCES

PROGRAM REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Domestic Licensing of Production and Utilization Facilities, particularly Section 50.55a, Codes and Standards.

2. ASME Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components, 1983 Edition, Summer 1983 Addenda.

3. ASME/ANSI OM-1987, Operation and Maintenance of Nuclear Power Plants, including 1988 Addenda, Part 10, Inservice Testing of Valves in Light Water Reactor Power Plants.

4. U. S. Nuclear Regulatory Commission, Generic Letter 89-04, Guidance on Developing Acceptable Inservice Testing Programs.

5. Braidwood Station UFSAR, Section 3.9.6.2, Inservice Testing of Valves.

6. Braidwood Station Technical Specification 4.0.5, ASME XI Program Requirements.

7. Braidwood Station Technical Staff Procedures, BVP 200-2, 200-3, & 200-4, IST Requirements for Valves.

8. NRC Safety Evaluation Reports (SER's):

    a. SER dated October 15, 1991 for Rev. 4/4a.

    b. SER dated Setpember 14, 1993 for Revision 5/5a.

SECTION 4.3

VALVE TABLES

TABLF DESCRIPTION

The following information is included in the valve summary tables:

A. REVISION:

The revision corresponds to the current revision of the program.

B. PAGE:

The pages are numbered sequentially and show the total number of tables.

C. VALVE NUMBER:

The valve number references the unique Braidwood Station equipment piece number (EPN). This specific valve number identifies the unit and system.

D. P&ID:

The P&ID column references the specific P&ID number which the valves are located on. The Unit 2 P&ID number is given directly underneath the Unit 1 P&ID number.

E. CLASS:

This column refers to the ASME Code Class assigned to the specific valve (1, 2, 3, N for non-Code, and T for tracking purposes only).

F. VALVE CATEGORY:

The valve category identifies the valve category defined in subarticle IWV-2200 of ASME Section XI.

G. VALVE SIZE:

The valve size lists the nominal pipe size of each valve in inches.

TABLE DESCRIPTION

H. VALVE TYPE:

The valve type categorizes the valve as to its valve design. The following abbreviations will be used to identify specific valve types:

Gate	GA
Globe	GL
Butterfly	BTF
Check	CK
Safety Valve	SV
Relief Valve	RV
Power Operated Relief Valve	PORV
Diaphragm Seated	D
Plug	P
Angle	AN

I. ACT. TYPE:

The actuator type identifies the valve actuator. The following abbreviations will be used to designate specific types of valve actuators:

Motor Operated	M.O.
Air Operated	A.O.
Hydraulic Operated	H.O.
Self Actuated	S.A.
Manual	M
Solenoid Operated	S.O.

J. NORMAL POSITION:

Normal position identifies the normal operating position of a specific valve. O for open and C for closed.

K. STROKE DIRECTION:

The stroke direction identifies the direction the valve actuator moves a specific valve stem to place the valve disc in a position to perform its designed safety function. O for open, and C for closed. This identifies the direction the valve stem will move when tested.

Note: Exercising of a power operated valve will involve stroking the valve to both its open and closed position. The valve will only be timed, however, in the direction designated to perform its safety function. Therefore, the program plan specifies only the direction in which valves must be stroked to be timed.

TABLE DESCRIPTION

L. TEST METHOD:

The test method column identifies specific tests which will be performed on specific valves to fulfill the requirements of Subsection IWV of ASME Section XI. The tests and abbreviations used are as follows:

1. (Bt) Check Valve Back Flow Test

   The check valve disc will be exercised to the closed position required to fulfill its safety function by verifying that the disc travels to the seat promptly on cessation or reversal of flow, except for those valves that can only be back flow tested by means of a seat leakage test.

2. (Ct) Check Valve Full Stroke Test

   The check valve disc will be exercised to the open position required to fulfill its safety function by verifying the maximum required accident flow through the valve or alternatives to full flow testing, per NRC Generic Letter 89-04, Attachment 1, Positions 1 and 2.

3. (Ft) Fail Safe Test

   Valves with fail safe actuators will be tested to verify the valve operator moves the valve stem to the required fail safe position upon loss of actuating power, in accordance with IWV-3415.

   This will be accomplished during the normal stroking of the valve. Upon stroking a valve to its fail safe position, the solenoid operator is de-energized causing air to be vented which in turn allows the spring to move the valve to its fail safe position. This condition simulates loss of actuating power (Electric and/or Air) and hence satisfies the fail safe test requirements of IWV-3415.

4. (It) Position Indication Check

   Valves which are identified to require a Position Indication Test will be inspected in accordance with IWV-3300 of ASME Section XI.

5. (Lt) Seat Leakage Test

   The seat leakage tests will meet the requirements of IWV-3420 for Category A valves. On these valves, seat leakage is limited to a specific maximum amount in the closed position for fulfillment of their safety function.

TABLE DESCRIPTION

6. (Rt) Safety Valve Setpoint Check

   Safety valve setpoints will be verified in accordance with IWV-3510 of ASME Section XI.

7. (St) Full Stroke Test

   Valve exercising tests of Category A and B valves will be performed in accordance with IWV-3410. The test will include full stroke testing to verify operability in the direction required to fulfill the required safety function.

8. (Xt) Partial-Stroke Test

   If only limited operation is practical during plant operation, the valves shall be part-stroke (Xt) exercised during plant operation and full-stroke exercised during cold shutdowns, in accordance with IWV-3412 or IWV-3522.

M. TEST MODE:

Denotes the frequency and plant condition necessary to perform a given test. The following abbreviations are used:

Normal Operation (OP)

Tests designated "OP" will be performed once every 3 months, except in those modes in which the valve is not required to be operable.

Semiannual (S)

Tests with this designation will be conducted once every 6 months, except in those modes in which the valve is not required to be operable.

Cold Shutdown (CS)

Valves that cannot be operated during plant operation shall be full stroke exercised during cold shutdowns. Valve testing will commence within 48 hours after shutdown, with completion of cold shutdown valve testing not being a prerequisite to plant startup. Valve tests which are not completed during a cold shutdown, shall be completed during subsequent cold shutdowns to meet the Code Specified Testing Frequency.

For planned shutdowns, where ample time is available, and testing all the valves identified for cold shutdown test frequency in the IST Program will be accomplished, exceptions to the 48 hours may be taken. In case of frequent cold shutdowns, valve testing need not be performed more often than once during any three-month period.

Reactor Refueling (RR)

Tests with this designation will be conducted during reactor refueling outages only.

TABLE DESCRIPTION

N. RELIEF REQUEST:

Relief requests reference a specific request for relief from code requirements. All relief requests are included in Section 4.6.

O. NOTES:

Notes provide a short explanation concerning a particular IST valve. All notes are included in Section 4.4.

P. TECHNICAL APPROACHES AND POSITIONS:

Technical approaches and positions provide detailed discussions on a particular IST topic. All technical approaches and positions are included in Section 4.5.

Q. REMARKS:

Remarks reference other information useful in determining valve testing requirements or methods.

NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
0AB8473	M-65-5A	3/T	C	2.0	CK	S.A.	C	O	CT	OP			5	
1/2AB8487	M-65-5A	3/T	C	2.0	CK	S.A.	C	O	Ct	OP			5	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2AF001A	M-37 M-122	3	C	6.0	CK	S.A.	C	O C	Xt/Ct Bt	OP/CS RR	 VR-19	12	3 3	
1/2AF001B	M-37 M-122	3	C	6.0	CK	S.A.	C	O C	Xt/Ct Bt	OP/CS RR	 VR-19	12	3 3	
1/2AF003A	M-37 M-122	3	C	6.0	CK	S.A.	C	O	Xt/Ct	OP/CS		12	3 3	
1/2AF003B	M-37 M-122	3	C	6.0	CK	S.A.	C	O	Xt/Ct	OP/CS		12	3 3	
1/2AF006A	M-37 M-122	3	B	6.0	GA	M.O.	C	O	St It	OP RR			1	
1/2AF006B	M-37 M-122	3	B	6.0	GA	M.O.	C	O	St It	OP RR			1	
1/2AF013A	M-37 M-122	2	B	4.0	GL	M.O.	O	C	St It	OP RR			1	
1/2AF013B	M-37 M-122	2	B	4.0	GL	M.O.	O	C	St It	OP RR			1	
1/2AF013C	M-37 M-122	2	B	4.0	GL	M.O.	O	C	St It	OP RR			1	
1/2AF013D	M-37 M-122	2	B	4.0	GL	M.O.	O	C	St It	OP RR			1	
1/2AF013E	M-37 M-122	2	B	4.0	GL	M.O.	O	C	St It	OP RR			1	
1/2AF013F	M-37 M-122	2	B	4.0	GL	M.O.	O	C	St It	OP RR			1	
1/2AF013G	M-37 M-122	2	B	4.0	GL	M.O.	O	C	St It	OP RR			1	
1/2AF013H	M-37 M-122	2	B	4.0	GL	M.O.	O	C	St It	OP RR			1	
1/2AF014A	M-37 M-122	2	C	4.0	CK	S.A.	C	O C	Ct Bt	CS CS		12 12, 30	3 3	
1/2AF014B	M-37 M-122	2	C	4.0	CK	S.A.	C	O C	Ct Bt	CS CS		12 12, 30	3 3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2AF014C	M-37 M-122	2	C	4.0	CK	S.A.	C	O C	Ct Bt	CS CS		12 12, 30	3 3	
1/2AF014D	M-37 M-122	2	C	4.0	CK	S.A.	C	O C	Ct Bt	CS CS		12 12, 30	3 3	
1/2AF014E	M-37 M-122	2	C	4.0	CK	S.A.	C	O C	Ct Bt	CS CS		12 12, 30	3 3	
1/2AF014F	M-37 M-122	2	C	4.0	CK	S.A.	C	O C	Ct Bt	CS CS		12 12, 30	3 3	
1/2AF014G	M-37 M-122	2	C	4.0	CK	S.A.	C	O C	Ct Bt	CS CS		12 12, 30	3 3	
1/2AF014H	M-37 M-122	2	C	4.0	CK	S.A.	C	O C	Ct Bt	CS CS		12 12, 30	3 3	
1/2AF017A	M-37 M-122	3	B	6.0	GA	M.O.	C	O	St It	OP RR			1	
1/2AF017B	M-37 M-122	3	B	6.0	GA	M.O.	C	O	St It	OP RR			1	
1/2AF029A	M-37 M-122	3	C	6.0	CK	S.A.	C	O	Ct	CS		12	3	
1/2AF029B	M-37 M-122	3	C	6.0	CK	S.A.	C	O	Ct	CS		12	3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2CC685	M-66-1A M-139-1	2	A	4.0	GA	M.O.	O	C	St It Lt	CS RR RR	VR-8 VR-1		1	
1/2CC9412A	M-66-2 M-139-2	3	B	12.0	GA	M.O.	C	O	St It	OP RR			1	
1/2CC9412B	M-66-2 M-139-2	3	B	12.0	GA	M.O.	O	C	St It	OP RR			1	
1/2CC9413A	M-66-1A M-139-1	2	A	6.0	GA	M.O.	O	C	St It Lt	CS RR RR	VR-8 VR-1		1	
1/2CC9414	M-66-1A M-139-1	2	A	6.0	GA	M.O.	O	C	St It Lt	CS RR RR	VR-8 VR-1		1	
1/2CC9415	M-66-4D	3	B	16.0	GA	M.O	O	C/O	St It	CS RR		40		
1/2CC9416	M-66-1A M-139-1	2	A	6.0	GA	M.O.	O	C	St It Lt	CS RR RR	VR-8 VR-1		1	
1/2CC9437A	M-66-1A M-139-1	2	B	3.0	GL	A.O.	C	C/O	St/Ft It	OP RR			1,2	
1/2CC9437B	M-66-1A M-139-1	2	B	3.0	GL	A.O.	O	C/O	St/Ft It	OP RR			1,2	
1/2CC9438	M-66-1A M-139-1	2	A	4.0	GA	M.O.	O	C	Lt It St	RR RR CS	VR-1 VR-8		 1	
1/2CC9459B	M-66-3A M-66-3A	3	B	16.0	GA	M	O/C	O/C	St	CS			7	
1/2CC9463A	M-66-3B	3	C	12.0	CK	S.A.	C	O C	Ct/Bt	OP		32	3	
1/2CC9463B	M-66-3B	3	C	12.0	CK	S.A.	C	O C	Ct/Bt	OP		32	3	
0CC9464	M-66-3B	3	C	12.0	CK	S.A.	C	O C	Ct/Bt	OP		32	3	
1/2CC9467B	M-66-4D M-66-4D	3	B	16.0	GA	M	O/C	O/C	St	CS			7	
1/2CC9473A	M-66-3B	3	B	16.0	GA	M.O	C	C/O	St It	OP RR			1	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2CC9473B	M-66-3B	3	B	16.0	GA	M.O.	C	C/O	St It	OP RR			I	
1/2CC9486	M-66-1A M-139-1	2	AC	6.0	CK	S.A.	O	C O	Lt/Bt Ct	RR OP	VR-1, 8 VR-8		3 3	
1/2CC9518	M-66-1A M-139-1	2	AC	.75	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-1, 8 VR-8	24	3 3	
1/2CC9534	M-66-1A M-139-1	2	AC	.75	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-1, 8 VR-8	24	3 3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2CS001A	M-61-4 M-136-4	2	B	14.0	GA	M.O.	O	C	St It	OP RR			1	
1/2CS001B	M-61-4 M-136-4	2	B	14.0	GA	M.O.	O	C	St It	OP RR			1	
1/2CS003A	M-46-1A M-129-1A	2	C	10.0	CK	S.A.	C	O	Xt/Ct	OP/RR	VR-4		3	
1/2CS003B	M-46-1A M-129-1A	2	C	10.0	CK	S.A.	C	O	Xt/Ct	OP/RR	VR-4		3	
1/2CS007A	M-46-1C M-129-1C	2	A	10.0	GA	M.O.	C	O/C	Lt St It	RR OP RR	VR-1		1	
1/2CS007B	M-46-1C M-129-1C	2	A	10.0	GA	M.O.	C	O/C	Lt St It	RR OP RR	VR-1		1	
1/2CS008A	M-46-1C M-129-1C	2	AC	10.0	CK	S.A.	C	O C	Ct/Bt Lt	RR RR	VR-4 VR-1		3 3	
1/2CS008B	M-46-1C M-129-1C	2	AC	10.0	CK	S.A.	C	O C	Ct/Bt Lt	RR RR	VR-4 VR-1		3 3	
1/2CS009A	M-61-4 M-136-4	2	B	16.0	GA	M.O.	C	O	St It	RR OP			1	
1/2CS009B	M-61-4 M-136-4	2	B	16.0	GA	M.O.	C	O	St It	OP RR			1	
1/2CS011A	M-46-1A M-129-1A	2	C	6.0	CK	S.A.	C	O	Xt Ct	OP RR	VR-28		3 3	
1/2CS011B	M-46-1A M-129-1A	2	C	6.0	CK	S.A.	C	O	Xt Ct	OP RR	VR-28		3 3	
1/2CS019A	M-46-1B M-129-1B	2	B	3.0	GA	M.O.	C	O/C	St It	OP RR			1	
1/2CS019B	M-46-1B M-129-1B	2	B	3.0	GA	M.O.	C	O/C	St It	OP RR			1	
1/2CS020A	M-46-1B M-129-1A	2	C	3.0	CK	S.A.	C	O C	Ct Bt	RR OP	VR-2		3 3	
1/2CS020B	M-46-1B M-129-1A	2	C	3.0	CK	S.A.	C	O C	Ct Bt	RR OP	VR-2		3 3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2CV112B	M-64-4A M-138-4B	2	B	4.0	GA	M.O.	C	C	St It	CS RR		4, 28	1	
1/2CV112C	M-64-41 M-138-4B	2	B	4.0	GA	M.O.	O	C	St It	CS RR		4, 28	1	
1/2CV112D	M-64-4B M-138-4A	2	B	8.0	GA	M.O.	C	O/C	St It	CS RR		2	1	
1/2CV112E	M-64-4B M-138-4A	2	B	8.0	GA	M.O.	C	O/C	St It	CS RR		2	1	
1/2CV8100	M-64-2 M-138-2	2	A	2.0	GL	M.O.	O	C	St It Lt	RR RR RR	VR-9 VR-1		1	
1/2CV8104	M-64-4B M-138-4A	2	B	3.0	GL	M.O.	C	O	St It	CS RR		2	1	
1/2CV8105	M-64-3B M-138-3B	2	B	3.0	GA	M.O.	O	C	St It	CS RR		4	1	
1/2CV8106	M-64-3B M-138-3B	2	B	3.0	GA	M.O.	O	C	St It	CS RR		4	1	
1/2CV8110	M-64-3A M-138-3	2	B	2.C	GL	M.O.	O	C/O	St It	OP RR			1	
1/2CV8111	M-64-3A M-138-3A	2	B	2.0	GL	M.O.	O	C/O	St It	OP RR			1	
1/2CV8112	M-64-2 M-138-2	2	A	2.0	GL	M.O.	O	C	St It Lt	RR RR RR	VR-9 VR-1		1	
1/2CV8113	M-64-2 M-138-2	2	AC	0.75	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-1, 9 VR-9		3 3	
1/2CV8114	M-64-3A M-138-3	2	B	2.0	GL	S.O.	O	C/O	St It	OP RR		20	1	
1/2CV8116	M-64-3A M-138-3A	2	b	2.0	GL	S.O.	O	C/O	St It	OP RR		20	1	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2CV8152	M-64-5 M-138-5A	2	A	3.0	GL	A.O.	O	C/O	St It Ft Lt	CS RR CS RR	VR-1	4 4	1 2	
1/2CV8160	M-64-5 M-138-5A	2	A	3.0	GL	A.O.	O	C/O	St It Ft Lt	CS RR CS RR	VR-1	4 4	1 2	
1/2CV8440	M-64-4B M-138-4B	2	C	4.0	CK	S.A.	O	C O	Bt Ct	CS OP		28, 4	3	RCPS NOT RUNNING
1/2CV8442	M-64-4B M-138-4A	2	C	2.0	CK	S.A.	C	O	Ct	CS		2, 29	3	
1/2CV8480A	M-64-3A M-138-3A	2	C	2.0	CK	S.A.	C	O C	Ct Bt	OP OP		31	3 3	
1/2CV8480B	M-64-3A M-138-3A	2	C	2.0	CK	S.A.	C	O C	Ct Bt	OP OP		31	3 3	
1/2CV8481A	M-64-3A M-138-3A	2	C	4.0	CK	S.A.	C	O C	Ct/Xt Bt	RR/OP RR	VR-15A VR-15A		3 3	
1/2CV8481B	M-64-3A M-138-3A	2	C	4.0	CK	S.A.	C	O C	Ct/Xt Bt	RR/OP RR	VR-15A VR-15A		3 3	
1/2CV8546	M-64-4B M-138-4A	2	C	8.0	CK	S.A.	C	O	Ct	RR	VR-15A	2, 26	3	
1/2CV8804A	M-64-4B M-138-41	2	B	8.0	GA	M.O.	C	O	St It	CS RR		2	1	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2DG5182A	M-54-4	NONE	B	3.0	GA	S.O.	C	O	St	OP	VR-13			
1/2DG5182B	M-152-20	NONE	B	3.0	GA	S.O.	C	O	St	OP	VR-13			
1/2DG5183A	M-54-4	NONE	B	3.0	GA	S.O.	C	O	St	OP	VR-13			
1/2DG5183B	M-54-4	NONE	B	3.0	GA	S.O.	C	O	St	OP	VR-13			
1/2DG5184A	M-152-20	NONE	C	3.0	CK	S.A.	C	O	Ct	OP	VR-13		3	
1/2DG5184B	M-152-20	NONE	C	3.0	CK	S.A.	C	O	Ct	OP	VR-13		3	
1/2DG5185A	M-152-20	NONE	C	3.0	CK	S.A.	C	O	Ct	OP	VR-13		3	
1/2DG5185B	M-152-20	NONE	C	3.0	CK	S.A.	C	O	Ct	OP	VR-13		3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2DO003A	M-50-1B	3	C	1.5	CK	S.A.	C	O	Ct	OP			3	
	M-130-1A							C	Bt	OP			3	
1/2DO003B	M-50-1A	3	C	1.5	CK	S.A.	C	O	Ct	OP			3	
	M-130-1B							C	Bt	OP			3	
1/2DO003C	M-50-1B	3	C	1.5	CK	S.A.	C	O	Ct	OP			3	
	M-130-1A							C	Bt	OP			3	
1/2DO003D	M-50-1A	3	C	1.5	CK	S.A.	C	O	Ct	OP			3	
	M-130-1B							C	Bt	OP			3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2FC009	M-63-1A	2	A	4.0	P	M	C	C	Lt	RR	VR-1			PASSIVE
1/2FC010	M-63-1A	2	A	4.0	P	M	C	C	Lt	RR	VR-1			PASSIVE
1/2FC011	M-63-1B M-63-1C	2	A	3.0	P	M	C	C	Lt	RR	VR-1			PASSIVE
1/2FC012	M-63-1B M-63-1C	2	A	3.0	P	M	C	C	Lt	RR	VR-1			PASSIVE

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2FP010	M-52-1	2	B	4.0	GL	A.O.	O	C	St It Ft	OP RR OP			1 2	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2FW009A	M-36-1C M-121-1B	2	B	16.0	GA	H.O.	O	C	St/Xt It	CS/OP RR		3	1	
1/2FW009B	M-36-1A M-121-D	2	B	16.0	GA	H.O.	O	C	St/Xt It	CS/OP RR		3	1	
1/2FW009C	M-36-1D M-121-1A	2	B	16.0	GA	H.O.	O	C	St/Xt It	CS/OP RR		3	1	
1/2FW009D	M-36-1B M-121-1C	2	B	16.0	GA	H.O.	O	C	St/Xt It	CS/OP RR		3	1	
1/2FW034A	M-36-1C M-121-1B	NONE	B	2.0	GL	A.O.	O	C	Ft	RR		21	2	
1/2FW034B	M-36-1A M-121-1D	NONE	B	2.0	GL	A.O.	O	C	Ft	RR		21	2	
1/2FW034C	M-36-1D M-121-1A	NONE	B	2.0	GL	A.O.	O	C	Ft	RR		21	2	
1/2FW034D	M-36-1B M-121-1C	NONE	B	2.0	GL	A.O.	O	C	Ft	RR		21	2	
1/2FW035A	M-36-1C M-121-1B	2	B	3.0	GL	A.O.	O	C	St It Ft	OP RR OP			1 2	
1/2FW035B	M-36-1A M-121-1D	2	B	3.0	GL	A.O.	O	C	St It Ft	OP RR OP			1 2	
1/2FW035C	M-36-1D M-121-1A	2	B	3.0	GL	A.O.	O	C	St It Ft	OP RR OP			1 2	
1/2FW035D	M-36-1B M-121-1C	2	B	3.0	GL	A.O.	O	C	St It Ft	OP RR OP			1 2	
1/2FW036A	M-36-1C M-121-1B	2	C	3.0	CK	S.A.	O	C	Bt	CS		38	3	
1/2FW036B	M-36-1A M-121-1A	2	C	3.0	CK	S.A.	O	C	Bt	CS		38	3	
1/2FW036C	M-36-1D M-121-1C	2	C	3.0	CK	S.A.	O	C	Bt	CS		38	3	
1/2FW036D	M-36-1B M-121-1C	2	C	3.0	CK	S.A.	O	C	Bt	CS		38	3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2FW039A	M-36-1C M-121-1B	2	B	6.0	GA	A.O.	O	C	St It Ft	OP RR CS		10 10	1 2	
1/2FW039B	M-36-1A M-121-1D	2	B	6.0	GA	A.O.	O	C	St It Ft	CS RR CS		10 10	1 2	
1/2FW039C	M-36-1D M-121-1A	2	B	6.0	GA	A.O.	O	C	St It Ft	CS RR CS		10 10	1 2	
1/2FW039D	M-36-1B M-121-1C	2	B	6.0	GA	A.O.	O	C	St It Ft	CS RR CS		10 10	1 2	
1/2FW043A	M-36-1C M-121-1B	2	B	3.0	GL	A.O.	C	C	St It Ft	OP RR OP			1 2	
1/2FW043B	M-36-1A M-121-1D	2	B	3.0	GL	A.O.	C	C	St It Ft	OP RR OP			1 2	
1/2FW043C	M-36-1D M-121-1A	2	B	3.0	GL	A.O.	C	C	St It Ft	OP RR OP			1 2	
1/2FW043D	M-36-1-B M-121-1C	2	B	3.0	GL	A.O.	C	C	St It Ft	OP RR OP			1 2	
1/2FW079A	M-36-1C M-121-1B	2	C	16.0	CK	S.A.	O	C	Bt	CS		39	3	
1/2FW079B	M-36-1A M-121-1D	2	C	16.0	CK	S.A.	O	C	Bt	CS		39	3	
1/2FW079C	M-36-1D M-121-1A	2	C	16.0	CK	S.A.	O	C	Bt	CS		39	3	
1/2FW079D	M-36-1B M-121-1C	2	C	16.0	CK	S.A.	O	C	Bt	CS		39	3	
1/2FW510	M-36-1C M-121-1	NONE	B	16.0	AN	A.O.	O	C	Ft	RR		16	2	
1/2FW510A	M-36-1C M-121-1	NONE	B	4.0	GA	A.O.	C	C	Ft	RR		17	2	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2FW520	M-36-1A M-121-1	NONE	B	16.0	AN	A.O.	O	C	Ft	RR		16	2	
1/2FW520A	M-36-1A M-121-1	NONE	B	4.0	GA	A.O.	C	C	Ft	RR		17	2	
1/2FW530	M-36-1D M-121-1A	NONE	B	16.0	AN	A.O.	O	C	Ft	RR		16	2	
1/2FW530A	M-36-1D M-121-1A	NONE	B	4.0	GA	A.O.	C	C	Ft	RR		17	2	
1/2FW540	M-36-1B M-121-1C	NONE	B	16.0	AN	A.O.	O	C	Ft	RR		16	2	
1/2FW540A	M-36-1B M-121-1C	NONE	B	4.0	GA	A.O.	C	C	Ft	RR		17	2	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2IA065	M-55-10 M-55-15	2	A	3.0	GL	A.O.	O	C	Lt St Ft It	RR RR RR RR	VR-1 VR-10 VR-10		 1 2	
1/2IA066	M-55-10 M-55-15	2	A	3.0	GL	A.O.	O	C/O	Lt St Ft It	RR RR RR RR	VR-1 VR-10 VR-10		 1 2	
1/2IA091	M-55-10 M-55-15	2	AC	0.75	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-1, 10 VR-10		3 3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TEC.. POS. (VA)	REMARKS
1/2MS001A	M-35-2 M-120-2A	2	B	30.25	GA	H.O.	O	C	St/Xt It	CS/OP RR		1	1	
1/2MS001B	M-35-1 M-120-1	2	B	30.25	GA	H.O.	O	C	St/Xt It	CS/OP RR		1	1	
1/2MS001C	M-35-2 M-120-1	2	B	30.25	GA	H.O.	O	C	St/Xt It	CS/OP RR		1	1	
1/2MS001D	M-35-1 M-120-1	2	B	30.25	GA	H.O.	O	C	St/Xt It	CS/OP RR		1	1	
1/2MS013A	M-35-2 M-120-2A	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS013B	M-35-1 M-120-1	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS013C	M-35-2 M-120-2B	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS013D	M-35-1 M-120-1	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS014A	M-35-2 M-120-2A	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS014B	M-35-1 M-120-1	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS014C	M-35-2 M-120-2B	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS014D	M-35-1 M-120-1	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS015A	M-35-2 M-120-2A	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS015B	M-35-1 M-120-1	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS015C	M-35-2 M-120-2B	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				
1/2MS015D	M-35-1 M-120-1	2	C	6.0 X 10.0	SV	S.A.	C	O/C	Rt	RR				

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2MS016A	M-35-2 M-120-2A	2	C	6.0 X 10.0	SV	S.A.	O	O/C	Rt	RR				
1/2MS016B	M-35-1 M-120-1	2	C	6.0 X 10.0	SV	S.A.	O	O/C	Rt	RR				
1/2MS016C	M-35-2 M-120-2B	2	C	6.0 X 10.0	SV	S.A.	O	O/C	Rt	RR				
1/2MS016D	M-35-1 M-120-1	2	C	6.0 X 10.0	SV	S.A.	O	O/C	Rt	RR				
1/2MS017A	M-35-2 M-120-2A	2	C	6.0 X 10.0	SV	S.A.	O	O/C	Rt	RR				
1/2MS017B	M-35-1 M-120-1	2	C	6.0 X 10.0	SV	S.A.	O	O/C	Rt	RR				
1/2MS017C	M-35-2 M-120-2B	2	C	6.0 X 10.0	SV	S.A.	O	O/C	Rt	RR				
1/2MS017D	M-35-1 M-120-1	2	C	6.0 X 10.0	SV	S.A.	O	O/C	Rt	RR				
1/2MS018A	M-35-2 M-120-2A	2	B	6.0 X 6.0	PORV	H.O.	C	C/O	St It Ft	OP RR OP	VR-12	1 2		
1/2MS018B	M-35-1 M-120-1	2	B	6.0 X 6.0	PORV	H.O.	C	C/O	St It Ft	OP RR OP	VR-12	1 2		
1/2MS018C	M-35-2 M-120-2B	2	B	6.0 X 6.0	PORV	H.O.	C	C/O	St It Ft	OP RR OP	VR-12	1 2		
1/2MS018D	M-35-1 M-120-1	2	B	6.0 X 6.0	PORV	H.O.	C	C/O	St It Ft	OP RR OP	VR-12	1 2		

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2MS019A	M-35-2 M-120-2A	2	B	6.0	GT	M	O	C	St	OP				
1/2MS019B	M-35-1 M-120-1	2	B	6.0	GT	M	O	C	St	OP				
1/2MS019C	M-35-2 M-120-2B	2	B	6.0	GT	M	O	C	St	OP				
1/2MS019D	M-35-1 M-120-1	2	B	6.0	GT	M	O	C	St	OP				
1/2MS101A	M-35-2 M-120-2A	2	B	4.0	GL	A.O.	C	C	St It Ft	OP RR OP			1 2	
1/2MS101B	M-35-1 M-120-1	2	B	4.0	GL	A.O.	C	C	St It Ft	OP RR OP			1 2	
1/2MS101C	M-35-1 M-120-2B	2	B	4.0	GL	A.O.	C	C	St It Ft	OP RR OP			1 2	
1/2MS101D	M-35-1 M-120-1	2	B	4.0	GL	A.O.	C	C	St It Ft	OP RR OP			1 2	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2OG057A	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	RR OP RR	VR-1		1	
1/2OG079	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	RR OP RR	VR-1		1	
1/2OG080	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	RR OP RR	VR-1		1	
1/2OG081	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	RR OP RR	VR-1		1	
1/2OG082	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	RR OP RR	VR-1		1	
1/2OG083	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	RR OP RR	VR-1		1	
1/2OG084	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	RR OP RR	VR-1		1	
1/2OG085	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	RR OP RR	VR-1		1	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2PR001A	M-78-10 M-151-1	2	A	1.0	GL	A.O.	O	C	Lt Ft St It	RR OP OP RR	VR-1		2 1	
1/2PR001B	M-78-10 M-151-1	2	A	1.0	GL	A.O.	O	C	Lt Ft St It	RR OP OP RR	VR-1		2 1	
1/2PR002E	M-78-6	2	A	2.0	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2PR002F	M-78-6	2	A	2.0	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2PR002G	M-78-6	2	AC	2.0	CK	S.A.	C	C	Lt	RR	VR-1			PASSIVE
1/2PR002H	M-78-6	2	AC	2.0	CK	S.A.	C	C	Lt	RR	VR-1			PASSIVE
1/2PR032	M-78-10 M-151-1	2	AC	1.0	CK	S.A.	C	C	Lt/Bt	RR	VR-1, 24		3	
1/2PR033A	M-78-6	2	A	2.0	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2PR033B	M-78-6	2	A	2.0	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2PR033C	M-78-6	2	A	2.0	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2PR033D	M-78-6	2	A	2.0	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2PR066	M-78-10 M-151-1	2	A	1.0	GL	A.O.	O	C	Lt Ft It St	RR OP RR OP	VR-1		2 1	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2PS228A	M-68-7 M-140-6	2	A	0.5	GA	S.O.	O	C/O	Lt St Ft It	RR OP OP RR	VR-1 VR-12	20	1 2	
1/2PS228B	M-68-7 M-140-6	2	A	0.5	GA	S.O.	O	C/O	Lt St Ft It	RR OP OP RR	VR-1 VR-12	20	1 2	
1/2PS229A	M-68-7 M-140-6	2	A	0.5	GA	S.O.	O	C/O	Lt St Ft It	RR OP OP RR	VR-1 VR-12	20	1 2	
1/2PS229B	M-68-7 M-140-6	2	A	0.5	GA	S.O.	O	C/O	Lt St Ft It	RR OP OP RR	VR-1 VR-12	20	1 2	
1/2PS230A	M-68-7 M-140-6	2	A	0.5	GA	S.O.	C	C/O	Lt St Ft It	RR OP OP RR	VR-1 VR-12	20	1 2	
1/2PS230B	M-68-7 M-140-6	2	A	0.5	GA	S.O.	C	C/O	Lt St Ft It	RR OP OP RR	VR-1 VR-12	20	1 2	
1/2PS231A	M-68-7 M-140-6	2	AC	.75	CK	S.A.	C	C O	Lt/Bt Ct	RR OP	VR-1, 25	22	3 3	
1/2PS231B	M-68-7 M-140-6	2	AC	.75	CK	S.A.	C	C O	Lt/Bt Ct	RR OP	VR-1, 25	22	3 3	

o:\depts\zd79g\217/60

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2PS9354A	M-68-7 M-140-1	2	A	0.375	GL	A.O.	C	C	St	OP			1	
									Lt	RR	VR-1			
									It	RR				
									Ft	OP			2	
1/2PS9354B	M-68-1B M-140-1	2	A	0.375	GL	A.O.	C	C	St	OP		1		
									Lt	RR	VR-1			
									It	RR				
									Ft	OP		2		
1/2PS9355A	M-68-1B M-140-1	2	A	0.375	GL	A.O.	C	C	St	OP		1		
									Lt	RR	VR-1			
									It	RR				
									Ft	OP		2		
1/2PS9355B	M-68-1B M-140-1	2	A	0.375	GL	A.O.	C	C	St	OP		1		
									Lt	RR	VR-1			
									It	RR				
									Ft	OP		2		
1/2PS9356A	M-68-1A M-140-1	2	A	0.375	GL	A.O.	C	C	St	OP		1		
									Lt	RR	VR-1			
									It	RR				
									Ft	OP		2		
1/2PS9356B	M-68-1A M-140-1	2	A	0.375	GL	A.O.	C	C	St	OP		1		
									Lt	RR	VR-1			
									It	RR				
									Ft	OP		2		
1/2PS9357A	M-68-1B M-140-1	2	A	0.375	GL	A.O.	C	C	St	OP		1		
									Lt	RR	VR-1			
									It	RR				
									Ft	OP		2		
1/2PS9357B	M-68-1B M-140-1	2	A	0.375	GL	A.O.	C	C	St	OP		1		
									Lt	RR	VR-1			
									It	RR				
									Ft	OP		2		

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2RC014A	M-60-1B M-135-1B	1	B	1.0	GL	S.O.	C	O/C	St Ft It	CS CS RR	VR-12	7 7 20	1 2	
1/2RC014B	M-60-1B M-135-1B	1	B	1.0	GL	S.O.	C	O/C	St Ft It	CS CS RR	VR-12	7 7 20	1 2	
1/2RC014C	M-60-1B M-135-1B	1	B	1.0	GL	S.O.	C	O/C	St Ft It	CS CS RR	VR-12	7 7 20	1 2	
1/2RC014D	M-60-1B M-135-1B	1	B	1.0	GL	S.O.	C	O/C	St Ft It	CS CS RR	VR-12	7 7 20	1 2	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2RE1003	M-70-1 M-141-1	2	A	3.0	D	A.O.	C	C	St Lt It Ft	OP RR RR OP	VR-1		1 2	
1/2RE9157	M-70-1 M-141-1	2	A	1.0	D	A.O.	O	C	St Lt It Ft	OP RR RR OP	VR-1		1 2	
1/2RE9159A	M-70-1 M-141-1	2	A	.75	D	A.O.	O	C	St Lt It Ft	OP RR RR OP	VR-1		1 2	
1/2RE9159B	M-70-1 M-141-1	2	A	.75	D	A.O.	C	C	St Lt It Ft	OP RR RR OP	VR-1		1 2	
1/2RE9160A	M-70-1 M-141-1	2	A	1.0	D	A.O.	O	C	St Lt It Ft	OP RR RR OP	VR-1		1 2	
1/2RE9160B	M-70-1 M-141-1	2	A	1.0	D	A.O.	O	C	St Lt It Ft	OP RR RR OP	VR-1		1 2	
1/2RE9170	M-70-1 M-141-1	2	A	3.0	D	A.O.	O	C	St Lt It Ft	OP RR RR OP	VR-1		1 2	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2RF026	M-48-6B	2	A	2.0	P	A.O.	O	C	Lt St It Ft	RR OP RR OP	VR-1		1 2	
1/2RF027	M-48-6A	2	A	2.0	P	A.O.	O	C	Lt St It Ft	RR OP RR OP	1 2			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2RH610	M-62 M-137	2.0	B	3.0	GA	M.O.	O	C/O	St It	OP RR				
1/2RH611	M-62 M-137	2.0	B	3.0	GA	M.O.	O	C/O	St It	OP RR				
1/2RH8701A	M-62 M-137	1.0	A	12.0	GA	M.O.	C	O/C	St It Lt	CS RR RR		5.0 6.0	1.0	
1/2RH8701B	M-62 M-137	1.0	A	12.0	GA	M.O.	C	O/C	St It Lt	CS RR RR		5.0 6.0	1.0	
1/2RH8702A	M-62 M-137	1.0	A	12.0	GA	M.O.	C	O/C	St It Lt	CS RR RR		5.0 6.0	1.0	
1/2RH8702B	M-62 M-137	1.0	A	12.0	GA	M.O.	C	O/C	St It Lt	CS RR RR		5.0 6.0	1.0	
1/2RH8705A	M-62 M-137	2.0	AC	.75	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-15B VR-15B	6.0 24, 35	3.0 3.0	
1/2RH8705B	M-62 M-137	2.0	AC	.75	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-15B VR-15B	6.0 24, 35	3.0 3.0	
1/2RH8708A	M-62 M-137	2.0	C	3.0 X 4.0	RV	S.A.	C	O	Rt	RR				
1/2RH8708B	M-62 M-137	2.0	C	3.0 X 4.0	RV	S.A.	C	O	Rt	RR				
1/2RH8730A	M-62 M-137	2.0	C	8.0	CK	S.A.	C	O C	Ct/Xt Bt	CS/OP CS		8.0	3.0 3.0	
1/2RH8730B	M-62 M-137	2.0	C	8.0	CK	S.A.	C	O C	Ct/Xt Bt	CS/OP CS		8.0	3.0 3.0	
1/2RH8716A	M-62 M-137	2.0	B	8.0	GA	M.O.	O	C/O	St It	CS RR		37.0	1, 4	
1/2RH8716B	M-62 M-137	2.0	B	8.0	GA	M.O.	O	C/O	St It	CS RR		37.0	1, 4	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2RY075	M-2060-6 M-2135-6	2.0	A	0.5	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2RY455A	M-60-5 M-135-5	1.0	B	3.0	PORV	C	O/C	St It Ft	CS RR CS		36.0		1.0 2.0	
1/2RY456	M-60-5 M-135-5	1.0	B	3.0	PORV	C	O/C	St It Ft	CS RR CS		36.0		1.0 2.0	
1/2RY8000A	M-60-5 M-135-5	1.0	B	3.0	GA	O	C	St It					1.0	
1/2RY8000B	M-60-5 M-135-5	1.0	B	3.0	GA	O	C	St It	RR				1.0	
1/2RY8010A	M-60-5 M-135-5	1.0	C	6.0	SV	C	O/C	Rt It	RR RR					
1/2RY8010B	M-60-5 M-135-5	1.0	C	6.0	SV	C	O/C	Rt It	RR RR					
1/2RY8010C	M-60-5 M-135-5	1.0	C	6.0	SV	C	O/C	Rt It	RR RR					
1/2RY8025	M-60-6 M-135-6	2.0	A	.375	GL	C	C	St Lt It Ft	OP RR RR OP	VR-1			1.0 2.0	
1/2RY8026	M-60-6 M-135-6	2.0	A	.375	GL	O	C	St Lt It Ft	OP RR RR OP	VR-1			1.0 2.0	
1/2RY8028	M-60-6 M-135-6	2.0	A	3.0	D	O	C	St Lt It Ft	OP RR RR OP	VR-1			1.0 2.0	
1/2RY8033	M-60-6 M-135-6	2.0	A	0.75	D	O	C	St Lt It Ft	OP RR RR OP	VR-1 VR-12			1.0 2.0	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS (VA)	REMARKS
1/2RY8046	M-60-6 M-135-6	2.0	AC	3.0	CK	S.A.	C	C	Lt/Bt	RR	VR-1, 26		3.0 3.0	
1/2RY8047	M-60-6 M-135-6	2.0	AC	0.75	CK	S.A.	C	C	Lt/Bt	RR	VR-1, 26		3.0 3.0	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2SA032	M-54-2	2	A	1.5	GL	A.O.	O	C	Lt St It Ft	RR OP RR OP	VR-1	 1 2		
1/2SA033	M-54-2	2	A	1.5	GL	A.O.	O	C	Lt St It Ft	RR OP RR OP	VR-1	 1 2		

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2SD002A	M-48-5A/B	2	A	2	GL	A.O.	O	C	Lt St It Ft	RR OP RR OP		34	1 2	
1/2SD002B	M-48-5A/B	2	A	2	GL	A.O.	O	C	Lt St It Ft	RR OP RR OP		34	1 2	
1/2SD002C	M-48-5A/B	2	A	2	GL	A.O.	O	C	Lt St It Ft	RR OP RR OP		34	1 2	
1/2SD002D	M-48-5A/B	2	A	2	GL	A.O.	O	C	Lt St It Ft	RR OP RR OP		34	1 2	
1/2SD002E	M-48-5A/B	2	A	2.0	GL	A.O.	O	C	Lt St It Ft	RR OP RR OP		34	1 2	
1/2SD002F	M-48-5A/B	2	A	2.0	GL	A.O.	O	C	Lt St It Ft	RR OP RR OP		34	1 2	
1/2SD002G	M-48-5A/B	2	A	2.0	GL	A.O.	O	C	Lt St It Ft	RR OP RR OP		34	1 2	
1/2SD002H	M-48-5A/B	2	A	2.0	GL	A.O.	O	C	Lt St It Ft	RR OP RR OP		34	1 2	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2SD005A	M-48-5A/B	2	A	0.375	GL	A.O.	O	C	St Lt It Ft	OP RR RR OP		34	1 2	
1/2SD005B	M-48-5A/B	2	A	0.375	GL	A.O.	O	C	St Lt It Ft	OP RR RR OP		34	1 2	
1/2SD005C	M-48-5A/B	2	A	0.375	GL	A.O.	O	C	St Lt It Ft	OP RR RR OP		34	1 2	
1/2SD005D	M-48-5A/B	2	A	0.375	GL	A.O.	O	C	St Lt It Ft	OP RR RR OP		34	1 2	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2SI8801A	M-61-2 M-136-2	2.0	B	4.0	GA	M.O.	C	O/C	St It	CS RR		13	1	
1/2SI8801B	M-61-2 M-136-2	2.0	B	4.0	GA	M.O.	C	O/C	St It	CS RR		13	1	
1/2SI8802A	M-61-3 M-136-3	2.0	B	4.0	GA	M.O.	C	O/C	St It	CS RR		14	1	
1/2SI8802B	M-61-3 M-136-3	2.0	B	4.0	GA	M.O.	C	O/C	St It	CS RR		14	1	
1/2SI8804B	M-61-1A M-136-1	2.0	B	8.0	GA	M.O.	C	O	St It	OP RR			1	
1/2SI8806	M-61-1A M-136-1	2.0	B	8.0	GA	M.O.	O	O/C	St It	OP RR		14	1	
1/2SI8807A	M-61-1A M-136-1	2.0	B	8.0	GA	M.O.	C	O	St It	OP RR			1	
1/2SI8807B	M-61-1A M-136-1	2.0	B	8.0	GA	M.O	C	O	St It	OP RR			1	
1/2SI8809A	M-61-4 M-136-4	2.0	B	8.0	GA	M.O.	O	O/C	St It	CS RR		14	1	
1/2SI8809B	M-61-4 M-136-4	2.0	B	8.0	GA	M.O.	O	O/C	St It	CS RR		14	1	
1/2SI8811A	M-61-4 M-136-4	2.0	B	24.0	GA	M.O.	C	O/C	St It	RR RR	VR-16		1	
1/2SI8811B	M-61-4 M-136-4	2.0	B	24.0	GA	M.O.	C	O/C	St It	RR RR	VR-16		1	
1/2SI8812A	M-61-4 M-136-4	2.0	B	12.0	GA	M.O.	O	C	St It	OP RR			1	
1/2SI8812B	M-61-4 M-136-4	2.0	B	12.0	GA	M.O.	O	C	St It	OP RR			1	
1/2SI8813	M-61-1B M-136-1	2.0	B	2.0	GL	M.O.	O	C	St It	CS RR		14	1	
1/2SI8814	M-61-1A M-136-1	2.0	B	1.5	GL	M.O.	O	C	St It	OP RR			1	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2SI8815	M-61-2	1	AC	3.0	CK	S.A.	C	O	Ct	RR	VR-15A		3	
	M-136-2							C	Lt/Bt	RR	VR-15A	6	3	
1/2SI8818A	M-61-4	1	AC	6.0	CK	S.A.	C	O	Ct/Bt	CS		9	3	
	M-136-4							C	Lt	RR		6, 23	3	
1/2SI8818B	M-61-4	1	AC	6.0	CK	S.A.	C	O	Ct/Bt	CS		9	3	
	M-136-4							C	Lt	RR		6, 23	3	
1/2SI8818C	M-61-4	1	AC	6.0	CK	S.A.	C	O	Ct/Bt	CS		9	3	
	M-136-4							C	Lt	RR		6, 23	3	
1/2SI8818D	M-61-4	1	AC	6.0	CK	S.A.	C	O	Ct/Bt	CS		9	3	
	M-136-4							C	Lt	RR		6, 23	3	
1/2SI8819A	M-61-3	1	AC	2.0	CK	S.A.	C	O	Lt/Bt	RR	VR-15C	6, 23	3	
	M-136-3							C	Ct	RR	VR-15C		3	
1/2SI8819B	M-61-3	1	AC	2.0	CK	S.A.	C	O	Lt/Bt	RR	VR-15C	6, 23	3	
	M-136-3							C	Ct	RR	VR-15C		3	
1/2SI8819C	M-61-3	1	AC	2.0	CK	S.A.	C	O	Lt/Bt	RR	VR-15C	6, 23	3	
	M-136-3							C	Ct	RR	VR-15C		3	
1/2SI8819D	M-61-3	1	AC	2.0	CK	S.A.	C	O	Lt/Bt	RR	VR-15C	6, 23	3	
	M-136-3							C	Ct	RR	VR-15C		3	
1/2SI8821A	M-61-3	2	B	4.0	GA	M.O.	O	C/O	St	OP			1	
	M-136-3								It	RR				
1/2SI8821B	M-61-3	2	B	4.0	GA	M.O.	O	C/O	St	OP			1	
	M-136-3								It	RR				
1/2SI8835	M-61-3	2	B	4.0	GA	M.O.	O	C/O	St	CS		14	1	
	M-136-3								It	RR				
1/2SI8840	M-61-3	2	B	12.0	GA	M.O.	C	C/O	St	CS		14	1	
	M-136-3								It	RR				
1/2SI8841A	M-61-3	1	AC	8.0	CK	S.A.	C	C	Lt	RR		6	3	
	M-136-3							O	Ct/Bt	RR	VR-15D		3	
1/2SI8841B	M-61-3	1	AC	8.0	CK	S.A.	C	C	Lt	RR		6	3	
	M-136-3							O	Ct/Bt	RR	VR-15D		3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2SI8871	M-61-2	2.0	A	.75	GL	A.O.	C	C	St	OP			1	
	M-136-6								Lt	RR	VR-1			
									It	RR				
									Ft	OP			2	
1/2SI8880	M-61-6	2.0	A	1.0	GL	A.O.	C	C	St	OP			1	
	M-136-6								Lt	RR	VR-1			
									It	RR				
									Ft	OP			2	
1/2SI8888	M-61-3	2.0	A	.75	GL	A.O.	C	C	St	OP			1	
	M-136-3								Lt	RR	[illegible]1			
									It	RR				
									Ft	OP			2	
1/2SI8900A	M-61-2	1.0	AC	1.5	CK	S.A.	C	O	Ct	RR	VR-15A		3	
	M-136-2							C	Lt/Bt	RR	VR-15A	6	3	
1/2SI8900B	M-61-2	1.0	AC	1.5	CK	S.A.	C	O	Ct	RR	VR-15A		3	
	M-136-2							C	Lt/Bt	RR	VR-15A	6	3	
1/2SI8900C	M-61-2	1.0	AC	1.5	CK	S.A.	C	O	Ct	RR	VR-15A		3	
	M-136-2							C	Lt/Bt	RR	VR-15A	6	3	
1/2SI8900D	M-61-2	1.0	AC	1.5	CK	S.A.	C	O	Ct	RR	VR-15A		3	
	M-136-2							C	Lt/Bt	RR	VR-15A	6	3	
1/2SI8905A	M-61-3	1.0	AC	2.0	CK	S.A.	C	O	Ct	RR	VR-15C		3	
	M-136-3							C	Lt/Bt	RR	VR-15C	6	3	
1/2SI8905B	M-61-3	1.0	AC	2.0	CK	S.A.	C	O	Ct	RR	VR-15C		3	
	M-136-3							C	Lt/Bt	RR	VR-15C	6	3	
1/2SI8905C	M-61-3	1.0	AC	2.0	CK	S.A.	C	O	Ct	RR	VR-15C		3	
	M-136-3							C	Lt/Bt	RR	VR-15C	6	3	
1/2SI8905D	M-61-3	1.0	AC	2.0	CK	S.A.	C	O	Ct	RR	VR-15C		3	
	M-136-3							C	Lt/Bt	RR	VR-15C	6	3	
1/2SI8919A	M-61-1A	2.0	C	1.5	CK	S.A.	C	O	Ct	OP			3	
	M-136-1							C	Bt	OP		31	3	
1/2SI8919B	M-61-1A	2.0	C	1.5	CK	S.A.	C	O	Ct	OP			3	
	M-136-1							C	Bt	OP		31	3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2SI8920	M-61-1A M-136-1	2	B	1.5	GL	M.O.	O	C	St It	OP RR			1	
1/SI8922A	M-61-1A M-136-1	2	C	4.0	CK	S.A.	C	O C	Ct Bt	RR RR	VR-3 VR-3		3 3	
1/2SI8922B	M-61-1A M-136-1	2	C	4.0	CK	S.A.	C	O C	Ct Bt	RR RR	VR-3 VR-3		3 3	
1/2SI8924	M-61-1A M-136-1	2	B	8.0	GA	M.O.	O	C/O	St It	OP RR			1	
1/2SI8926	M-61-1A M-136-1	2	C	8.0	CK	S.A.	C	O	Ct/Xt	RR/OP	VR-6	25	3	
1/2SI8948A	M-61-5 M-136-5	1	AC	10.0	CK	S.A.	C	C O	Lt Xt/Bt Ct	RR CS RR	VR-5 VR-5 VR-5	6, 23	3 3 3	
1/2SI8948B	M-61-5 M-136-5	1	AC	10.0	CK	S.A.	C	C O	Lt Xt/Bt Ct	RR CS RR	VR-5 VR-5 VR-5	6, 23	3 3 3	
1/2SI8948C	M-61-6 M-136-6	1	AC	10.0	CK	S.A.	C	C O	Lt Xt/Bt Ct	RR CS RR	VR-5 VR-5 VR-5	6, 23	3 3 3	
1/2SI8948D	M-61-6 M-136-6	1	AC	10.0	CK	S.A.	C	C O	Lt Xt/Bt Ct	RR CS RR	VR-5 VR-5 VR-5	6, 23	3 3 3	
1/2SI8949A	M-61-3 M-136-3	1	AC	8.0	CK	S.A.	C	C O	Lt Ct/Bt	RR RR	 VR-15D	6	3 3	
1/2SI8949B	M-61-3 M-136-3	1	AC	8.0	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-15C VR-15C	6	3 3	
1/2SI8949C	M-61-3 M-136-3	1	AC	8.0	CK	S.A.	C	C O	Lt Ct/Bt	R. RR	 VR-15D	6	3 3	
1/2SI8949D	M-61-3 M-136-3	1	AC	8.0	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-15C VR-15C	6	3 3	
1/2SI8956A	M-61-5 M-136-5	1	AC	10.0	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-5 VR-5	6	3 3	
1/2SI8956B	M-61-5 M-136-5	1	AC	10.0	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-5 VR-5	6	3 3	
1/2SI8956C	M-61-6 M-136-6	1	AC	10.0	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-5 VR-5	6	3 3	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2SI8956D	M-61-6 M-136-6	1	AC	10.0	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	VR-5 VR-5	6	3 3	
1/2SI8958A	M-61-4 M-136-4	2	C	12.0	CK	S.A.	C	O C	Ct Bt	CS OP		9 27	3 3	
1/2SI8958B	M-61-4 M-136-4	2	C	12.0	CK	S.A.	C	O C	Ct Bt	CS OP		9 27	3 3	
1/2SI8964	M-61-6 M-136-6	2	A	.75	GL	A.O.	C	C	St Lt ft Ft	OP RR RR OP	 VR-1		1 2	
1/2SI8968	M-61-6 M-136-6	2	AC	1.0	CK	S.A.	C	C	Lt	RR	VR-1			PASSIVE

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
0SX007	M-42-2A	3.0	B	30.0	BTF	M.O.	C	O	St It	OP RR			1.0	
0SX146	M-42-2A	3.0	B	30.0	BTF	M.O.	C	O	St It	OP RR			1.0	
0SX147	M-42-2A	3.0	B	30.0	BTF	M.O.	C	O	St It	OP RR			1.0	
1/2SX002A	M-42-1B	3.0	C	36.0	CK	S.A.	C	O C	Ct Bt	OP OP			3 3	
1/2SX002B	M-42-1A	3.0	C	36.0	CK	S.A.	C	O C	Ct Bt	OP OP			3 3	
1/2SX016A	M-42-5B M-126-3	2.0	B	16.0	BTF	M.O.	O	O/C	St It	OP RR			1	
1/2SX016B	M-42-5A M-126-3	2.0	B	16.0	BTF	M.O.	O	O/C	St It	OP RR			1	
1/2SX027A	M-42-5B M-126-3	2.0	B	16.0	BTF	M.O.	O	O/C	St It	OP RR			1	
1/2SX027B	M-42-5A M-126-3	2.0	B	16.0	BTF	M.O.	O	O/C	St It	OP RR			1	
1/2SX101A	M-42-3 M-126-1	3.0	B	1.5	GL	S.O.	C	C O	St Ft	OP OP			6 2, 6	
1/2SX112A	M-42-3 M-126-1	3.0	B	12.0	BTF	A.O.	O	C	St It Ft	OP RR OP			1 2	
1/2SX112B	M-42-3 M-126-1	3.0	B	12.0	BTF	A.O.	O	C	St It Ft	OP RR OP			1 2	
1/2SX114A	M-42-3 M-126-1	3.0	B	12.0	BTF	A.O.	O	C	St It Ft	OP RR OP			1 2	
1/2SX114B	M-42-3 M-126-1	3.0	B	12.0	BTF	A.O.	O	C	St It Ft	OP RR OP			1 2	
1/2SX116A	M-42-2B M-42-2B	3.0	C	3.0	CK	S.A.	O	O	Ct	OP			3.0	
1/2SX116B	M-42-2B M-42-2B	3.0	C	3.0	CK	S.A.	O	O	Ct	OP			3.0	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2SX147A	M-42-3 M-126-1	3.0	B	15.0	BTF	A.O.	N/A	O	Ft	OP			2	
1/2SX147B	M-42-3 M-126-1	3.0	B	16.0	BTF	A.O.	N/A	O	Ft	OP			2	
1/2SX169A	M-42-3 M-126-1	3.0	B	10.0	BTF	A.O.	C	O	St It Ft	OP RR OP			1 2	
1/2SX169B	M-42-3 M-126-1	3.0	B	10.0	BTF	A.O.	C	O	St It Ft	OP RR OP			1 2	
1/2SX173	M-42-3 M-126-1	3.0	B	6.0	GA	A.O.	C	O	St Ft	OP RR			1 2	
1/2SX174	M-42-3 M-126-1	3.0	C	6.0	CK	S.A.	C	O	Ct	OP			3	
1/2SX178	M-42-3 M-126-1	3.0	B	6.0	GA	A.O.	C	O	St Ft	OP OP			1 2	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2VQ00*A	M-105-1 M-106-1	2.0	A	48.0	BTF	H.O.	C	C	Lt St It	S CS RR	VR-1	11 11	1	
1/2VQ001B	M-105-1 M-106-1	2.0	A	48.0	BTF	H.O.	C	C	Lt St It	S CS RR	VR-1	11 11	1	
1/2VQ002A	M-105-1 M-106-1	2.0	A	48.0	BTF	H.O.	C	C	Lt St It	S CS RR	VR-1	11 11	1	
1/2VQ002B	M-105-1 M-106-1	2.0	A	48.0	BTF	H.O.	C	C	Lt St It	S CS RR	VR-1	11 11	1	
1/2VQ003	M-105-1 M-106-1	2.0	A	8.0	BTF	A.O.	C	C	Lt St It	RR OP RR	VR-1	11	1	
1/2VQ004A	M-105-1 M-106-1	2.0	A	8.0	BTF	A.O.	C	C	Lt St It	RR OP RR	VR-1	11	1	
1/2VQ004B	M-105-1 M-106-1	2.0	A	8.0	BTF	A.O.	C	C	Lt St It	RR OP RR	VR-1	11	1	
1/2VQ005A	M-105-1 M-106-1	2.0	A	8.0	BTF	A.O.	C	C	Lt St It	RR OP RR	VR-1	11	1	
1/2VQ005B	M-105-1 M-106-1	2.0	A	8.0	BTF	A.O.	C	C	Lt St It	RR OP RR	VR-1	11	1	
1/2VQ005C	M-10[illegible]	2.0	A	8.0	BTF	A.O.	C	C	Lt St It	RR OP RR	VR-1	11	1	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2VQ016	M-105-3	2	A	0.5	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2VQ017	M-105-3	2	A	0.5	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2VQ018	M-105-3	2	A	0.5	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2VQ019	M-105-3	2	A	0.5	GL	M	C	C	Lt	RR	VR-1			PASSIVE

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH. POS. (VA)	REMARKS
1/2WM190	M-49-1A M-49-1B	2	A	2.0	GL	M	C	C	Lt	RR	VR-1			PASSIVE
1/2WM191	M-49-1A M-49-1B	2	AC	2.0	CK	S.A.	C	C	Lt	RR	VR-1			PASSIVE

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST MODE	RELIEF REQUEST (VR)	NOTES	TECH POS. (VA)	REMARKS
1/2WO006A	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	OP RR RR	VR-1		1	
1/2WO006B	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	OP RR RR	VR-1		1	
1/2WO007A	M-118-5 M-118-7	2	AC	10.0	CK	S.A.	C	C	Lt/Bt	RR	VR-1, 27		3	
1/2WO007B	M-118-5 M-118-7	2	AC	10.0	CK	S.A.	C	C	Lt/Bt	RR	VR-1, 27		3	
1/2WO020A	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	OP RR RR	VR-1		1	
1/2WO020B	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	OP RR RR	VR-1		1	
1/2WO056A	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	OP RR RR	VR-1		1	
1/2WO056B	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	OP RR RR	VR-1		1	

SECTION 4.4

VALVE NOTES

VALVE NOTES

NOTE 1

Closure of the Main Steam isolation valves 1MS001A-D or 2MS001A-D during unit operation would result in reactor trip and safety injection actuation. To avoid this transient, these valves will be partially stroked every three months. Full stroke testing will be done during Modes 4, 5, or 6 as plant conditions allow, per IWV-3412.

NOTE 2

The testing of any emergency boration flowpath valves during unit operation is not practical. Stroke testing the Boric Acid injection isolation valve 1CV8104/2CV8104 and check valve 1CV8442/2CV8442, the RH to CV pump suction isolation valve 1CV8804A/2CV8804A, or the RWST to CV pump suction isolation valves 1CV112D,E/2CV112D,E, could result in boration of the RCS, resulting in a cooldown transient. Aligning the system in this configuration even for a short duration is, therefore, unacceptable. These valves will be stroke tested during cold shutdown, in accordance with IWV-3412.

NOTE 3

These valves are the Main Feedwater isolation valves: 1FW009A-D/2FW009A-D, and cannot be fully stroked during operation as feedwater would be terminated causing a reactor trip. They will, however, be partially stroke tested during operation as well as full stroke tested during cold shutdown, per the requirements of IWV-3412.

NOTE 4

Closure of these letdown and makeup valves 1CV112B,C/2CV112B,C, 1CV8105/2CV8105, 1CV8106/2CV8106, 1CV8152/2CV8152, and 1CV8160/2CV8160 during normal unit operation would cause a loss of charging flow which would result in a reactor coolant inventory transient, and possibly, a subsequent reactor trip. These valves will be full stroke/fail safe exercised during cold shutdown as required by IWV-3412.

NOTE 5

The 1RH8701A/B, 1RH8702A/B, 2RH8701A/B, and 2RH8702A/B valves are the isolation boundary between the Residual Heat Removal Pumps and the Reactor Coolant System. Opening one of these valves during unit operation will leave only one valve isolating RHR from the high RCS pressure. This would place the plant in an undesirable condition. Therefore, these valves will be full stroke tested during cold shutdown, per IWV-3522.

NOTE 6

The following valves have been identified as intersystem LOCA valves. They form a pressure boundary between the RCS and other essential components in order to protect these components from damage. These valves will be leak tested in accordance with the Braidwood Technical Specifications. Performance of the leak test on these valves also satisfies the back-flow test required for check valves by NRC Generic Letter 89-04.

Intersystem LOCA Valves

1RH8701A/B	1RH8702A/B	2RH8701A/B	2RH8702A/B
1RH8705A/B*	1SI8815	2RH8705A/B*	2SI8815
1SI8818A-D	1SI8905A-D	2SI8818A-D	2SI8905A-D
1SI8819A-D	1SI8948A-D	2SI8819A-D	2SI8948A-D
1SI8841A/B	1SI8949A-D	2SI8841A/B	2SI8949A-D
1SI8900A-D	1SI8956A-D	2SI8900A-D	2SI8956A-D

* Not true pressure isolation valves - not listed in Tech Specs.

NOTE 7

The Reactor Pressure Vessel Vent Valves 1RC014A-D and 2RC014A-D cannot be stroked during unit operation, as they provide a pressure boundary between the Reactor Coolant system and containment atmosphere. Failure of one of these valves in the open position would result in leaving only one valve as the high pressure boundary. These valves will be full stroke/fail safe exercised when the RCS pressure is at a minimum during cold shutdown, per IWV-3412.

NOTE 8

The Residual Heat Removal Pump discharge check valves 1RH8730A/B and 2RH8730A/B cannot be full stroke exercised during unit operation due to the high RCS pressure. These check valves will be partial stroke tested, however, on a quarterly basis and full stroke exercised during cold shutdown. This is in accordance with IWV-3522.

NOTE 9

Due to the RCS pressure, the check valves listed below cannot be full stroke exercised during unit operation:

1SI8818A-D	2SI8818A-D	SDC/RH to Cold Leg Injection
1SI8958A/B	2SI8958A/B	RWST to RHR Pump Suction

These valves will be full stroke exercised (Ct-open; Bt-closed) during cold shutdown, in accordance with IWV-3522.

NOTE 10

The 1FW039A-D and 2FW039A-D valves cannot be stroke tested during unit operation as closure of these valves would result in termination of the waterhammer prevention feedwater flow. This would result in undesirable affects on the Steam Generators. These valves will be full stroke/fail safe tested during cold shutdown, per IWV-3412.

NOTE 11

The Primary Containment Purge Supply and Exhaust Valves 1VQ001A/B, 1VQ002A/B, 2VQ001A/B, and 2VQ002A/B cannot be stroke timed during unit operation. These 48-inch valves are the only isolation points between the containment atmosphere and the environment. Stroking these valves at any time other than mode 5 or 6 would be a violation of the Braidwood Technical Specifications. These valves will be full stroke tested during cold shutdown, in accordance with IWV-3412. These valves will be leak tested semiannually, in accordance with Braidwood Station Technical Specifications.

The Primary Containment Mini-Purge and Exhaust Valves 1VQ004A/B, 1VQ005A/B/C, 2VQ004A/B, and 2VQ005A//B/C, and the Post LOCA Purge Exhaust Valves 1VQ003/ 2VQ003 will be leak tested every 3 months, in accordance with Braidwood Station Technical Specifications.

NOTE 12

The Auxiliary Feedwater check valves 1AF001A/B, 1AF003A/B, 1AF014A-H, 1AF029A/B, 2AF001A/B, 2AF003A/B, 2AF014A-H, and 2AF029A/B cannot be full stroke tested during unit operation, as this would induce potentially damaging thermal stresses in the upper feedwater nozzle piping. The 1AF001A/B, 1AF003A/B, 2AF001A/B, and 2AF003A/B valves will be partially stroke tested during operation, and all valves full stroke tested during cold shutdown. This will be performed per Tech Spec 4.7.1.2.2 and is in accordance with IWV-3522.

NOTE 13

The High Head Injection Isolation Valves 1SI8801A/B and 2SI8801A/B cannot be stroke tested during unit operation. These valves isolate the CV system from the RCS. Opening them during operation would enable charging flow to pass directly into the RCS, bypassing the regenerative heat exchanger. The temperature difference of the charging flow and the RCS could result in damaging thermal stresses to the cold leg nozzles as well as cause a reactivity change which would, in turn, cause a plant transient. These valves will be full stroke tested during cold shutdown in accordance with IWV-3412.

NOTE 14

The safety injection system SVAG (Spurious Valve Actuation Group) valves 1SI8802A/B, 1SI8806, 1SI8809A/B, 1SI8813, 1SI8835, 1SI8840, 2SI8802A/B, 2SI8806, 2SI8809A/B, 2SI8813, 2SI8835, and 2SI8840 cannot be stroke tested during unit operation. These valves are required by the Technical Specifications to be de-energized in their proper positions during unit operation. Stroking them would be a violation of the Technical Specifications as well as defeating the de-energized SVAG valve principle. These valves will be stroke tested during cold shutdown when they are not required to be de-energized. This is in accordance with IWV-3412.

NOTE 15

-DELETED-

NOTE 16

These feedwater valves are exempt from all ASME Section XI testing requirements per IWV-1100 and IWV-1200. They are included in the program for operability tracking purposes only. The closure of the Main Feedwater Regulating Valves 1FW510, 1FW520, 1FW530, 1FW540, 2FW510, 2FW520, 2FW530, and 2FW540 during unit operation would cause a loss of feedwater to the steam generators, resulting in a plant transient with a possible reactor trip as a result. These valves will be fail safe (Ft) tested pursuant to the Braidwood Station Technical Specifications.

NOTE 17

These feedwater valves are exempt from all ASME Section XI testing requirements per IWV-1100 and IWV-1200. They are included in the program for operability tracking purposes only. The closure of the Main Feedwater Regulating Bypass Valves 1FW510A, 1FW520A, 1FW530A, 1FW540A, 2FW510A, 2FW520A, 2FW530A, and 2FW540A during unit operation would require the Main Feedwater Regulating Valves to correct for bypassed flow and could result in a plant transient with a possible reactor trip as a result. These valves will be fail safe (Ft) tested pursuant to the Braidwood Station Technical Specifications.

NOTE 18

-DELETED-
(Incorporated into NOTE 21)

NOTE 19

-DELETED-
(Incorporated into NOTE 14)

NOTE 20

The remote position indicator for these valves cannot be observed directly due to the encapsulated design of the solenoid valve body. During the indication test, indirect evidence of the necessary valve disk movement shall be used, in accordance with IWV-3412 (b). The valves affected are listed below:

1CV8114	1PS230A/B	2PS228A/B
1CV8116	1RC014A-D	2PS229A/B
1PS228A/B	2CV8114	2PS230A/B
1PS229A/B	2CV8116	2RC014A-D

NOTE 21

The Main Feedwater Tempering Flow Isolation Valves 1/2FW034A-D are exempt from all ASME Section XI testing requirements per IWV-1100 and IWV-1200. They are included in the program for operability tracking purposes only, and will be fail safe (Ft) tested pursuant to the Braidwood Station Technical Specifications.

NOTE 22

Per NRC request, the post-accident hydrogen monitoring system check valves 1/2PS231A and 1/2PS231B will be stroke exercised open on a quarterly frequency to verify operability.

NOTE 23

1/2SI8818A-D, 1/2SI8819A-D, and 1/2SI8948A/B are Event V check valves, which are defined as two check valves in series at a low pressure/RCS interface whose failure may result in a LOCA that bypasses containment. They are individually leak-tested in accordance with NRC generic letter 89-04, position #4b.

NOTE 24

1/2CC9518, 1/2CC9534, 1/2CV8113, and 1RH8705A/B are check valves designed to relieve pressure between two containment isolation valves. The full flow limiting value is zero, since the safety function of these valves in the open direction is to relieve pressure only.

NOTE 25

Check valve 1/2SI8926 prevents flow from the Safety Injection (SI) pump suction line to the Refueling Water Storage Tank (RWST). The SI pumps are normally lined up in the INJECTION MODE to take suction from the RWST. This check valve would stop reverse flow when the SI pumps are transferred to HOT/COLD LEG RECIRCULATION MODE to prevent contamination of the RWST. However, the 1/2SI8806 M.O.V. is in series with this check valve and would be closed to prevent reverse flow as directed by the emergency procedures. Therefore, no backflow test (Bt) is required for 1/2SI8926.

NOTE 26

Check valve 1/2CV8546 prevents flow from the Chemical and Volume Control (CV) pump suction line to the Refueling Water Storage Tank (RWST). The CV pumps are normally lined up in the INJECTION MODE to take suction from the RWST. This check valve would stop reverse flow when the CV pumps a.e transferred to HOT/COLD LEG INJECTION MODE to prevent contamination of the RWST. However, the 1/2CV112D and 1/2CV112E M.O.V.'s are in series with this check valve and would be closed to prevent reverse flow as directed by the emergency procedures. Therefore, no back flow test (Bt) is required for 1/2CV8546.

NOTE 27

Check valves 1/2SI8958A/B prevent flow from the Residual Heat (RH) Removal pump suction line to the Refueling Water Storage Tank (RWST). The RH pumps are normally lined up in the INJECTION MODE to take suction from the RWST. These check valves would stop reverse flow when the RH pumps are transferred to HOT/COLD LEG RECIRCULATION MODE to prevent contamination of the RWST. The 1/2SI8812A/B M.O.V.'s are in series with these check valves and would be closed to prevent reverse flow as directed by the emergency procedures. In addition, the RH suction valves 1/2SI8812A/B, 1/2RH8701A/B or 1/2RH8702A/B, and 1/2SI8811A/B are electrically interlocked to prevent the backflow to the RWST when the RH system is in a RECIRCULATION MODE. However, during the injection mode if a pump fails to start, these valves are relied upon to prevent diversionary flow back to the RWST.

NOTE 28

The 1/2CV8440 check valves allow seal water return to the suction of the CV pumps. During the hot leg recirculation phase of an SI, the VCT outlet check valve prevents diversionary flow back to VCT via the seal water heat exchanger relief valve, which could potentially lead to an unfiltered release of radioactivity to the environment. These valves can only be tested in cold shutdown, when all 4 RCPs and charging pump are off. Refer to CHRON #0117821 dated November 23, 1992.

NOTE 29

Check valve 1/2CV8442 prevents flow from the Chemical and Volume Control (CV) pump suction header to the boric acid transfer pump. This line is normally isolated by the 1/2CV8104 emergency boration valve. This valve would only be opened during an emergency with the boric acid transfer pump running. This check valve is unnecessary with the current system operation, and thus, no back flow testing of 1/2CV8442 is required.

NOTE 30

Check valves 1/2AF014A-H are verified to be closed each shift by the Operating Department, by verifying that the temperature at 1/2AF005A-H is $\leq$ 130° F. If the temperature is > 130° F at any 1/2AF005 valve, then an abnormal operating procedure is entered to isolate and cool down the affected lines. This shiftly monitoring of 1/2AF014A-H in the closed position adequately monitors the status of these valves during unit operation.

NOTE 31

Check valves 1/2CV8480A/B and 1/2SI8919A/B are the Centrifugal Charging Pump and Safety Injection Pump mini-flow recirculation line valves which open to allow recirculation flow during IST Surveillances. Acceptable full-stroke will be verified whenever the recorded mini-recirculation flowrate is within the "acceptable" or "alert" ranges given in the IST Pump Surveillance.

NOTE 32

Deleted - Byron demonstrated quarterly testing did not adversely affect the low flow alarms and RCP seal flow.

NOTE 33

Used at Byron Station ONLY

NOTE 34

Per Braidwood Technical Specifications Amendment, valves 1/2SD002A-H, 1/2SD005A-D have been removed from the list of valves to be tested under 10CFR50 Appendix J and will now be tested per ASME Code Section XI, IWV-3420.

NOTE 35

The 1/2RH8705A/B check valves will be operability tested by verifying that there is depressurization in line 1/2RH26AA-3/4 and 1/2RH26AB-3/4 when they are opened. This is a test method which was approved by the NRC in Byron's SER dated 9/14/90.

NOTE 36

In response to GL 90-06, "PORV and Block Valve Reliability and Additional LTOP for LWRs," the 1(2)RY455A and 1(2)RY456 valves will be restricted from stroke testing in Mode 1. Technical Specifications will provide direction for any further operability testing required.
(Reference NTS Item - 456-130-90-4.4-0100)

NOTE 37

The 1/2RH8716A/B "RHR Cross Tie" valves are out-of-service open per Technical Specifications and can only be exercised during cold shutdown or refuel.

<u>NOTE 38</u>

These are the feedwater tempering flow check valves and are open during full/high power operation to ensure the S/G upper nozzle subcooled margin is maintained above the 75 °F minimum. They also open to allow tempering flow during shutdown and startup. The close to provide an immediate isolation function during a feedwater line break accident to mitigate a loss of secondary make-up and/or inventory.

They are 3 inch swing type check valves with no position indication. Flow through this line at full/high power cannot be stopped for longer than one minute while in Mode 1. Also, flow/pressure is always toward the Steam Generators (S/Gs) during operation, making it impractical to perform a back leakage or back pressure test to prove valve closure. These check valves will be tested during cold shutdowns using non-intrusive techniques to prove valve closure.

<u>NOTE 39</u>

These are the main feedwater header flow check valves. They open to allow main feedwater flow during power operation. They close to provide an immediate (2 to 3 second) isolation function during a feedwater line break accident to mitigate a loss of secondary make-up and/or inventory. The safety function in the close position is to provide pressure integrity of the piping between the safety related portion and the non-safety related portion. They are 16 inch tilting disc type check valves utilizing a piston and rod assembly as an anti-slam mechanism. These check valves have no external position indicators to provide disc position. Also, flow/pressure is always toward the Steam Generators (S/Gs) during normal operation, making it impractical and unsafe to perform a back leakage or back pressure test to prove valve closure on a quarterly basis. The main feedwater flow check valves cannot be stroked closed during power operation without causing a reactor trip due to low S/G level.

These check valves will be tested during cold shutdowns when bonnet temperature is less than 100 °F using ultrasonic techniques to prove closure. Closure is determined by the piston rod height as measured using an ultrasonic straight beam technique, similar to that used for measuring the height of sediment in a pipe. A transducer is placed on the piston cylinder and the backwall is brought up (range/depth and amplitude) on the scope above the piston. As the transducer is lowered, the backwall signal will decrease, while the top of the piston rod signal starts to appear. This transition zone is used to give the disc position, since the piston rod is connected to the disc.

NOTE 40

The 1/2CC9415 are motor operated, 16 inch, gate valves in the supply line to the reactor coolant pumps and other non-essential component cooling loads. They close to isolate non-essential loads. These valves can only be closed when all 4 RCPs are off, therefore, these valves will be tested in cold shutdowns when all 4 RCPs are off. Refer to VR-8 for additional information.

SECTION 4.5

VALVE TECHNICAL APPROACHES AND POSITIONS

IST Technical Approach and Position
No. VA-01

A. Component Identification:

1. Description: Method of Stroke Timing Valves - Timing using control board position indication lights (St).

2. Component Numbers: See IST Valve Tables.

3. References: ASME Code, Section XI, Subsection IWV, paragraph IWV-3413(a).

4. Code Class: 1, 2, and 3.

B. Requirement:

Use of the control board open and closed lights to determine the stroke time of power-operated valves has recently become an issue for discussion in the industry. Paragraph IWV-3413 of ASME XI defines "full-stroke time" as "that time interval from initiation of the actuating signal to the end of the actuating cycle." It is common industry practice to measure stroke time as the time interval between placing the operator switch on the control board in the "close" or "open" position and indication that the valve is open or closed on the control board (switch to light).

C. Position:

It is recognized that the way in which the limit switch that operates the remote position indicator lights is set may result in "closed" or "open" indication before the valve obturator has actually completed its travel. This is not considered to be a problem, as the purpose of the test is to determine if degradation of the valve operator system is occurring, which is determined by observing changes in stroke time relative to the reference stroke time. Stroke time measurements should be rounded to the nearest tenth (0.1) of a second, except that stroke times less than one half (0.5) second may be rounded to 0.5 second, if appropriate.

Standard rounding techniques are to be used when rounding stop watch readings during valve stroke time testing (e.g , 10.45 rounds to 10.5 and 10.44 rounds to 10.4). Rounding to the nearest second for stroke times of 10 seconds or less, or 10% of the specified limiting stroke time for stroke times longer than 10 seconds, as allowed by ASME Section XI subparagraph IWV-3413(b), will not be used.

IST Technical Approach and Position
No. VA-02

A. Component Identification:

1. Description: Method of Fail Safe Testing Valves.

2. Component Numbers: See IST Valve Tables (Ft).

3. References: ASME Code, Section XI, Subsection IWV, paragraph IWV-3415.

4. Code Class: 1, 2, and 3.

B. Requirement:

Paragraph IWV-3415 of ASME XI states that "When practical, valves with fail-safe actuators shall be tested by observing the operation of the valves upon loss of actuator power." Most valves with fail-safe positions have actuators that use the fail-safe mechanism to stroke the valve to the fail-safe position during normal operation. For example, an air-operated valve that fails closed may use air to open the valve against spring pressure. When the actuator is placed in the closed position, air is vented from the diaphragm and the spring moves the obturator to the closed position.

C. Position:

In the cases where normal valve operator action moves the valve to the closed position by de-energizing the operator electrically, by venting air or both (e.g., an electric solenoid in the air system of a valve operator moves to the vent position on loss of power), no additional fail-safe testing is required. Valves with fail-safe actuators that do not operate as part of normal actuator operation must be tested by other means. This may be accomplished for motor-operated valves by opening the circuit breaker supplying operator power and observing that the valve moves to its fail-safe position. Lifting leads is not required unless it is the only method of de-energizing the actuator.

Using a valve remote position indicator as verification of proper fail-safe operation is acceptable, provided the indicator is periodically verified to be operating properly as required by ASME Code, Section XI, Subsection IWV, paragraph IWV-3300.

IST Technical Approach and Position
No. VA-03

A. Component Identification:

1. Description: Method of Full Stroke (Ct) and Back Flow (Bt) Exercising of Check Valves.

2. Component Numbers: See IST Valve Tests (Ct and Bt).

3. References: (a) NRC Generic Letter 89-04, Guidance on Developing Acceptable Inservice Testing Programs, Attachment 1, Positions 1, 2, and 3; (b) ASME Code, Section XI, Subsection IWV, paragraph IWV-3522; (c) SMAD Report M-1078-91, "SI Accumulator Check Valve Acoustic Test."

4. Code Class: 1, 2, and 3.

B. Requirement:

Paragraph IWV-3522 of Article XI states "check valves shall be exercised to the position required to fulfill their function unless such operation is not practical during plant operation. If only limited operation is practical, during plant operation the check valve shall be part-stroke exercised during plant operation and full-stroke exercised during cold shutdowns." For check valves with no external position indication devices, the determination of when they are in full open position has proven difficult to determine. The verification of when a valve is the full open position affects the determination of which valves are only part-stroked and thus require additional full-stroke testing during cold shutdown or refueling.

C. Position:

Valid full-stroke exercising to the full-open or full-closed position may be accomplished by observing an external position indicator which is considered to be a positive means of determining obturator position. Where external position indicators are not provided, manual stroking of the valve is acceptable. Where a mechanical exerciser is used, the torque required to move the obturator must be recorded and meet the acceptance standards of subparagraph IWV-3522(b). Per the requirements of NRC Generic Letter 89-04, Attachment 1, Position 1, the other acceptable method of full-stroke exercising a check valve to the open position is to verify that the valve passes the maximum required accident condition flow. Any flow less than this is considered as a part-stroke exercise. Flow through the valve must be determined by positive means such as permanently installed flow instruments, temporary flow instruments, or by measuring the pressure drop across the valve or other in-line component. Measuring total flow through multiple parallel lines does not provide verification of flow through individual valves.

IST Technical Approach and Position
No. VA-03

C. Position, continued

One exception to the "maximum required accident flow" requirement is the methodology used to verify full-stroke exercising of the Safety Injection (SI) Accumulator Back-up Check Valves, 1/2SI8956A-D. Because of the high maximum design flow rate of these valves, a maximum design accident flow rate test is physically impossible to perform. For these valves, an Engineering calculation has been performed to determine the minimum flow rate for full disc lift. An acceptable full-stroke exercise of these valves will be performed each refueling outage by measuring the pressurizer level increase over time, converting these parameters to a flow rate through the valve, and verifying this value is greater than or equal to the engineering calculated minimum flow rate for full disc lift. Per reference c above, these valves were also verified to full-stroke open by using a "time of arrival" acoustic emission technique on the unit one valves that was performed in conjunction with the injection test described in VR-05. This method is superior to sample disassembly and inspection of one valve per outage which would require unusual system line-ups, freeze seals, radiation exposure, and possible plant transients.

Other alternatives to measuring full design accident flow or disassembly and inspection of check valves to satisfy full stroke requirements is allowed as long as the requirements of NRC Generic Letter 89-04, Attachment 1, Positions 1, 2, and 3 are utilized OR specific relief requests are approved by the NRC.

Stroking a valve to the full closed position for valves without a manual exerciser or position indicator must be verified using indirect means. These include, but are not limited to, (1) observing pressure indications on both sides of the valve to determine if the differential pressure expected with the valve shut is obtained, or (2) opening a drain connection on the upstream side of the valve to detect leakage rates in excess of that expected with the valve shut.

Valves that cannot be full-stroke tested or where full-stroking cannot be verified, shall be disassembled, inspected, and manually exercised. Valves that require disassembly for full-stroke testing during cold shutdowns or refueling still require quarterly part-stroke testing, where possible.

Testing of check valves by disassembly shall comply with the following:

a. During valve testing by disassembly, the valve internals shall be visually inspected for worn or corroded parts, and the valve disk shall be manually exercised.

b. Due to the scope of this testing, the personnel hazards involved, and system operating restrictions, valve disassembly and inspection may be performed during reactor refueling outages. Since this frequency differs from the Code required frequency, this deviation must be specifically noted in the IST program.

c. Where it is burdensome to disassemble and inspect all applicable valves each refueling outage, a sample disassembly and inspection plan for groups of identical valves in similar applications may be employed. The NRC Generic Letter 89-04 guidelines for this plan are explained below:

> The sample disassembly and inspection program involves grouping similar valves and testing one valve in each group during each refueling outage. The sampling technique requires that each valve in the group be the same design (manufacturer, size, model number, and materials of construction) and have the same service conditions including valve orientation. Additionally, at each disassembly the licensee must verify that the disassembled valve is capable of full-stroking and that the internals of the valve are structurally sound (no loose or corroded parts). Also, if the disassembly is to verify the full-stroke capability of the valve, the disk should be manually exercised.
>
> A different valve of each group is required to be disassembled, inspected, and manually full-stroke exercised at each successive refueling outage, until the entire group has been tested. If the disassembled valve is not capable of being full-stroke exercised or there is binding or failure of valve internals, the remaining valves in that group must also be disassembled, inspected, and manually full-stroke exercised during the same outage. Once this is completed, the sequence of disassembly must be repeated unless extension of the interval can be justified.

Extending the valve sample disassembly and inspection interval from disassembly of one valve in the group every refueling outage or expanding the group size would increase the time between testing of any particular valve in the group. With four valves in a group and an 18-month reactor cycle, each valve would be disassembled and inspected every six years. If the fuel cycle is increased to 24 months, each valve in a four-valve sample group would be disassembled and inspected only once every eight years.

Extension of the valve disassembly/inspection interval from that allowed by the Code (quarterly or cold shutdown frequency) to longer than once every 6 years is a substantial change which may not be justified by the valve failure rate data for all valve groupings. When disassembly/inspection data for a valve group show a greater than 25% failure rate, the station should determine whether the group size should be decreased or whether more valves from the group should be disassembled during every refueling outage.

Extensions of the group size will be done on a case by case basis.

IST Technical Approach and Position
No. VA-04

A. Component Identification:

1. Description: Determining Limiting Values of Full-Stroke Times for Power Operated Valves.

2. Component Numbers: See IST Valve Tables (St).

3. References:

   a. ASME Code, Section XI, Subsection IWV, Sub Article IWV-3413.

   b. NRC Generic Letter 89-04, Attachment A, Position 5.

   c. ANSI/ASME OM-1987 through OMb-1989 Addenda, Part 10, Section 4.2

4. Code Class: 1, 2, and 3.

B. Requirement:

The IST program originally assigned a limiting value of full-stroke time based on the most conservative value from plant Technical Specifications (TS) or Updated Final Safety Analysis Report (UFSAR). For valves not having a specified value of full-stroke, a limiting value was assigned based on manufacturers design input, engineering input, or initial valve pre-operational testing. This methodology is contrary to NRC Generic Letter 89-04.

According to NRC Generic Letter 89-04 the limiting value of full-stroke should be based on an average reference stroke time of a valve when it is known to be operating properly. The limiting value should be a reasonable deviation from this reference stroke time based on the valve size, valve type, and actuator type. The deviation should not be so restrictive that it results in a valve being declared inoperable due to reasonable stroke time variations. However, the deviation used to establish the limit should be such that corrective action would be taken for a valve that may not perform its intended function. When the calculated limiting value for a full-stroke is greater than a TS or safety analysis limit, the TS or safety analysis limit should be used as the limiting value of full-stroke time. Based on this, a review of each valve operating history was performed and an average/reference value of full-stroke determined. In addition, valves were grouped together by system, train, unit, valve type, and actuator type to provide for a more thorough review in determining what would be a "reasonable" deviation from the average/reference full-stroke value.

The 1983 Edition through Summer 1983 Addenda of ASME Section XI does not provide guidance for determining values of full-stroke.

C. Position:

The following criteria will be used as general guidance to establish REQUIRED ACTION ranges for power-operated valves:

SOVs/HOVs/AOVs - Less than or equal to 10 seconds:

REQUIRED ACTION VALUE: Greater than $(2.0)(T_{ref})$

SOVs/HOVs/AOVs - Greater than 10 seconds:

REQUIRED ACTION VALUE: Greater than $(1.75)(T_{ref})$ or $(T_{ref}+20\text{ sec})$

MOVs - Less than or equal to 10 seconds:

REQUIRED ACTION VALUE: Greater than $(1.5)(T_{ref})$

MOVs - Greater than 10 seconds:

REQUIRED ACTION VALUE: Greater than $(1.25)(T_{ref})$ or $(T_{ref}+20\text{ sec})$

Additional Notes:

1. T_{ref} is the reference or average stroke value in seconds of an individual valve or valve grouping established when the valve is known to be operating acceptably.

2. Standard rounding techniques are to be used when rounding off stopwatch readings during valve stroke timing (e.g. 10.45 rounds to 10.5, and 10.44 is rounded to 10.4 seconds). Round off all measured stroke time to the nearest tenth of a second.

3. When reference stroke valves or average stroke valves are affected by other parameters or conditions, then these parameters or conditions must be analyzed and the above factors adjusted.

4. If the above calculated values exceed a Technical Specification or FSAR value, then the TS or FSAR value must be used for the limiting value of full-stroke.

5. Limiting values of full stroke will be rounded to the nearest second.

6. REFER to relief request VR-20 for fixed ALERT Ranges.

Additional Notes: (continued)

7. Fast acting valves (valves which normally stroke in less than 2 seconds consistently) are included in Relief Request VR-12. These valves are NOT assigned ALERT RANGES and are NOT trended.

8. The above criteria is a guide and cannot cover all valves. The REQUIRE ACTION VALUES are selected based on comparison between the REFERENCE VALUE, LIMITING VALUE given in Technical Specifications/UFSAR, operating history, and calculated values using the above criteria.

9. Valves which serve the same function on dual trains (i.e., 1CC9473A and 1CC9473B) and dual units (i.e. 1CC9473A and 2CC9473A) are assigned the same REQUIRED ACTION VALUE based on human factors considerations, unless valve or system design differences exist between the trains/units.

IST Technical Approach and Position
No. VA-05

A. Component Identification:

1. Description: Testing of the Boric Acid Transfer Pumps Discharge Check Valves

2. Component Numbers: 0AB8473, 1/2AB8487

3. References: (a) Engineering Correspondence (CHRON # 161733) dated January 17, 1991

4. Code Class: 3/T (Tracking purposes ONLY)

B. Requirement:

These check valves are tested per the Technical Specification requirement that requires an 18 month flow verification of 30 gpm to the RCS. Because the AB pumps were added to the program, the discharge check valves will also be added for tracking purposes only.

C. Position:

The boric acid transfer pumps were added to the IST program per pump technical position PA-01. Since this was done, it was decided to put the discharge check valves in the program as well for tracking purposes only. These valves are required to pass a minimum of 30 gpm in order to meet the Technical Specification requirement. The quarterly pump test will verify greater than 30 gpm, which is significantly more frequent than the current Technical Specification frequency. Back flow is prevented from the chemical and volume control system (CV) by check valve 1(2)CV8442 and motor operated valve 1(2)CV8104 in the emergency boration flow path. Also, the system uses only a single pump in series which precludes short circuiting of flow through the parallel pump's discharge check valve, so no back flow test will be performed.

IST Technical Approach and Position
No. VA-06

A. Component Identification:

1. Description: Stroke Timing Solenoid Valves without Position Indication using Non-intrusive Magnetic and Acoustical Techniques

2. Component Numbers: 1SX101A, 2SX101A

3. References: ASME Code, Section XI, Article IWV-3000

   a. Full stroke time power operated valves per IWV-3413(a) and IWV-3413(b).
   b. Fail-safe test actuators per IWV-3415.
   c. Take corrective action per IWV-3417(a) and IWV-3417(b).

4. Code Class: 3

B. Requirement:

The 1/2SX101A valves are the essential service water (SX) cooling outlet valves for the motor driven auxiliary feedwater (AF) pump lube oil coolers. Both of these valves are completely encapsulated per design (valve stem not visible) and do not have any type of limit/reed switches for remote position indication. These valves are energized and de-energized in conjunction with the pump control-start switch.

The 1/2SX101A valves are pilot operated globe type solenoid valves - energized to close. Upon de-energizing (pump start), the valve opens by both spring force against the plunger, which holds the pilot off its seat, and differential pressure across the main disk, caused by the pilot orifice opening allowing pressure to be reduced, assisting in opening the valve. Upon energizing, the valve closes by the magnetic force of the coil pulling the plunger down, closing the pilot disk which closes the pilot orifice, permitting pressure to build up above the main disk, assisting in closing the valve. In the absence of any pressure differential across the main disk, the spring or magnetic force is sufficient to open or close the valve, respectively.

Per the Code requirements, these valves can not be tested by the traditional means of stopwatch and indicating lights. The Code also requires that fail-safe actuators be tested by observing the operation of the valve upon loss of actuator power (in this case electrical power). Additionally, stroke times are to be compared to the previous value. Relief request VR-20 has been approved to use fixed reference values to establish acceptance criteria.

C. Position:

In situ testing has shown that the differential pressure, which is not able to be controlled, affects the opening stroke characteristics more so than the closing stroke characteristics, in regards to stroke time measurement. Therefore, the stroke time will be measured in the close direction (instead of the open direction) on a quarterly basis. The closing stroke time will be used to provide the key parameter for determining degradation (based on the repeatability in stroke time results, in the closed direction, obtained to date). The fail-safe test will be accomplished by observing that the cooling water outlet temperature changes when the pump starts, along with a minimum stroke time value on valve closing.

C. Position: (continued)

The process developed for measuring the actuation time of the 1/2SX101A solenoid operated valves uses both an acoustic (accelerometer) transducer and magnetic field (inductive coil) sensor mounted external to the valve's houiing. The use of a magnetic field sensor provides the (within a few milliseconds) time the solenoid's coil is either energized or de-energized. The accelerometer detects the acoustical "click" within the valve to indicate the end of the stroke cycle. The same certified test equipment and computer software (not safety related) that is used for check valve testing is used for this test. Signal processing and analysis of the collected data is performed to accurately determine valve stroke time. This tinming method is on the order of two magnitudes more accurate than the conventional Code stroke time method and is clearly an acceptable test method to meet the Code requirement.

The acceptance criteria to be used for these valves has been established at two times the reference value (these valves stroke normally around 80 msec), with a minimum stroke time of 40 msec. The minimum stroke time is based on the acoustic "click" which is representative of the pilot valve and main disk impacting the seat. Any stoke time value less than 40 msec is indicative of the valve not full stroking to the open position. There is also a monthly test which uses changes in the cooling water outlet temperature, in conjuction with acceptable lube oil temperatures, to monitor valve opening.

IST Technical Approach and Position
No. VA-07

A. Component Identification:

1. Description: Justification for exercising the U-0 heat exchanger and pump isolation valves on a U-2 Cold Shutdown frequency per OM-10, paragraph 4.2.1.2.c.

2. Component Numbers: 1/2CC9459B, CC Pump Suction Header Crosstie Manual Isolation Valves; 1/2CC9467B, CC Heat Exchanger Outlet Header Xtie Isolation Valves.

3. References: (a) ASME code, section XI, Subsection IWV, paragraphs IWV-3411, 3412; (b) Draft NUREG-1482, Section 3.1.1, (c) OM-10, paragraphs 4.2.1.1, 4.2.1.2.

4. Code Class: 3

B. Requirement:

Per OM-10, paragraph 4.2.1.1, active category A and B valves shall be tested nominally every 3 months, except as provided by paras. 4.2.1.2, 4.2.1.5 and 4.2.1.7. Per section 4.2.1.2.c, if exercising is not practicable during plant operation, it may be limited to full stroke exercising during cold shutdowns. Per Draft NUREG-1482, section 3.1.1, testing at Cold Shutdown is an allowable deferral of testing required by OM-10. Hence, Braidwood will use OM-10 for justifying the impracticality of exercising these Component Cooling Water valves quarterly.

C. Position:

These manual valves are used to provide for train separation and/or isolation of the Component Cooling Water system. They are aligned to place the U-0 Heat Exchanger and pump on the U-1 or U-2 side of CCW to ensure adequate cooling during Shutdowns and/or Post-Accident.

Stroking these valves quarterly or during U-1 cold shutdowns would be a considerable burden and potential safety concern. The CC system is a delicately balanced system that has the potential for becoming upset upon swapping the Unit 0 Heat Exchanger and pump from one unit to the other. History has shown that stroking these valves will cause oscillations in the lines, disrupt flow balancing due to D/P differences throughout the system, and would place the normal loads at risk for adequate cooling. For instance, the CC685 valve, which is the Reactor Coolant Pump thermal barrier Component Cooling Water return valve, auto-closes on high flow, which would result in a loss of flow to the RCP thermal barriers. This valve could potentially close during the CC stroke tests due to the upset flow conditions. In addition, the CC surge tanks will be at risk of draining, resulting in possible pump trips on low-low level. The potential problems would only be compounded by stroking these valves at a cold shutdown frequency since the U-0 heat exchanger and pump will be in use on the U-1 train. Hence, Braidwood considers it impractical to perform this testing quarterly or during a U-1 cold shutdown.

UFSAR "active valve" table 3.9.16 does not list these valves as "active" and Section 9.2.2.4 gives justification that these valves are not required in the short term following an accident. Also, the UFSAR states that if there was a single failure of a valve in the long term, making it undesirable to use a particular pump and heat exchanger, sufficient cooling would be provided with a different subsystem. Hence, testing these valves is conservative on Braidwood's part and quarterly testing is less significant than in other cases due to the design of the system.

IST Technical Approach and Position
No. VA-07

A minimum eighteen month frequency will reduce the likelihood of a CC system malfunction caused by stroking these manual valves. In addition, a review of maintenance history shows there has been no evidence of valve exercising malfunctions. These valves are normally aligned such that the U-0 CC heat exchanger and pump are on the U-1 side. The valves normally stay in this position until U-2 is shutdown and put on RHR cooldown. When this is done, the U-0 heat exchanger and pump are aligned to U-2, which includes stroking open the 2CC9459B and 2CC9467B valves, and closing the U-1 respective valves. Following the U-2 Cold Shutdown or Refueling Outage, the lineup will be re-set to the original lineup which involves stroking the CC9459B and CC9467B valves in the opposite direction than before the shutdown. This would complete the necessary stroking of the manual valves listed. Since these valves are not often manipulated, they experience minimal wear and a minimum eighteen month stroke frequency should be sufficient to detect a problem.

These manual valves will be stroke exercised in one direction prior to each U-2 Cold Shutdown, or a minimum of once every 18 months during a U-2 Refueling Outage. This is when the U-0 heat exchanger and pump are normally swapped to U-2. The CC9467B and CC9459B valves will be stroked in the opposite direction when the U-0 heat exchanger and pump are re-aligned to the U-1 side following the U-2 Cold Shutdown or Refueling Outage. The testing will occur under carefully controlled conditions to minimize the consequence of exercising these valves.

SECTION 4.6

VALVE RELIEF PEQUESTS

RELIEF REQUEST VR-1

1. Valve Number:

All Type C tested primary containment isolation valves in this program are listed as Category A:

	VALVE #		VALVE #		VALVE #
1)	1CC685	41)	1PR033B	81)	1SI8888
2)	1CC9413A	42)	1PR033C	82)	1SI8964
3)	1CC9414	43)	1PR033D	83)	1SI8968
4)	1CC9416	44)	1PR066	84)	1VQ001A
5)	1CC9438	45)	1PS228A	85)	1VQ001B
6)	1CC9486	46)	1PS228B	86)	1VQ002A
7)	1CC9518	47)	1PS229A	87)	1VQ002B
8)	1CC9534	48)	1PS229B	88)	1VQ003
9)	1CS007A	49)	1PS230A	89)	1VQ004A
10)	1CS007B	50)	1PS230B	90)	1VQ004B
11)	1CS008A	51)	1PS231A	91)	1VQ005A
12)	1CS008B	52)	1PS231B	92)	1VQ005B
13)	1CV8100	53)	1PS9354A	93)	1VQ005C
14)	1CV8112	54)	1PS9354B	94)	1VQ016
15)	1CV8113	55)	1PS9355A	95)	1VQ017
16)	1CV8152	56)	1PS9355B	96)	1VQ018
17)	1CV8160	57)	1PS9356A	97)	1VQ019
18)	1FC009	58)	1PS9356B	98)	1WM190
19)	1FC010	59)	1PS9357A	99)	1WM191
20)	1FC011	60)	1PS9357B	100)	1WO006A
21)	1FC012	61)	1RE1003	101)	1WO006B
22)	1IA065	62)	1RE9157	102)	1WO007A
23)	1IA066	63)	1RE9159A	103)	1WO007B
24)	1IA091	64)	1RE9159B	104)	1WO020A
25)	1OG057A	65)	1RE9160A	105)	1WO020B
26)	1OG079	66)	1RE9160B	106)	1WO056A
27)	1OG080	67)	1RE9170	107)	1WO056B
28)	1OG081	68)	1RF026		
29)	1OG082	69)	1RF027		
30)	1OG083	70)	1RY075		
31)	1OG084	71)	1RY8025		
32)	1OG085	72)	1RY8026		
33)	1PR001A	73)	1RY8028		
34)	1PR001B	74)	1RY8033		
35)	1PR002E	75)	1RY8046		
36)	1PR002F	76)	1RY8047		
37)	1PR002G	77)	1SA032		
38)	1PR002H	78)	1SA033		
39)	1PR032	79)	1SI8871		
40)	1PR033A	80)	1SI8880		

RELIEF REQUEST VR-1

Valve Number: (continued)

	VALVE #		VALVE #		VALVE #
108)	2CC685	148)	2PR033B	188)	2SI8888
109)	2CC9413A	149)	2PR033C	189)	2SI8964
110)	2CC9414	150)	2PR033D	190)	2SI8968
111)	2CC9416	151)	2PR066	191)	2VQ001A
112)	2CC9438	152)	2PS228A	192)	2VQ001B
113)	2CC9486	153)	2PS228B	193)	2VQ002A
114)	2CC9518	154)	2PS229A	194)	2VQ002B
115)	2CC9534	155)	2PS229B	195)	2VQ003
116)	2CS007A	156)	2PS230A	196)	2VQ004A
117)	2CS007B	157)	2PS230B	197)	2VQ004B
118)	2CS008A	158)	2PS231A	198)	2VQ005A
119)	2CS008B	159)	2PS231B	199)	2VQ005B
120)	2CV8100	160)	2PS9354A	200)	2VQ005C
121)	2CV8112	161)	2PS9354B	201)	2VQ016
122)	2CV8113	162)	2PS9355A	202)	2VQ017
123)	2CV8152	163)	2PS9355B	203)	2VQ018
124)	2CV8160	164)	2PS9356A	204)	2VQ019
125)	2FC009	165)	2PS9356B	205)	2WM190
126)	2FC010	166)	2PS9357A	206)	2WM191
127)	2FC011	167)	2PS9357B	207)	2WO006A
128)	2FC012	168)	2RE1003	208)	2WO006B
129)	2IA065	169)	2RE9157	209)	2WO007A
130)	2IA066	170)	2RE9159A	210)	2WO007B
131)	2IA091	171)	2RE9159B	211)	2WO020A
132)	2OG057A	172)	2RE9160A	212)	2WO020B
133)	2OG079	173)	2RE9160B	213)	2WO056A
134)	2OG080	174)	2RE9170	214)	2WO056B
135)	2OG081	175)	2RF026		
136)	2OG082	176)	2RF027		
137)	2OG083	177)	2RY075		
138)	2OG084	178)	2RY8025		
139)	2OG085	179)	2RY8026		
140)	2PR001A	180)	2RY8028		
141)	2PR001B	181)	2RY8033		
142)	2PR002E	182)	2RY8046		
143)	2PR002F	183)	2RY8047		
144)	2PR002G	184)	2SA032		
145)	2PR002H	185)	2SA033		
146)	2PR032	186)	2SI8871		
147)	2PR033A	187)	2SI8880		

RELIEF REQUEST VR-1

2. Number of Items: 214

3. ASME Code Category: A or AC

4. ASME Code, Section XI Requirements:

   Seat Leakage Measurement per IWV-3420 and Corrective Action per IWV-3427(b).

5. Basis for Relief:

   Primary containment isolation valves will be seat leak tested in accordance with 10CFR50, Appendix J. For these valves, Section XI testing requirements are essentially equivalent to those of Appendix J.

6. Alternate Testing:

   Primary containment isolation valves shall be seat leak rate tested in accordance with the requirements of 10 CFR 50, Appendix J. The results of such leak rate measurements shall be analyzed and corrected, as necessary, in accordance with the guidance set forth in ASME Code Section XI, Subsection IWV, paragraphs IWV-3426 and IWV-3427(a). The trending requirements of IWV-3427(b) will not be utilized.

7. Justification:

   No additional information concerning valve leakage would be gained by performing separate tests to both Section XI and Appendix J. Therefore, overall plant safety is not affected. As specified per NRC Generic Letter 89-04, Attachment 1, position 10, the usefulness of IWV-3427(b) does not justify the burden of complying with this requirement.

8. Applicable Time Period:

   This relief is requested once per two years during the first inspection interval.

9. Approval Status:

   a. Relief granted per NRC Generic Letter 89-04, Position 10.

   b. Deleted SD valves per Technical Specification Amendment #26.

   c. Added 1/2RY075 due to Appendix J, Type C Testing per Rev. 5a.

RELIEF REQUEST VR-2

1. Valve Number: 1CS020A 2CS020A
   1CS020B 2CS020B

2. Number of Items: 4

3. ASME Code Category: C

4. ASME Code, Section XI Requirements:

   Exercise check valves to the position required to fulfill their function (Ct/Open; Bt/Closed) quarterly, unless such operation is not practical during plant operation per IWV-3521, or exercise during cold shutdown per IWV-3522.

5. Basis for Relief:

   These check valves in the spray additive system (CS) cannot be stroked without introducing NaOH into the CS system, unless the piping between the NaOH storage tank and the injection isolation valves, 1/2CS021A/B, is drained into containers, which amounts to almost two 55 gallon drums of potentially (radioactive/toxic) mixed waste that requires either recycling or disposal. Then, primarily water is connected to the CS system and is used to flow test the line to ensure that the proper Technical Specification eductor flow rate can be passed, via special test connections.

   The problem with disposal stems from the caustic being slightly contaminated, as well as having a high ph. Recycling (pouring the contents of the drums bank into the NaOH tank) is not always a viable option either, considering the caustic has been contained in a stagnate line (up to five years) and may not meet chemistry requirements. Thus storage of hazardous mixed waste can become very costly. This is due to the non-existence of commercial disposal facilities for mixed waste, which means that any mixed waste generated would have to be stored on-site. Also, the draining and handling of this highly caustic material poses a significant hazard to personnel, and can result in loss of eye sight and/or chemical burns, if splashed or spilled.

6. Alternate Testing:

Group 1	Group 2
1CS020A	2CS020A
1CS020B	2CS020B

   The A and B train valves are of the same design (manufacturer, size, model number, and materials of construction) and have the same service conditions, including orientation. This forms an acceptable sample disassembly group per Generic Letter 89-04, Position 2c.
   Each group will be disassembled and visually inspected at the same frequency as the Technical Specification eductor flow test, conducted at least once every five years. The visual inspection of internals will precede the eductor flow test.

RELIEF REQUEST VR-2

7. Justification:

If the disassembled valve is not capable of being manually full-stroked exercised or there is binding or failure of internals, the remaining valve on the affected unit will be evaluated for further action as well.

Full flow testing of these valves cannot be accomplished without posing a serious threat to the safety of equipment and personnel. It is impractical to either full or partial stroke exercise these valves since flow through them requires draining and flushing the piping to prevent the introduction of caustic effluent into the CS system. The problem of mixed waste disposal or recycling created by system draining of approximately two 55 gallon drums is considered an undue hardship, if the Code requirements are imposed.

The alternate test frequency (same frequency as the Technical Specification eductor flow test of at least once every five years) is justifiable in that **maintenance history and previous inspections** of these valves at both Byron and Braidwood stations have shown no evidence of degradation or physical impairments (i.e. corrosion, chemical buildup, wear). This is to be expected since these valves see limited operation (flow in line during eductor flow test only).

Industry experience, as documented in NPRDS, show no history of problems with these valves. A company wide check valve **evaluation** addressing the **"EPRI Application Guidelines for Check Valves in Nuclear Power Plants"** revealed that the location, orientation and application of these valves are not conducive to the type of wear or degradation correlated with SOER 86-03 type failures.

The alternate test method, visual inspection of internals followed by the Technical Specification eductor flow test, at least once every five years, is sufficient to ensure operability of these valves and is consistent with Generic Letter 89-04 guidelines. The hardship involved with the hazardous mixed waste disposal and handling caustic material with regards to personnel safety does not provide a compensated increase in safety of the CS system equipment.

8. Applicable Time Period:

This relief is requested for the first inspection interval.

9. Approval Status:

a. Relief granted per Generic Letter 89-04, Rev. 4/4a.

b. This relief request is being resubmitted based on further experience gained during inservice testing and inspections, Rev. 5.

c. Resubmitted for mixed waste considerations, Rev. 5 Supplement.

d. Incorporated into Rev. 5a; previously reviewed per OSR 92-017.

e. Pending SER (dated September 14, 1993) Response dated December 13, 1993. Refer to attachment B of response for interim relief requirements.

RELIEF REQUEST VR-3

1. Valve Number: 1SI8922A/B 2SI8922A/B

2. Number of Items: 4

3. ASME Code Category: C

4. ASME Code, Section XI Requirements:

   Exercise for operability (Ct/Bt) of check valves every 3 months, per IWV-3521.

5. Basis for Relief:

   These check valves cannot be full flow tested during operation as the shut-off head of the Safety Injection pumps is lower than the reactor coolant system pressure. Performance of this test with the RCS depressurized, but intact, could lead to inadvertent over-pressurization of the system. The alternate method of protecting against over-pressurization by partially draining the RCS to provide a surge volume is not considered a safe practice due to concerns of maintaining adequate water level above the reactor core.

6. Alternative Testing:

   These valves will be full-stroke tested during refueling outages as a minimum, but no more frequently than once per quarter.

7. Justification:

   This alternative will adequately maintain the system in a state of operational readiness, while not sacrificing the safety of the plant, by testing the valves as often as safely possible.

8. Applicable Time Period:

   This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

   a. Relief granted per NRC Generic Letter 89-04 and SE dated 10/15/91.

RELIEF REQUEST VR-4

1. Valve Number: 1CS003A/B 2CS003A/B
1CS008A/B 2CS008A/B

2. Number of Items: 8

3. ASME Code Category: AC and C

4. ASME Code, Section XI Requirements:

a. Exercise check valves to the position required to fulfill their function (Open/Ct; Closed/Bt), unless such operation is not practical during plant operation, per IWV-3522.

b. When a valve has been repaired, replaced, or has undergone maintenance that could affect its performance and prior to the time it is returned to service, it shall be tested to demonstrate that the performance parameters, which could have been affected by the replacement, repair, or maintenance, are within acceptable limits, per IWV-3200.

The 1/2CS003A/B check valves are on discharge of the CS pumps and function in the open direction to allow flow from the refueling water storage tank (RWST) to the spray rings inside containment. They function in the closed direction to prevent water column separation and reverse rotation of the CS pumps. The 1/2CS008A/B check valves are the inboard containment isolation valve for the spray header piping and function in the open direction to allow flow. They function in the closed direction to provide for containment isolation, which is a redundant function to the outboard CIV. These valves cannot be full flow tested as a matter of course during unit operation or cold shutdown as water from the CS pumps would be discharged through the CS ring headers causing undesirable effects on many critical components inside containment.

Additionally, the full flow testing of these check valves during periods of cold shutdown, using the CS pumps, would fill the reactor refueling cavity with borated water from the refueling water storage tank. This would adversely affect the reactor head components (e.g. Control Rod Drives). The filling of the cavity, via temporarily installed large bore piping, would require the removal of the reactor vessel head so as to preclude equipment damage from borated water. The erection of temporary piping from the CS line to the reactor cavity would take an estimated nine to twelve shifts, compared to one to two shifts for valve inspection. This estimate does not take into account the time required to drain and remove the piping from containment. Testing in this manner would also require overriding protective electrical interlocks in the pump start circuitry.

Full flow recirculation flow paths do not exist from the discharge of the CS pumps through these check valves to the refueling water storage tank. The addition of such flow paths would require extensive modifications to existing plant designs: including additional penetrations of the containment boundary, and electrical system changes to allow for pump start without the need of jumpering out protective interlocks.

RELIEF REQUEST VR-4

5. Basis for Relief: (continued)

Partial stroking of the 1/2CS008A/B valves with air using existing LLRT connections does not provide adequate flow to obtain any meaningful acoustic monitoring data, relative to valve condition or its performance parameters. This acoustic testing was attempted at Byron Station per special process procedure, SPP 91-054.

6. Alternate Testing:

UNIT 1

Group 1	Group 2
1CS003A	1CS008A
1CS003B	1CS008B

UNIT 2

Group 1	Group 2
2CS003A	2CS008A
2CS003B	2CS008B

The A and B train valves are of the same design (manufacturer, size, model number, and materials of construction) and have the same service conditions, including orientation, therefore they form a sample disassembly group.

One valve from each group, on a per unit basis, will be examined each refueling outage. If the disassembled valve is not capable of being manually full stroked exercised or if there is binding or failure of internals, the remaining valve on the affected unit will be inspected.

In addition to the above, the 1/2CS003A/B valves will be partial stroke tested during the quarterly pump surveillance and after maintenance in order to verify that it was installed correctly. The 1/2CS008A/B are required to be leak tested before and after visual inspection per Appendix J requirements. The leakage test following reassembly of the valve into the system will serve as post-maintenance verification that the valve was installed correctly. Partial flow testing the 1/2CS008A/B following maintenance in not practical for the same reasons given in the "Basis for Relief" section.

7. Justification:

The 1/2CS003A, B and 1/2CS008A, B valves are removed from the system and visually examined per the strict detailed inspection requirements of the Station Check Valve Program. This inspection adequately verifies that the valves are maintained in a state of operational readiness and that their performance parameters are adequately assessed. The valves are verified to be functional by performing a thorough visual inspection of the internals and by performing a manual full-stroke exercise of each disc. Previous inspections of these particular valves at both Byron and Braidwood Stations have repeatedly shown them to be in good condition.

RELIEF REQUEST VR-4

7. Justification: (continued)

The wafer type design of the valve body for these valves makes their removal a simple process, with little chance of damage to their internals. Also, there is no disassembly of internal parts required; all wear surfaces are accessible to visual examination. After inspection and stroke testing, the valve is reinstalled into the line and post maintenance testing is performed. The 1/2CS008A, B valves receive a local leak rate test per the requirements of 10CFR50 Appendix J, and the 1/2CS003A, B valves are partial flow tested. These tests verify proper installation of the check valves, and the valve inspection procedure requires post-inspection visual examination of the check valve to ensure that the pin is oriented properly and that the flow direction is correct.

The alternate test frequency is justifiable in that **maintenance history** and previous inspections of these valves at both Byron and Braidwood stations has shown no evidence of degradation or physical impairments. In addition, **industry experience**, as documented in NPRDS, show no history of problems with these valves.

A company wide check valve **evaluation** addressing the **"EPRI Application Guidelines for Check Valves in Nuclear Power Plants"** revealed that the location, orientation and application of these valves are not conducive to the type of wear or degradation correlated with SOER 86-03 type problems. However, they still require some level of monitoring to detect hidden problems.

The alternate test method is sufficient to ensure operability of these valves and is consistent with Generic Letter 89-04. The hardship involved with full stroke exercising these check valves, if the Code requirements were imposed, does not provide a compensated increase in safety of these CS system valves.

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief granted per NRC Generic Letter 89-04, Rev. 5.

b. Changed to incorporate acoustic test results, Rev. 5a.

c. Approved per SE dated 9/10/92 with provision.

RELIEF REQUEST VR-5

1. Valve Number:

   1SI8948A-D   2SI8948A-D   (SI Accumulator Check Valves)
   1SI8956A-D   2SI8956A-D   (SI Accumulator Check Valves)

2. Number of Items: 16

3. ASME Code Category: AC

4. ASME Code, Section XI Requirements:

   The purpose of this relief request is to request relief from the 3 month test frequency for the full stroke (CT) and backflow (BT) test as stated in ASME Section XI, IWV-3521: "Check Valves shall be exercised at least once every 3 months, except as provided by IWV-3522." IWV-3522 states that valves that cannot be exercised during plant operation shall be specifically identified by the owner and shall be full-stroke exercised during cold shutdowns.

5. Basis for Relief:

   Safety Function

   The 1/2SI8948A-D and 1/2SI8956A-D check valves are located inside the containment building missile barrier on the lines from the accumulator tanks to the Reactor Coolant System (RCS) cold legs. These 16 check valves have safety functions in both the open and closed directions:

   1/2SI8956A-D

   Closed

   The 1/2SI8956A-D check valves' safety function in the closed direction is to maintain the Reactor Coolant Pressure Boundary (RCPB).

   Open

   The 1/2SI8956A-D check valves' safety function in the open direction is to permit the injection of borated water into the reactor vessel cold legs during the passive injection phase of a safety injection.

   Basis

   Check valves 1/2SI8956A-D cannot be tested during unit operation due to the pressure differential between the accumulators (650 psig) and the reactor coolant system (2235 psig). Full stroke exercising of these valves could occur only with a rapid depressurization of the reactor coolant system. Exercising these valves at times other than refueling poses an undesirable situation as discussed in NRC Information Notice 89-67: "Loss of Residual Heat Removal Caused by Accumulator Nitrogen Injection."

RELIEF REQUEST VR-5 cont.

1/2SI8948A-D

Closed

The 1/2SI8948A-D check valves' safety function in the closed direction is to provide a redundant (backup to the 1/2SI8956A-D, 1/2SI8818A-D, and 1/2SI8819A-D Reactor Coolant Pressure Boundary (RCPB).

Open

The 1/2SI8948A-D check valves' safety function in the open direction is to permit the injection of borated water into the RCS cold legs during the injection phase of a safety injection.

Basis

Check valves 1/2SI8948 cannot be tested without depressurizing the RCS to 1600 psig (to stroke using Safety Injection pumps) or to 200 psig (to use the Residual Heat Removal pumps).

6. Alternate Testing:

These valves will be backflow tested (BT) on the same schedule as the Braidwood station Technical Specifications leakage test as follows.

a. At least once per 18 months,

b. Prior to entering MODE 2 whenever the plant has been in COLD SHUTDOWN for 72 hours or more if leakage testing has not been performed in the previous 9 months,

c. Prior to returning the valve to service following maintenance, repair or replacement work on the valve, and

d. Within 24 hours following valve actuation due to manual action or flow through the valve.

Braidwood Station will full stroke exercise (CT) these check valves each refueling outage and partially stroke the 1/2SI8948 valves during cold shutdowns. The full stroke test will be accomplished using the pressurizer as a surge volume and "burping" the accumulator discharge check valves. Positive verification of valve operability will be by noting a change in pressurizer or accumulator level and by the use of acoustic monitoring to confirm full disk lift by the time-of-arrival technique.

The time of arrival technique utilizes two sensors, one mounted at the backstop location and the other at the seat location. When the valve full strokes open, the disk arm impacts on the backstop (valve body) creating an acoustic event. This acoustic event propagates through the body at a specific velocity based on the material of construction. The sensor at the backstop detects the event first, with the sensor at the seat detecting the event at a later point in time. This lag or time delay between the backstop sensor and the seat sensor represents the time of arrival method and is used to demonstrate that the valve full strokes.

RELIEF REQUEST VR-5 cont.

7. Justification:

These sixteen valves are part of the Passive Injection subsystem portion of the safety injection system. This subsystem is designed to inject borated water into the reactor cold legs only after Reactor Coolant System (RCS) pressure has decreased below the accumulator nitrogen gas pressure. Under normal plant conditions the RCS system pressure is 2235 psig and the accumulator pressure is 650 psig making passive injection impossible. Therefore, it is not possible to full stroke these valves unless there is rapid depressurization of the Reactor Coolant System. Full stroke testing (CT) of these valves during operation or at cold shutdown requires depressurization of the RCS. The SI8948 check valves can be partial stroked using the RHR pumps during shutdown cooling operations.

Additionally, full stroking these valves during cold shutdowns, routine or forced would impose considerable hardship with no compensating increase in plant safety. To perform this test, the reactor coolant system (RCS) must be at approximately 40 psi with all 4 reactor pumps (RCPs) off and accumulator pressure at 100 psi over RCS pressure. Also, at or near end-of-core-life, the boron concentration is low compared to the 1900-2100 ppm concentration of the accumulators. This injection test requires that approximately 8 thousand gallons of this boron concentrated water be injected into the RCS. This would result in a considerable increase in the boron concentration of the RCS. The feed and bleed process required to restore desired RCS boron concentration would result in considerable increases in testing time and in amounts of radioactive water rejected from the site. The cost of the nitrogen required to test these valves is at least $2500, and although not quantified, the cost of processing the reactor coolant to restore the optimum boron concentration are not inconsequential.

Successful completion of the seat leakage test will provide positive verification of closure (BT). Therefore, backflow testing these valves on the same schedule as their required Technical Specification leak rate testing will adequately maintain the system in a state of operational readiness.

8. Applicable Status:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief granted per NRC Generic Letter 89-04 for Rev.4.

b. Requesting refueling frequency for the CT exercise test; incorporated the necessary information and justification, Rev. 5.

c. Incorporated additional technical information and justification and acoustic time-of-arrival, per Rev. 5a.

d. Approved per SE dated 9/14/93.

RELIEF REQUEST VR-6

1. Valve Number: 1SI8926 2SI8926

2. Number of Items: 2

3. ASME Code Category: C

4. ASME Code, Section XI Requirements:

   Exercise for operability (Ct) of check valves every 3 months, per IWV-3521.

5. Basis for Relief:

   Full stroke exercising of the Safety Injection pump suction check valves, 1SI8926 and 2SI8926 cannot be demonstrated during unit operation as the reactor coolant system pressure prevents the pumps from reaching full flow injection conditions. Performance of this test with the reactor coolant system intact could lead to an inadvertent over-pressurization of the system. The alternate method of protecting against over-pressurization by partial draining of the reactor coolant system to provide a surge volume is not considered a safe practice due to concerns of maintaining adequate water level above the reactor core.

6. Alternate Testing:

   The 1SI8926 and 2SI8926 valves will be partial stroke tested during periodic inservice tests with the SI pumps in the recirculation mode. Full stroke exercising for the valves will be done during refueling outages as a minimum, but no more frequently than once per quarter.

7. Justification:

   This alternative will adequately maintain the system in a state of operational readiness, while not sacrificing the safety of the plant, by testing the valves as often as safely possible.

8. Applicable Time Period:

   This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

   a. Relief granted per NRC Generic Letter 89-04.

   b. Approved per SE dated 10/15/91.

RELIEF REQUEST VR-7

-DELETED-

Deleted relief request VR-7. Incorporated valves formerly covered by VR-7 into VR-12 and VR-17.

RELIEF REQUEST VR-8

1. Valve Number:

1CC685	2CC685	Thermal Barrier Return
1CC9438	2CC9438	Thermal Barrier Return
1CC9518	2CC9518	Pressure Relief Check
1CC9413A	2CC9413A	Motor/Thermal Barrier Supply
1CC9486	2CC9486	Motor/Thermal Barrier Supply
1CC9414	2CC9414	Motor Bearing Return
1CC9416	2CC9416	Motor Bearing Return
1CC9534	2CC9534	Pressure Relief Check

2. Number of Items: 16

3. ASME Code Category: A, B, and C

4. ASME Code, Section XI Requirements:

Exercise for operability: full stroke timing and exercising (St) of Category A & B valves; full stroke and back flow testing (Ct/Bt) of Category C valves every 3 months per IWV-3411 and IWV-3421, respectively. Per IWV-3412 for power operated valves, and IWV-3522 for check valves, valves that cannot be exercised during plant operation shall be specifically identified by the owner and exercised during cold shutdowns.

5. Basis for Relief:

All of the above listed valves function in the closed position to provide a limited leakage barrier between the containment atmosphere and the environment during accident conditions (containment isolation). The isolation valves function in the open position to allow component cooling water flow (monitored by flow sensing instruments) to the upper and lower RCP motor bearings and to the thermal barrier between the RCS and the RCP mechanical seals. The 1/2CC9518 and 1/2CC9534 check valves function in the open direction only when both of the associated containment isolation valves (CIVs) are closed during an accident condition involving adverse containment conditions. Each valve opens in a manner that will bypass the upstream isolation valve to relieve excess pressure. This is to prevent hydraulic locking of the associated isolation valves in the closed position; which can be accomplished manually by using the manual vent between the two isolation valves. They are also needed for pressure integrity purposes.

Component cooling (CC) water flow to the Reactor Coolant Pumps (RCPs) is required at all times while the pumps are in operation. The failure of one of these valves in a closed position during an exercise test would result in a loss of cooling flow to the RCPs and possible pump damage and/or trip, which can further lead to disruptions in RCS pressure control. In addition, the RCPs provide the necessary driving head to the pressurizer spray valves for pressure control in the RCS while a steam bubble exists in the pressurizer during power operation and cold shutdown.

RELIEF REQUEST VR-8

5. Basis for Relief: (continued)

A reactor coolant pump start involves two operations personnel in attendance to monitor and report pump shaft rotation information to the control room. This involves a containment entry, inside the inner missile barrier, which is a high radiation area. The exposure to personnel is dependent on the number of "bumps" needed (normally 2-3 bumps at an estimated 9-12 hours) to rid the system of air.

The Code requires that the 1/2CC9518, 1/2CC9534 and the 1/2CC9486 check valves be tested in the closed direction to verify their seating capability. However, these check valves can only be verified closed by performing the Appendix J, Type C local leakage rate test (LLRT). Performing the LLRT requires placing the system in an inoperable status (removed from service) for an extended period of time due to the need to isolate and drain portions of the system, and connecting a leak rate monitor (LRM). This will prevent starting the RCPs and could delay reactor startup. These tests will require a minimum of three shifts each to perform.

This would cause undue hardship with no compensating increase in plant or component safety, if the Code requirements were imposed.

6. Alternate Testing:

The isolation valves will be stroked on a refueling frequency or at planned cold shutdowns when all four RCPs are no longer required to support plant conditions and can be removed form service. The RCPs will not be shutdown for the sole purpose of stoke timing the isolation valves.

Check valves 1/2CC9486 (total) CC supply flow to the RCPs will be back flow tested (Bt) closed on the same frequency as their Appendix J seat leakage test. The 1/2CC9518 and 1/2CC9534 pressure check valves will be exercised and back flow tested (Ct/Bt) each refueling outage in conjunction with their associated Appendix J seat leakage test. This frequency is at least once per two years, to be performed during reactor refueling outages.

7. Justification:

This alternate testing will adequately maintain these portions of the CC system in a state of operational readiness, while not impacting the safety of the plant. It also eliminates unnecessary personnel radiation exposure, possible damage to the RCP seals, and minimizes the potential RCS pressure transient involved with restarting RCPs at low temperatures.
Back flow testing these check valves on the same schedule as their Appendix J leakage test will adequately maintain this portion of the CC system in a state of operational readiness without causing unnecessary personnel radiation exposure, possible damage to the RCPs or delays in reactor startup. In addition, the Code only requires a five year frequency for pressure relief testing.

RELIEF REQUEST VR-8

7. Justification: (continued)

Performance of leakage testing on a two year (refueling) frequency is adequate to demonstrate structural integrity and valve seating capability per both Appendix J and ASME Section XI requirements.

There is no reason to perform the Appendix J, Type C (low pressure air at approximately 45 psig) seat leakage test more often than that already required by 10CFR50. This low pressure air test is adequate to monitor the valve's ability to seat; the smallest amounts of dirt, general corrosion, and foreign material can be detected between the seating surfaces by this test.

Performing an LLRT to prove valve closure would only draw manpower away from the task at hand, and could hamper attempts to restart the unit. An LLRT requires personnel involvement from operations (valve manipulations and out of services), radiation protection (radiation surveys and monitoring), instrument maintenance (installation of test equipment), and technical staff (LLRT test equipment operation and test supervision) that results in increased exposure. This excess exposure conflicts with station ALARA goals and radiation work practices. For these reasons, performing an LLRT to verify valve closure is considered to be impractical during cold shutdown.

Quarterly and cold shutdown testing requires a containment entry which would conflict with station ALARA goals and radiation practices in reducing exposure, and it is not prudent from a personnel safety standpoint. For personnel safety considerations, two individuals must always enter containment together, whenever containment integrity is set. The performance of this test would require a minimum of three (3) shifts with personnel working in a high radiation area. In addition, performing the LLRT test on a more frequent basis has an adverse impact on the required test equipment (LRMs).

The leak rate monitors (LRM) used for Type C LLRTs are required to be shipped off-site for calibration. During operation and cold shutdown when containment integrity is set, the LRM(s) would need to be taken inside the containment. If the LRM is contaminated and then unable to be decontaminated, this would prevent its calibration and render it unusable. This equipment is expensive and the number of monitors available for use is limited. During refueling outages, a staging area is set up outside containment in a low dose, non-contaminated area and hoses are run inside to the various containment isolation valves. This is possible due to the relaxed containment integrity requirements. These precautions are taken to prevent the LRMs from becoming contaminated.

RELIEF REQUEST VR-8

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief granted per NRC Generic Letter 89-04.
b. Requesting additional relief for valves 1/2CC9518 & 1/2CC9534, Rev. 5.
c. Added additional technical information and justification, Rev. 5a.
d. Approved by SE dated 9/14/93.

RELIEF REQUEST VR-9

1. Valve Number:

1CV8100	2CV8100	RCP Seal Water Return
1CV8112	2CV8112	RCP Seal Water Return
1CV8113	2CV8113	Pressure Relief Check

2. Number of Items: 6

3. ASME Code Category: A and AC

4. ASME Code, Section XI Requirements:

Exercise for operability: full stroke timing and exercising (St) of Category A & B valves; full stroke and back flow testing (Ct/Bt) of Category C valves every 3 months per IWV-3411 and IWV-3421, respectively. Per IWV-3412 for power operated valves, and IWV-3522 for check valves, valves that cannot be exercised during plant operation shall be specifically identified by the owner and exercised during cold shutdowns.

5. Basis for Relief:

All of the above valves function to provide for a limited leakage barrier between the containment atmosphere and the environment during accident conditions (containment isolation). Their open function is to allow a return path for filtered seal water flow for cooling and flushing to the RCP mechanical seals during plant operation. During startup and shutdown, the pressure in the RCS is too low to maintain the gap across the number 1 seal. Under such conditions, the number 1 seal bypass flow is established which assures adequate cooling of the pump's lower radial bearing and limits the temperature rise of water cooling the number 1 seal. The 1/2CV8113 pressure relief check valves function in the open position only when both of the associated containment isolation valves (CIVs) are closed during an accident condition involving adverse containment conditions. Each valve opens in a manner that will bypass the upstream isolation valve to relieve excess pressure. This is to prevent hydraulic locking of the associated isolation valves in the closed position; which can be accomplished manually by using the manual vent between the two isolation valves. They are also needed for pressure integrity purposes.

These valves cannot be tested during unit or pump operation as seal water flow from the CV system is required continuously while the reactor coolant pumps are in operation. Loss of flow could result in damage to the seals from overheating and contamination by foreign material. Also, failure of one of these valves in the closed position during an exercise test would result in seal water return flow being diverted to the PRT by lifting a relief valve upstream of the isolation valves, generating significant quantities of liquid radwaste. The RCPs are also needed to provide the driving head to the pressurizer spray valves for pressure control in the RCS while a steam bubble exists in the pressurizer during power operation and cold shutdown.

A reactor coolant pump start involves two operations personnel in attendance to monitor and report pump shaft rotation information to the control room. This involves a containment entry, inside the inner missile barrier, which is a high radiation area.

RELIEF REQUEST VR-9

5. Basis for Relief: (continued)

The exposure to personnel is dependent on the number of "bumps" needed (normally 2-3 bumps estimated at an 8-12 hours) to rid the system of air.

The closure test for the 1/2CV8113 (seal return pressure relief check valves) can only be verified by performing a local leakage rate test (LLRT). Performing this test requires placing the system in an inoperable status, isolating the seal return line portion of piping, and connecting an external pressure supply. This test will require a minimum of two shifts to perform. The opening test requires isolating both the inboard motor and manual isolation valves and running a centrifugal charging pump on mini-flow recirculation to supply pressure for opening the valve. The inboard manual vent is opened to verify that the check valve is capable of relieving pressure. This would require a minimum of 1 shift to perform.

6. Alternate Testing:

The 1/2CV8113 and 1/2CV8112 isolation valves will be stroked on a refueling frequency or at planned cold shutdowns when all four RCPs are no longer required to support plant operations and can be taken out of service. The RCPs will not be shutdown for the sole purpose of stroke timing the isolation valves.

The 1/2CV8113 pressure check valves will be exercised and back flow (Ct/Bt) tested each refueling outage in conjunction with their associated Appendix J leakage rate test. This frequency is at least once per two years, to be performed during each reactor refueling outage.

7. Justification:

This alternate testing will adequately maintain this portion of the CV system in a state of operational readiness, while not impacting the safety of the plant. It also eliminates unnecessary personnel radiation exposure, possible damage to the RCP seals, and minimizes the potential RCS pressure transient involved with restarting RCPs at low temperatures.

Back flow testing these check valves on the same schedule as their Appendix J leak rate test will adequately maintain this portion of the CV system in a state of operational readiness without causing unnecessary personnel radiation exposure, delays in reactor startup or possible damage to the RCPs. In addition, the Code only requires a five year frequency for pressure relief testing.

Performance of leakage testing on a two year (refueling) frequency is adequate to demonstrate structural integrity and valve seating capability per both Appendix J and ASME Section XI requirements. There is no reason to perform the Appendix J, Type C (low pressure air at approximately 45 psig) seat leakage test more often than that already required by 10CFR50. This low pressure air test is adequate to monitor the valve's ability to seat; the smallest amounts of dirt, general corrosion, and foreign material can be detected between the seating surfaces by this test.

RELIEF REQUEST VR-9

7. Justification: (continued)

During forced outages, limited manpower and resources are available to perform the necessary prerequisites involved with an LLRT. Performing an LLRT to prove valve closure would only draw manpower away from the task at hand, and could hamper attempts to restart the unit. An LLRT requires personnel involvement from operations (valve manipulations and out of services), radiation protection (radiation surveys and monitoring), instrument maintenance (installation of test equipment), and technical staff (LLRT test equipment operation and test supervision) that results in increased exposure. This excess exposure conflicts with station ALARA goals and practices. For these reasons, performing an LLRT to verify valve closure is considered to be impractical during cold shutdown.

Quarterly and cold shutdown testing requires a containment entry which would conflict with station ALARA goals and radiation practices in reducing man-rem, and it is not prudent from a personnel safety standpoint. For personnel safety considerations, two individuals must always enter containment together, whenever containment integrity is set. The performance of this test would require a minimum of three (3) shifts with personnel working in a high radiation area. In addition, performing the LLRT test on a more frequent basis has an adverse impact on the required test equipment (LRMs).

The leak rate monitors (LRM) used for Type C LLRTs are required to be shipped off-site for calibration. During operation and cold shutdown when containment integrity is set, the LRM(s) would need to be taken inside the containment. If the LRM is contaminated and then unable to be decontaminated, this would prevent its calibration and render it unusable. This equipment is expensive and the number of monitors available for use is limited. During refueling outages, a staging area is set up outside containment in a low dose, non-contaminated area and hoses are run inside to the various containment isolation valves. This is possible due to the relaxed containment integrity requirements. These precautions are taken to prevent the LRMs from becoming contaminated.

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief granted per NRC Generic Letter 89-04.

b. Requesting additional relief for the 1/2CV8113 check valves, Rev. 5.

c. Added additional technical information and justification, Rev. 5a.

d. Approved by SER dated 9/14/93.

RELIEF REQUEST VR-10

1. Valve Number:

1IA065	2IA065	Outbd Instrument Isolation
1IA066	2IA066	Inbd Instrument Isolation
1IA091	2IA091	Inbd Isolation Supply Check

2. Number of Items: 6

3. ASME Code Category: A and AC

4. ASME Code, Section XI Requirements:

Exercise for operability: full stroke timing and exercising (St) of Category A & B valves; full stroke and back flow testing (Ct/Bt) of Category C valves every 3 months per IWV-3411 and IWV-3421, respectively. Per IWV-3412 for power operated valves, and IWV-3522 for check valves, valves that cannot be exercised during plant operation shall be specifically identified by the owner and exercised during cold shutdowns.

Fail-safe test actuators per IWV-3415.

5. Basis for Relief:

The 1/2IA065 and 1/2IA066 valves are air-operated containment isolation valves for the instrument air line to containment; they fail closed on loss of air supply/power. The 1/2IA091 check valves are in the supply air line to the 1/2IA066 valves, which taps off the line between the two isolation valves. These check valves also perform a containment isolation function in the closed position.

Stroke testing of these valves during plant operation or cold shutdown would, by design, isolate the air operated instruments and valves inside the containment building. The loss of instrument air to containment creates a very serious situation and should be avoided for testing purposes. This situation involves loss of pressure control via the sprays, letdown isolation, and loss of charging flow. Additionally, loss of air would leave the pressurizer PORVs with only their accumulators as an air supply, limiting the number of operations available.

6. Alternate Testing:

These valves will be exercised during refueling outages. The back flow (Bt) test for the 1/2IA091 check valves will be done in conjunction the Appendix J seat leakage test.

This testing period will be each refueling outage as a minimum, but no more frequently than once per quarter.

7. Justification:

The full stroke exercising of the instrument air containment isolation valves during unit power operations or cold shutdowns introduces the possibility of causing major operating perturbations and/or personnel safety concerns during the test. Additionally, should these valves fail to re-open during testing activities, the transient would be exacerbated.

RELIEF REQUEST VR-10

7. Justification: (continued)

The failure of these valves in the closed position, as a result of testing activities during plant operation or cold shutdown, would subsequently isolate the air operated instruments and valves inside the containment building thus resulting in one or more of the following scenarios:

A. **Loss of Pressurizer Pressure Control**

The pressurizer spray valves 1/2RY455B & C and the pressurizer auxiliary spray valve 1/2CV8145 would fail closed and not be available for pressurizer pressure control.

B. **Loss of Chemical Volume Control System Letdown Flow (both normal and excess) and Charging Flow**

The loss of instrument air would cause a disruption in the unit letdown flow paths resulting in pressurizer level increases. Such valves as the letdown orifice containment outlet header isolation valve 1/2CV8160, the letdown line isolation valves 1/2CV459 and 1/2CV460, the letdown orifice outlet isolation valves 1/2CV8149 A, B & C, the excess letdown heat exchanger inlet isolation valves 1/2CV8153A & B, and the regen heat exchanger letdown inlet isolation valves 1/2CV8389A & B would go to their fail closed positions. Additionally, the ability to normally make up reactor coolant inventory and adjust the reactor chemical shim (i.e. normal boration/dilution) would also be lost as the regenerative heat exchanger inlet isolation valves 1/2CV8324A & B would fail to their respective closed positions.

An additional detrimental effect would be the thermal cycle imposed on the reactor vessel nozzle upon restoration of system operation.

C. **Loss of Component Cooling to Containment Penetrations**

The loss of instrument air supply would cause the penetration cooling supply flow control valve 1/2CC053 to go to its fail closed position. The loss of penetration cooling would result in elevated temperatures being imposed on the penetrations being supported by the component cooling system.

D. **Loss of Personnel Breathing Air**

The loss of instrument air supply to the service air downstream isolation valve 1/2SA033 would cause this valve to go to its fail closed position. This loss of service air in the containment building would eliminate the normal source of supplied breathing air needed to support numerous maintenance and component inspection activities in a contaminated radiological environment.

RELIEF REQUEST VR-10

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Revised (to address NRC concerns) in Byron's response to SER 12/16/88 (Byron Station Letter 88-1321).

b. Added check valves 1/2IA091, regarding back flow testing. Rev. 5.

c. Added additional technical ation and justification, Rev. 5a.

d. Approved per SE dated 9/14/93.

RELIEF REQUEST VR-11

-DELETED-

Deleted relief request VR-11 per EG&G Idaho (Technical Reviewers) recommendation to Byron. This was a request for extension of position indication tests from every two years to every three years.

RELIEF REQUEST VR-12

1. Valve Number: Valves that normally stroke in 2 seconds or less:

VALVE #	VALVE #
1MS018A-D	2MS018A-D
1PS228A, B	2PS228A, B
1PS229A, B	2PS229A, B
1PS230A, B	2PS230A, B
1RC014A-D	2RC014A-D
1RY8033	2RY8033

2. Number of Items: 30

3. ASME Code Category: A & B

4. ASME Code, Section XI Requirements:

   Verification, by trending of power operated valve times, that an increase in stroke time of 50% or more, from the previous test, does not occur, per IWV-3417(a).

5. Basis for Relief:

   Minor timing inaccuracies, with small stroke times can lead to substantial increases (percent wise) in stroke times. For example, a valve with a stroke time of 1 second in an initial test, and 1.6 seconds in the subsequent test, has experienced an apparent 60% increase in stroke time. If the accuracy requirements of IWV-3413(b) are utilized, it could be argued that stroke times between 1 and 2 seconds could constitute as much as a 100% increase in stroke time when, in fact, only a 0.2 second increase occurred. For instance, if the initial time was 1.4 seconds, (measured to the nearest second is 1.0 second) and if the next time is then 1.6 seconds, (measured to the nearest second is 2.0 seconds) the percent increase is 100%.

6. Alternate Testing:

   Fast acting valves can be defined as those valves that normally stroke in 2 seconds or less. No trending of stroke time will be required, and upon exceeding 2 seconds, corrective action shall be taken immediately in accordance with IWV-3417(b).

RELIEF REQUEST VR-12

7. Justification:

For short stroke times, the trending requirements are too stringent for the accuracies specified in the Code. The alternative specified will adequately maintain the system in a state of operational readiness, while not imposing undue hardships or sacrificing the safety of the plant.

8. Applicable Time Period:

This relief is requested once per quarter, during the first inspection interval.

9. Approval Status:

a. Revised (to address NRC concerns) in Byron's response to SER 12/16/88 (Byron Station Letter 88-1321).

b. Relief granted per NRC Generic Letter 89-04.

c. Approved per SE dated 10/15/91.

RELIEF REQUEST VR-13

1. Valve Numbers: 1DG5182A,B 2DG5182A,B
1DG5183A,B 2DG5183A,B
1DG5184A,B 2DG5184A,B
1DG5185A,B 2DG5185A,B

2. Number of Items: 16

3. ASME Code Category: B & C

4. ASME Code Section XI Requirements:

These valves are not within the scope of ASME Code, Section XI, Subsection IWV requirements. However, the requirements for stroke timing and trending of the valves associated with the Diesel Air Start System are being mandated by the NRC as an augmented testing requirement pursuant to 10CFR50.55 (a) (g).

Therefore, valves associated with the Diesel Air Start System shall be exercised to the position required to fulfill their function during plant operation per IWV-3412 and IWV-3522. Additionally, the stroke testing of power operated valves shall be measured to the nearest second and such stroke times trended to document continued valve operational readiness per IWV-3413 (b) and IWV-3417.

5. Basis for Relief:

The monthly Diesel Generator testing program, outlined in Braidwood Station's Technical Specifications and implemented by station operating procedures, exceeds the intent of the quarterly valve testing program which would be required by ASME Code, Section XI. Additionally, the stroke timing of solenoid operated valves associated with the Diesel Air Start System is impractical due to the fast actuation of these valves.

6. Alternate Testing:

The performance of Braidwood Station's Diesel Generator operability monthly surveillance will verify the operational readiness of the valves associated with the Diesel Air Start System.

This surveillance testing will require the recording of the air pressures contained in both trains A & B of the Diesel Generator Air Start Receiver Tanks both before and immediately after Diesel Generator start.

By the comparison of these valves between trains, the satisfactory operation of the power operated and self-actuated check valves associated with the Diesel Air Start System can be adequately demonstrated.

RELIEF REQUEST VR-13

7. Justification:

Proper valve operation will be demonstrated on a monthly basis by the verification of Diesel Generator air start capability. Such verification will compare the air pressures contained in the receiver tanks both before and after the Diesel Generator start, thus verifying the operability of the air start control valves. The proposed testing methodology at the increased frequency satisfies the intent of the Section XI requirements without posing undue hardships or difficulties.

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief granted NRC Generic Letter 89-04.

b. Approved per SE dated 10/15/91.

RELIEF REQUEST VR-14

-DELETED-

Deleted relief request VR-14. This was a request for exemption for position indicating tests for solenoid operated valves. Alternate testing allowed by the ASME Code will be used instead.

RELIEF REQUEST VR-15A

1. Valve Numbers:

1CV8481A,B	2CV8481A,B	CV Pmp Dsch
1CV8546	2CV8546	CV Pmp Comb Suction
1SI8815	2SI8815	CV Inject Comb Hdr
1SI8900A-D	2SI8900A-D	CV Cold Leg Inject

2. Number of Valves: 16

3. ASME Code Category: AC

4. ASME Code, Section XI Requirements:

Relief is requested from both the quarterly and cold shutdown exercise frequencies for the full stroke (Ct) and backflow (Bt) tests for the above check valves as required by paragraphs IWV-3521 and IWV-3522.

5. Basis for Relief:

Safety Function

1/2SI8815

Open

This valve is in the line from the Chemical and Volume Control (CV) Centrifugal Charging pump. Its safety function in the open direction is to permit flow of coolant from the centrifugal charging pump to the four lines which branch off and provide flow to the reactor cold legs during the high pressure injection phase of a safety injection.

Closed

The safety function of this valve in the closed direction is to provide a redundant (back up to the 1/2SI8900A-D check valves) reactor coolant system pressure boundary (PIV).

1/2SI8900A-D

Open

These valves are in the four lines which branch off from the lines containing the 1/2SI8815 valves mentioned above. Their safety function in the open direction is to permit flow of coolant from the chemical and volume control centrifugal charging pumps to the reactor cold legs during the high pressure injection phase of a safety injection.

Closed

The safety function of these valves in the closed direction is to provide a reactor coolant pressure boundary.

1/2CV8481A,B

Open

These check valves are located at the discharge of the Chemical and Volume Control charging pump. Their function is to prevent reverse flow from the charging header when the pump is not in operation. The safety function in the open position is to permit flow of coolant during a safety injection.

1/2CV8546

Open

This check valve is the combined suction of the charging pumps from the Refueling Water Storage Tank (RWST). Their function is to prevent flow from the suction header. The safety function in the open position is to permit flow of coolant when the charging pumps take suction from the RWST during a safety injection.

<u>Basis</u>

The full stroke exercising of check valves 1/2SI8815 and 1/2SI8900A-D associated with the Emergency Core Cooling System during operation would induce thermal stresses on their respective reactor vessel nozzles as the Reactor Coolant System (maintained at greater than 500 °F) is injected with water from the Refueling Water Storage Tank (maintained at approximately 65°F). The 1/2CV8481A,B and 1/2CV8546 check valves are in series and cannot be full stroke exercised without causing stroking of 1/2SI8815 and 1/2SI8900A-D.

These valves cannot be exercised during cold shutdowns without increasing the possibility of low temperature over-pressurization (LTOP) of the Reactor Coolant System. The Braidwood Station Technical Specifications requires that all Safety Injection Pumps and all but one Charging Pump be inoperable during Modes 4, 5 and 6, except when the reactor vessel head is removed to prevent this over-pressurization occurring while at low temperatures. In addition, injecting large quantities of highly borated water from the RWST would likely delay reactor start up and the cost of processing the reactor coolant to restore the optimum boron concentration are not inconsequential.

The 1/2SI8900A-D and 1/2SI8815 check valves can only be verified closed by performance of an individual leakage test on each valve. These valves are simple lift check valves and are not equipped with an external operator or disk position indication. It is impractical to verify them closed during power operation or during cold shutdowns. System reconfiguration and connecting and disconnecting leak testing equipment during cold shutdowns would likely delay the return to power. This would be costly and burdensome to the station. System redesign and modification would be necessary to allow testing these valves closed quarterly, which would also be costly and burdensome. Both of these alternatives would provide no compensating increase in plant safety.

6. <u>Alternate Testing:</u>

Braidwood Station will full stroke exercise (open--Ct; close--Bt) the 1/2SI8815 and 1/2SI8900A-D on a refueling frequency test schedule. These valves are verified closed in conjunction with the Technical Specification pressure isolation valve leakage test.

Check valves 1/2CV8481A, B; 1/2CV8546 cannot be full stroke exercised without causing stroking of 1/2SI8815 and 1/2SI8900A-D, therefore they will be full stroke exercised on the same schedule (refueling frequency) as the 1/2SI8815 and 1/2SI8900A-D valves.

RELIEF REQUEST VR-15A (continued)

7. Justification

Based on the guidance provided in question 24 of the "Public Meeting notes on Generic Letter 89-04": check valves possessing safety functions in both the open and closed direction should be stroked to the open position and then tested in the closed position. For the 1/2SI8815 and 1/2SI8900A-D valves, it is best to perform the backflow (Bt) test, which in this case is accomplished in conjunction with the leakage test (Lt), on the same frequency as the full flow (Ct) test, thus testing them to their open position and then to their closed position.

Check valves 1/2CV8481A, B and 1/2CV8546 cannot be full stroke exercised without causing stroking of 1/2SI8815 and 1/2SI8900A-D because of the system configuration. Therefore, 1/2CV8481A/B will be full flow (Ct) and backflow (Bt) tested in conjunction with the 1/2SI8815 and 1/2SI8900A-D full flow test (B train backflow tested during A train full flow and vice versa). The 1/2CV8546 will also be full flow (Ct) tested in conjunction with the full flow test of the 1/2SI8815 and 1/2SI8900s.

In addition, the high pressure (from CV pumps) safety injection check valves will have their seat tightness demonstrated during the Braidwood Station Technical Specification testing required to verify the pressure isolation capability of these valves under the following conditions:

a. At least once per 18 months.
b. Prior to entering MODE 2 whenever the plant has been in COLD SHUTDOWN for 72 hours or more and if leakage testing has not been performed in the previous 9 months.
c. Prior to returning the valve to service following maintenance, repair or replacement work on the valve, and
d. Within the 24 hours following valve actuation due to manual action or flow through the valve.

The alternate test frequency will adequately maintain this portion of the safety injection system in a state of operational readiness, while not sacrificing the safety of the plant, by testing these check valves at each refueling outage, when the safety risks are minimal.

8. Applicable Status:

This relief is requested for the first inspection interval.

9. Approval Status:

a. Approved per SE dated 10/15/91.

b. Approved per SE dated 9/14/93.

c. Rev. 6 - Reorganized to indicate:
   1) Safety function of all valves
   2) Full-stroke and backflow tests.

RELIEF REQUEST VR-15B

1. Valve Number: 1RH8705A,B 2RH8705A, B RH Suction Isolation Thermal/Pressure Relief

2. Number of Valves: 4

3. ASME Code Category: AC

4. ASME Code, Section XI Requirements:

   Relief is requested from both the quarterly and cold shutdown exercise frequencies for the full stroke (Ct) and backlow (Bt) tests for the above check valves as required by paragraphs IWV-3521 and IWV-3522.

5. Basis for Relief:

Safety Function

1/RH8705A, B

Open

These valves are located on the 3/4" branch line between the 1/2RH8701A, B and 1/2RH8702A, B RH suction isolation valves. Their safety function in the open direction is to relieve excess pressure due to thermal expansion back to the RCS when both suction isolation valves are closed in order to prevent over pressurization of the piping.

Closed

The safety function of these valves in the closed direction is to maintain the integrity of the reactor coolant pressure boundary.

The 1/2RH8705A, B and 1/2RH8705A, B thermal/pressure relief check valves can only be verified closed by performance of an individual leakage test on each valve. These valves are simple spring loaded lift check valves and are not equipped with an external operator or disk position indication. It is impractical to verify them closed during power operation or during cold shutdowns. System reconfiguration and connecting and disconnecting leak testing equipment in conjunction with depressurizing the RCS during cold shutdowns would delay the return to power. This would be costly and burdensome to the station. System redesign and modification would be necessary to allow testing these valves closed quarterly, which would also be costly and burdensome.

6. Alternate Testing:

   The 1/2RH8705A/B check valves will be operability tested in the open direction by verifying that the piping between the suction isolation valves is able to be depressurized through the applicable valve. The PIV leakage test will be used to verify valve closure and seat tightness. Both of these (Ct-open, Bt-closed) tests will be performed at each reactor refueling outage.

RELIEF REQUEST VR-15B

7. Justification

Performing the exercise test requires placing the standby train of residual heat removal (RHR) in an inoperable condition and that the RCS be depressurized (requires all four reactor coolant pumps to be stopped). This will delay reactor start up and return to power. In addition, taking away the back/redundant train of RHR reduces both the plant decay removal capability and the available safety margin regarding shutdown risk assessment. Furthermore, these valves are also given specific exemption from being leakage tested (no closure test required) following flow through the suction isolations per Technical Specifications (regarding PIV testing.)

This alternate test frequency is adequate to a maintain this portion of RHR in a state of operational readiness, while not sacrificing the safety of the plant, or causing undue hardship in returning to power with no compensated increase in safety.

8. Applicable Status:

This relief is requested for the first inspection interval.

9. Approval Status:

a. Approved per SE dated 9/14/93.

b. Rev. 6 - Reorganized to indicate:

1. Safety function of all valves.
2. Full stroke and backflow tests.

RELIEF REQUEST VR-15C

1. Valve Number: 1SI8819A-D 2SI8819A-D SI Cold Leg Inj
   1SI9805A-D 2SI8905A-D SI Hot Leg Inj
   1SI8949B,D 2SI8949B,D SI/RH Hot Leg Inj

2. Number of Valves: 20

3. ASME Code Category: AC

4. ASME Code, Section XI Requirements:

   Relief is requested from both the quarterly and cold shutdown exercise frequencies for the full stroke (CT) test and backflow (BT) test as stated in ASME Section XI IWV-3521: "Check Valves shall be exercised at least once every 3 months, except as provided by IWV-3522.

5. Basis for Relief:

Safety Function

1/2SI8819A-D

Open

These valves are located in the lines going from the Safety Injection pumps to the reactor vessel cold legs. Their safety function in the open direction is to permit flow of coolant to the reactor cold legs during a safety injection.

Closed

The safety function of these valves in the closed direction is to maintain the reactor coolant system pressure boundary (PIV).

1/2SI8905A-D

Open

The safety function of this valve in the open direction is to permit flow of coolant from the Safety Injection pump to the reactor vessel hot legs during the Hot Leg Recirculation portion of a safety injection.

Closed

The closed safety function of this valve is to maintain the reactor coolant pressure boundary.

1/2SI8949B,D

Open

The safety function of this valve in the open direction is to permit flow of coolant from the Safety Injection pumps to the reactor vessel hot legs during the Hot Leg Recirculation portion of a safety injection.

Closed

The closed safety function of these valves is to maintain the reactor coolant pressure boundary.

5. Basis for Relief: (continued)

These valves cannot be full stroke exercised during operation or during routine Mode 5 cold shutdowns due to Braidwood Station Technical Specifications requirement that all Safety Injection Pumps and all but one Charging Pump be inoperable during modes 4, 5, and 6 (temperature less then 350° F), except when the reactor vessel head is removed (the reactor head is only removed during refueling outages). This requirement minimizes the possibility of low temperature over-pressurization (LTOP) of the Reactor Coolant System (RCS).

6. Alternate Testing:

Full stroke exercising of these valves can only be safety performed in Mode 6 with the Reactor vessel head removed. Therefore, full stroke exercising and backflow testing of these valves will be performed at each refueling outage.

7. Justification:

These check valves cannot be stroked during cold shutdown without exceeding Technical/Specification limiting condition for operation (LCO 3/4.5.3). Since stroking these valves requires starting an SI pump. Stroke exercising check valves 1/2SI8819A-D, 1/2SI8905A-D, and 1/2SI8949B,D during each reactor refueling outage, will insure compliance with Braidwood Station Technical Specification and will reduce the risk of low temperature over-pressurization of the Reactor Coolant System.

8. Applicable Status:

This relief is requested for the first inspection interval.

9. Approval Status:

a. 01/15/91 - Relief for full stroke granted per SER

b. Approved per SE dated 9/14/93.

c. 01/01/93 - Reorganized to indicate:

1) Safety Function of all valves.
2) Backflow test for valves 1/2SI8819A-D, 1/2SI8905A-D, and 1/2SI8949B,D.

RELIEF REQUEST VR-15D

1. Valve Number: 1SI8841A,B 2SI8841A,B RH Hot Leg Inj
1SI8949A,C 2SI8949A,C SI/RH Hot Leg Inj

2. Number of Valves: 8

3. ASME Code Category: AC

4. ASME Code, Section XI Requirements:

Relief is requested from both the quarterly and cold shutdown exercise frequencies for the full stroke (Ct) test and backflow (Bt) test as stated in ASME Section XI IWV-3521: "Check Valves shall be exercised at least once every 3 months, except as provided by IWV-3522.

5. Basis for Relief:

Safety Function

1/2SI8841A,B

Open

The safety function of the 1/2SI8841A,B check valves in the open direction is to permit flow of coolant from the RHR Pumps to the reactor vessel hot legs during the Hot Leg Recirculation phase of a safety injection.

Closed

The safety function of these valves in the closed direction is to maintain the reactor coolant system pressure boundary (PIV).

1/2SI8949A,C

Open

The safety function of the 1/2SI8949A,C check valves in the open direction is to permit flow of makeup water upon a safety injection from: (1) the Safety Injection Pumps during the high pressure safety injection phase, or (2) the RHR Pumps during the Hot Leg Recirculation phase, to the reactor vessel hot legs.

Closed

The closed safety function of these valves is to maintain the reactor coolant pressure boundary.

Basis

The full stroke exercising of check valves 1/2SI8841A,B and 1/2SI8949A,C associated with the Emergency Core Cooling System (ECCS) and the Residual Heat Removal (RHR) System cannot be accomplished during normal reactor operation because of the low head developed by the RHR pumps (less than 250 psi) is not great enough to inject water into the RCS (2235 psi).

In addition, the SI Pumps cannot be used to full stroke the 1/2SI8949A,C check valves at power due to: (1) the high thermal stresses imposed on the reactor vessel nozzles, (2) the margin of safety is reduced for brittle fracture prevention, and (3) an unacceptable reactivity excursion would be created (high boron concentration and low temperature water).

Exercising these check vales in cold shutdown is not practical, full or partial, because they are required by Technical Specifications to be leak tested if there has been flow through them. This leak rate testing will cause a delay in returning the plant to power. Flow testing and the resultant leak rate testing would cause unnecessary radiation exposure to test personnel.

RELIEF REQUEST VR-15D (continued)

6. Alternate Testing:

These check valves will be exercised (Ct-open; Bt-closed) during each refueling outage and is consistent with ASME/ANSI Part 10, 4.3.2.2 regarding deferral of check valve exercising until refueling outages, which was approved in rulemaking to 10CFR50.55a effective September 8, 1992. The closure test is done in conjunction with the leak test.

7. Justification:

Based on the guidance provided in question 24 of the "Public Meeting notes on Generic Letter 89-04": check valves possessing safety functions in both the open and closed direction should be stroked to the open position and then tested in the closed position. For the 1/2SI8841A,B and 1/2SI8949A,C valves, it is best to perform the backflow (Bt) test, which in this case is accomplished in conjunction with the leakage test (Lt), on the same frequency as the full flow (Ct) test, thus testing them to their open position and then to their closed position.

The alternate test frequency is adequate to maintain this portion of RHR in a state of operation readiness, while not sacrificing the safety of the plant, or causing undue hardship in returning to power with no compensating increase in safety.

8. Applicable Status:

This relief is requested for the first inspection interval.

9. Approval Status:

a. Relief for full stroke granted per SE dated October 15, 1991 (1/2SI8949A-D)

b. Approved per SE dated September 14, 1993 for (1/2SI8841A/B)

c. Reorganized to indicate:

   1. Safety function of all valves.
   2. Backflow test for valves 1/2SI8841A,B; and 1/2SI8949A,C.

RELIEF REQUEST VR-16

1. Valve Numbers: 1SI8811A, B 2SI8811A, B

2. Number of Valves: 4

3. ASME Code Category: B

4. ASME Code, Section XI Requirements:

   Valves that cannot be exercised during plant operation shall be specifically identified by the owner and shall be full stroke exercised during cold shutdowns per IWV-3412.

5. Basis for Relief:

   The full stroke exercising of valves not stroked quarterly is required to be performed during cold shutdowns. However, the stroking of the Containment Sump Outlet Isolation Valves, 1/2SI8811A,B requires the suction of the Residual Heat Removal Pumps to be drained, thus rendering one train of the system inoperable.

   For Cold Shutdown operations with the Reactor Coolant Loops filled and one train of Residual Heat Removal declared inoperable, Braidwood Station's Technical Specifications require two steam generators with a secondary side narrow range water level greater than 41% (Unit 1) and greater than 18% (Unit 2). However, if the cold shutdown was necessitated by a problem requiring draining of the secondary side of the Steam Generators (i.e. tube leaks), Braidwood Station's Technical Specification 3.4.1.4.1 would preclude the testing of the containment sump outlet isolation valves until such time as the affected steam generators had been refilled.

   For Cold Shutdown operations with the Reactor Coolant Loops not filled (i.e. drained down to support Reactor Vessel Incore Seal Table, Loop Stop Valve, Reactor Coolant Pump and Seal Maintenance or primary leakage), Braidwood Station's Technical Specification 3.4.1.4.2 would preclude the testing of the Containment Sump Outlet Isolation Valves as it mandates that "two residual heat removal (RHR) Loops shall be operable and at least one RHR Loop shall be in operation.

6. Alternate Testing:

   Braidwood Station will full stroke exercise the Containment Sump Outlet Isolation Valves, 1/2SI8811A, B during refueling outages vice cold shutdown.

RELIEF REQUEST VR-16

7. Justification:

The full stroke testing of the 1/2SI8811A, B valves; in conjunction with system draining, filling and ting of each train, accounts for an additional six days (3 days per train) of scheduling requirements and increased radiation dose to operators and radiological control personnel. Processing of thousands of gallons of contaminated water, and subsequent required liquid effluent discharges would also result from the draining, refilling and venting of the RHR system. This time duration required to perform the surveillance testing of the Containment Sump Outlet Isolation Valves during Cold Shutdown activities, could, as a result, cause a violation of the action requirements for Braidwood Station's Technical Specifications 3.4.1.4.1 and 3.4.1.4.2. The violations would occur since these action statements require (as noted in their respective foot note sections) the return of the inoperable residual heat removal loop to service within 2 hours, if such loop was removed for surveillance testing provided the other RHR Loop is operable and in operation.

In addition, NRC Generic Letter 88-17, Loss of Decay Heat Removal, highlights the consequences of a loss of RH during reduced Reactor Coolant System inventory (below three feet below the reactor vessel flange). If the operating RH pump is lost due to air entrainment, and the other train is inoperable for the stroke test, then the "operable" train must be vented to restore decay heat removal. Under worst conditions, boiling in the core would occur in approximately 10 minutes, the core would be uncovered in approximately 30 minutes, and fuel damage would occur in approximately 1 hour.

Given the apparent disparity between the Technical Specification time requirements for an inoperable RHR Loop return to service (2 hours) and the time required to perform surveillance stroke testing of the Containment Sump Outlet Isolation valves (3 days) during Cold Shutdown, the proposed alternate testing frequency of refueling outage periodicity will adequately maintain the system in a state of operational readiness, while not imposing undue hardships or sacrificing the safety of the plant.

8. Applicable Time Period:

This relief is requested once per quarter, during the first inspection interval.

9. Approval Status:

a. Revised (to address NRC concerns) in Byron's response to SER 12/16/90.

b. Approved per SER dated 10/15/91.

RELIEF REQUEST VR-17

- Deleted - Made VA-06.

RELIEF REQUEST VR-18

Deleted per Revision 5a. Valves are passive and only require leak testing per IWV-3700.

RELIEF REQUEST VR-19

1. Valve Numbers: 1AF001A 2AF001A
   1AF001B 2AF001B

2. Number of Valves: 4

3. ASME Code Category: C

4. ASME Code, Section XI Requirement:

   Exercise check valves to the position required to fulfill their function (Bt/Closed. Ct/Open), unless such operation is not practical during plant operation, per IWV-3522.

5. Basis for Relief:

   The 1/2AF001A/B valves are the suction check valves to the AFW pumps from the condensate storage tanks, and function to prevent backflow of essential service water if that suction source is required. It is undesirable to full stroke open these valves quarterly due to the transients placed on the feedwater system and the thermal stresses imposed on the steam generator (S/G) nozzles (refer to program note 12).

   With respect to acoustically testing these valves to prove closure, versus disassembly, the operating surveillance procedure used for the auxiliary feedwater (AFW) check valve cold shutdown full stroke test is written to test a single train of AFW at a time. With an AFW pump running on mini-flow recirculation, flow is initiated to each S/G on a gradual basis, while simultaneously reducing feedwater flow. As soon as the required flow data is obtained, AFW flow is gradually reduced, while simultaneously increasing feedwater flow, to minimize feedwater flow perturbations to the S/Gs. Due to this gradual change in flow, the open and close acoustical impacts cannot be observed from that of the flow noise.

   However, the acoustic data taken during the 18 month dual pump injection test, has provided sufficient data to determine valve disk closure (refer to SMAD Report M-6479-91, dated 10-28-91). This test is scheduled during the shutdown process, preceding reactor refueling, due to the large transient placed on feedwater flow and the thermal stresses imposed on the S/Gs.

   The application of RCM (Reliability Centered Maintenance) to the AF system has both concluded and recommended that performing acoustic monitoring on a 3 year frequency is sufficient to detect if the check valves fail to close. The failure analysis process required that the functional failures identified be evaluated using the failure modes and effects analysis (FMEA). The FMEA provides a format for identifying the dominant failure modes of component failures leading to a functional failure and the impact of each component failure locally at the component, on the system, and on the plant.

RELIEF REQUEST VR-19

5. Basis for Relief: (continued)

Additionally, the closure capability of these valves cannot be verified adequately by performing a back pressure test due to the multiple boundary isolation points. The system configuration makes it impossible to assign any observed leakage to any individual valve or component using standard mass make-up or pressure decay techniques.

6. Alternate Testing:

The 1/2AF001A and 1/2AF001B suction check valves will be acoustically tested for closure (Bt) at each refuel outage in conjunction with the AFW full flow test and equipment response time of the AFW pumps. The open stroke (Ct) test will be tested during cold shutdowns, or at least once during each refueling cycle (approximately 18 months).

7. Justification:

Performing a pressure test to verify closure is impractical due to the system configuration. To perform this test it would be necessary to attach a pump or some other type of pressure source to a test connection and pressurize the line containing the valve. However, this line also contains many potential leakage paths (valves, pump seals, and instruments). It is not possible to assign a leakage value to any specific path using available methods of seat leakage testing.

Maintenance history and previous inspections of these valves at both Byron and Braidwood stations has shown no evidence of degradation or physical impairments. Industry experience, as documented in NPRDS, has shown no history of problems with these valves. A company wide check valve evaluation addressing the "EPRI Application Guidelines for Check Valves in Nuclear Power Plants" revealed that the location, orientation and application of these valves are not conducive to the type of wear or degradation correlated with SOER 86-03 type problems.

Acoustic testing provides ample information relative to valve condition, without physically taking the valve apart for visual inspection to prove valve closure. These valves are of the same design (manufacturer, size, model, and materials of construction) and have the same service conditions, including orientation. Upon abnormal or questionable acoustic test results, the valve will be scheduled for disassembly and internal visual inspection. The results of this inspection will be used to further evaluate the standby train valve as well, for possible action. This type of alternate testing provides more than adequate assurance of both valve functional and operational requirements.

The alternate test method is sufficient to ensure both functional and operational requirements are met based on RCM failure mode and effect analysis for these valves.

RELIEF REQUEST VR-19

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief granted per NRC Generic Letter 89-04, for Rev. 5.

b. Changed to incorporate RCM recommendations using acoustic monitoring techniques, Rev 5a.

c. Changed to reflect approval of refueling frequency per SER dated September 14, 1993.

RELIEF REQUEST VR-20

1. Valve Numbers: All **Power Operated Valves**, except those identified in VR-12 (rapid-acting valves)

2. Number of Valves: Various

3. ASME Code Category: A and B

4. ASME Code, Section XI Requirement:

   Subarticle IWV-3417(a), "Corrective Action"

5. Basis for Relief:

   The Code requirement for increased frequency testing is based on a comparison between the current stroke time and the previous stroke time. Depending on the stroke duration and the percentage increase, monthly testing may be required. This approach, if not checked by trending, allows for the threshold for more frequent testing to slowly creep up over time. For example, an increase of 10% at each quarterly test could take place over a period of one year without any action being required. This variable limit is also difficult to administer because the limit is not a permanent entry in the test procedure.

   A more appropriate method to be used should be based on an empirically derived fixed limit using valve operating history, valve condition and comparison with other valves of similar design (valve size, valve type, and actuator type). This allows for a more thorough review in determining what the "reasonable deviation" from the average/reference stroke value should be for an individual or group of valves.

   For those valves that are identified for stroke testing in cold shutdown or refueling only, these valves cannot be placed on monthly testing for the reasons already presented in the valve test program. The Code does not provide any direction for these frequencies of test, as to if these valves are even to be included in the context of IWV-3417(a).

6. Alternate Testing:

   For all power operated valves which normally stroke in greater than two seconds, an "Alert" range will be established based on reaching a given percent increase from the reference/average value. The maximum limiting value of full stroke is established per Technical Approach and Position, VA-04.

   The reference value used to determine the alert range will be reconfirmed following maintenance activities that could affect valve stroke time, or a new limit will be established based on the new stroke time.

RELIEF REQUEST VR-20

6. Alternate Testing: (continued)

For valves that can only be stroke timed in cold shutdown or refueling, once the valve(s) enter the alert range, they will be retested. If the retest is acceptable then an evaluation will be performed to determine the cause. If the retest is unacceptable then the valve will be declared inoperable until corrective actions are taken or an evaluation is completed justifying continued operability.

For valves that are stroke timed quarterly, when the alert range is exceeded the valve will be immediately retested. If the retest is acceptable, then an evaluation will document this deviation. If the retest is unacceptable the valve will be placed on monthly testing until corrective action is taken or an evaluation is completed, justifying continued operability providing the limiting valve or full stroke is not exceeded.

The following criteria will be used as a starting point in evaluation of this fixed ALERT RANGE for power operated valves:

SOVs/HOVs/AOVs - Less than or equal to 10 seconds:

ALERT RANGE VALUES: $(1.50)(T_{ref})$

SOVs/HOVs/AOVs - Greater than 10 seconds:

ALERT RANGE VALUES: $(1.25)(T_{ref})$, or $(T_{ref}+10\ sec)$

MOVs - Less than or equal to 10 seconds:

ALERT RANGE VALUES: $(1.25)(T_{ref})$

MOVs - Greater than 10 seconds:

ALERT RANGE VALUES: $(1.15)(T_{ref})$, or $(T_{ref}+10\ sec)$

NOTE

REFER to TECHNICAL POSITION AND APPROACH VA-04 for additional related information REGARDING LIMITING VALUES OF FULL STROKE.

RELIEF REQUEST VR-20

7. Justification:

Using fixed ALERT ranges based on the reference value established when a valve is known to be operating acceptably will ensure that gradual valve performance degradation is monitored and evaluated, by placing the valve on increased testing frequency when the stroke time exceeds a fixed multiple of the reference value. This method is superior to that required by the Code in that the point of refererce used to evaluate the performance trend on a valve remains fixed. This alternate test method uses the same percentage increase as the Code, except that its applied to the reference value.

Performing an engineering evaluation/investigation when a cold shutdown/refueling valve enters the Alert range, providing the retest is acceptable, is adequate to monitor the valve for degradation.

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. This relief request is being submitted for initial approval per Rev. 5a.

b. Relief revised to incorporate SER comments re: OM-10 corrective actions for cold shutdown and refueling valves. Alternative authorized per SER dated September 14, 1993.

RELIEF REQUEST VR-21

Withdrawn from Byron's program per SER dated 09/14/90

Not used at Braidwood - Byron ONLY

RELIEF REQUEST VR-22

Not used at Braidwood - Byron ONLY

RELIEF REQUEST VR-23

Deleted by Revision 5a. Valves are passive and only require leak testing per IWV-3700.

RELIEF REQUEST VR-24

1. Valve Numbers: 1/2PR032

2. Number of Valves: 2

3. ASME Code Category: AC

4. ASME Code, Section XI Requirement:

   Exercise check valves to the position required to fulfill their function (Bt/Closed), unless such operation is not practical during plant operation, per IWV-3522.

5. Basis for Relief:

   The 1/2PR032 check valves are located inside containment in the return line of the process radiation monitor (PRM) (1/2PR11J panel) and are normally open. The only safety function these valves provide in the closed position is containment isolation, which is a redundant function to the outboard containment isolation valve. These valves open to allow return air flow back into containment. The 1/2PR11J PRM panel also provides the continuous means to monitor containment atmosphere during plant operation and cold shutdown.

   The Code requires that these check valves be tested in the closed direction to verify their seating capability on a quarterly or cold shutdown basis. However, these valves can only be verified closed by performing the Appendix J, Type C local leakage rate test (LLRT). Performing the LLRT requires placing the system in an inoperable status (removed from service) for an extended period of time due to the need to isolate portions of the system, and connecting a leak rate monitor (LRM). This would make the process radiation monitor (PRM) inoperable requiring entry into a 72 hour Technical Specification time clock (LCO).

   This would cause undue hardship with no compensating increase in plant or component safety, if the Code requirements were imposed.

6. Alternate Testing:

   These check valves will be back flow tested each refueling outage by the performance of their Appendix J, Type C seat leakage test.

7. Justification:

   Performance of leakage testing on a two year (refueling) frequency is adequate to demonstrate structural integrity and valve seating capability per both Appendix J and ASME Section XI requirements. There is no reason to perform the Appendix J, Type C (low pressure air at approximately 45 psig) seat leakage test more often than that already required by 10CFR50. This low pressure air test is adequate to monitor the valve's ability to seat; the smallest amounts of dirt, general corrosion, and foreign material can be detected between the seating surfaces by this test.

RELIEF REQUEST VR-24

7. Justification: (continued)

When a valve fails to meet its leakage criteria and repairs are required which make the internals accessible for inspection, a detailed visual inspection is performed per station procedures. The disassembled valve disc is verified to be capable of being full stroked and is checked for binding or failure of valve internals. Trained check valve inspectors are utilized for this examination and the results are reviewed and evaluated by the station's Check Valve Coordinator. This is in addition to the root cause analysis performed per station requirements.

Quarterly and cold shutdown testing requires a containment entry which would conflict with station ALARA goals and radiation work practices in reducing exposure, and it is not prudent from a personnel safety standpoint. For personnel safety considerations, two individuals must always enter containment together, whenever containment integrity is set. The performance of this test would require a minimum of three (3) shifts with personnel working in a high radiation area.

The leak rate monitors (LRM) used for Type C LLRTs are required to be shipped off-site for calibration. During operation and cold shutdown when containment integrity is set, the LRM(s) would need to be taken inside the containment. If the LRM is contaminated and then unable to be decontaminated, this would prevent its calibration and render it unusable. This equipment is expensive and the number of monitors available for use is limited. During refueling outages, a staging area is set up outside containment in a low dose, non-contaminated area and hoses are run inside to the various containment isolation valves. These precautions are taken to prevent the LRMs from becoming contaminated.

This alternate test method is sufficient to insure the safety function of these valves is maintained at an acceptable level.

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief is requested per Rev. 5.

b. Added additional technical information and justification, Rev. 5a.

c. Approved per SE dated 9/14/93 with provision to investigate non-intrusives.

RELIEF REQUEST VR-254

1. Valve Numbers: 1/2PS231A, 1/2PS231B

2. Number of Valves: 4

3. ASME Code Category: AC

4. ASME Code, Section XI Requirement:

   Exercise check valves to the position required to fulfill their function (Bt/Closed), unless such operation is not practical during plant operation, per IWV-3522.

5. Basis for Relief:

   The 1/2PS231A,B check valves are located inside containment in the return line of the post-LOCA hydrogen monitors and are normally closed. These check valves have a safety function in the closed position to provide containment isolation, which is a redundant function to the outboard containment isolatio valves. They function in the open direction to allow the sampled containment air to be returned to containment.

   The Code requires that these check valves be tested in the closed direction to verify their seating capability on a quarterly or cold shutdown basis. However, these valves can only be verified closed by performing the Appendix J, Type C local leakage rate test (LLRT). Performing the LLRT requires placing the system in an inoperable status (removed from service) for an extended period of time due to the need to isolate portions of the system, and connecting a leak rate monitor (LRM). This would make the hydrogen monitor inoperable while the system is isolated.

   This would cause undue hardship with no compensating increase in plant or component safety, if the Code requirements were imposed.

6. Alternate Testing:

   These check valves will be back flow tested each refueling outage by the performance of their Appendix J, Type C seat leakage test.

7. Justification:

   Performance of leakage testing on a two year (refueling) frequency is adequate to demonstrate structural integrity and valve seating capability per both Appendix J and ASME Section XI requirements. There is no reason to perform the Appendix J, Type C (low pressure air at approximately 45 psig) seat leakage test more often than that already required by 10CFR50. This low pressure air test is adequate to monitor the valve's ability to seat; the smallest amounts of dirt, general corrosion, and foreign material can be detected between the seating surfaces by this test.

RELIEF REQUEST VR-25

7. Justification: (continued)

When a valve fails to meet its leakage criteria and repairs are required which make the internals accessible for inspection, a detailed visual inspection is performed per station procedures. The disassembled valve disc is verified to be capable of being full stroked and is checked for binding or failure of valve internals. Trained check valve inspectors are utilized for this examination and the results are reviewed and evaluated by the station's Check Valve Coordinator. This is in addition to the root cause analysis performed per station requirements.

Quarterly and cold shutdown testing requires a containment entry and climbing in the penetration areas which would conflict with station ALARA goals and radiation work practices in reducing exposure, and it is not prudent from a personnel safety standpoint. For personnel safety considerations, two individuals must always enter containment together, whenever containment integrity is set. The performance of this test would require a minimum of three (3) shifts with personnel working in a high radiation area. Also, quarterly testing would conflict with Technical Specification 3/4.6.3.2, which requires the hydrogen monitors to be in the standby mode in order to meet the requirements set forth in NUREG 0737, Item II F.1.6 in Modes 1 and 2.

The leak rate monitors (LRM) used for Type C LLRTs are required to be shipped off-site for calibration. During operation and cold shutdown when containment integrity is set, the LRM(s) would need to be taken inside the containment. If the LRM is contaminated and then unable to be decontaminated, this would prevent its calibration and render it unusable. This equipment is expensive and the number of monitors available for use is limited. During refueling outages, a staging area is set up outside containment in a low dose, non-contaminated area and hoses are run inside to the various containment isolation valves. These precautions are taken to prevent the LRMs from becoming contaminated.

This alternate test method is sufficient to insure the safety function of these valves is maintained at an acceptable level.

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief is requested per Rev. 5.

b. Added additional technical information and justification, Rev. 5a.

c. Approved per SE dated 9/14/93 with provision to investigate non-intrusives.

RELIEF REQUEST VR-26

1. Valve Numbers: 1/2RY8046, 1/2RY8047

2. Number of Valves: 4

3. ASME Code Category: AC

4. ASME Code, Section XI Requirement:

   Exercise check valves to the position required to fulfill their function (Bt/Closed), unless such operation is not practical during plant operation, per IWV-3522.

5. Basis for Relief:

   The RY8046 check valve is located inside containment in the primary water (PW) supply line to the Pressure Relief Tank (PRT) and Reactor Coolant Pumps (RCPs) number three seal head tanks/standpipes. The only safety function for this check valve is to close for containment isolation purposes; this is redundant to the outboard air operated isolation valve. The open function is to provide makeup water to the PRT and to each of the #3 seal head tanks. The water in the PRT serves as a quench volume for steam discharged from the PORVs and/or PZR safety relief valves, it also is used to cooldown the PRT after a steam discharge. The primary water to the RCPs #3 seal is for cooling and flushing.

   The RY8047 check valve is also located inside containment in the nitrogen supply line to the PRT. The only safety function for this check valve is to close for containment isolation purposes; this is redundant to the outboard air operated isolation valve. The open function is to provide nitrogen gas to the PRT in order to maintain an inert atmosphere to prevent O_2 and H_2 gas from combining into an explosive mixture. PRT pressure is maintained at 3 psig and is monitored by installed instrumentation.

   The Code requires that these check valves be tested in the closed direction to verify their seating capability on a quarterly or cold shutdown basis. However, these valves can only be verified closed by performing the Appendix J, Type C local leakage rate test (LLRT). Performing the LLRT requires placing the system in an inoperable status (removed from service) for an extended period of time due to the need to isolate portions of the system, and connecting a leak rate monitor (LRM).

   This would cause undue hardship with no compensating increase in plant or component safety, if the Code requirements were imposed.

6. Alternate Testing:

   These check valves will be back flow tested each refueling outage by the performance of their Appendix J, Type C seat leakage test.

RELIEF REQUEST VR-26

7. Justification:

Performance of leakage testing on a two year (refueling) frequency is adequate to demonstrate structural integrity and valve seating capability per both Appendix J and ASME Section XI requirements. There is no reason to perform the Appendix J, Type C (low pressure air at approximately 45 psig) seat leakage test more often than that already required by 10CFR50. This low pressure air test is adequate to monitor the valve's ability to seat; the smallest amounts of dirt, general corrosion, and foreign material can be detected between the seating surfaces by this test.

When a valve fails to meet its leakage criteria and repairs are required which make the internals accessible for inspection, a detailed visual inspection is performed per station procedures. The disassembled valve disc is verified to be capable of being full stroked and is checked for binding or failure of valve internals. Trained check valve inspectors are utilized for this examination and the results are reviewed and evaluated by the station's Check Valve Coordinator. This is in addition to the root cause analysis performed per station requirements.

To perform a Type C leakage test on a quarterly basis would require that both the nitrogen and PW systems be removed from service and placed in an inoperable condition, directly impacting the operability of the PRT and the RCPs. These components are not required to be operable during refueling, hence, allowing for the LLRT to be performed without affecting systems or components.

Quarterly and cold shutdown testing requires a containment entry which would conflict with station ALARA goals and radiation work practices in reducing exposure, and it is not prudent from a personnel safety standpoint. For personnel safety considerations, two individuals must always enter containment together, whenever containment integrity is set. The performance of each of these tests would require a minimum of three (3) shifts with personnel working in a high radiation area. Also, it is not practical to remove these valves from service, during quarterly or cold shutdowns, as these systems are required to support plant conditions (RCS pressure protection and control) and safe equipment (PRT and the RCP #3 seal) operation.

The leak rate monitors (LRM) used for Type C LLRTs are required to be shipped off-site for calibration. During operation and cold shutdown when containment integrity is set, the LRM(s) would need to be taken inside the containment. If the LRM is contaminated and then unable to be decontaminated, this would prevent its calibration and render it unusable. This equipment is expensive and the number of monitors available for use is limited. During refueling outages, a staging area is set up outside containment in a low dose, non-contaminated area and hoses are run inside to the various containment isolation valves. These precautions are taken to prevent the LRMs from becoming contaminated.

This alternate test method is sufficient to insure the safety function of these valves is maintained at an acceptable level.

RELIEF REQUEST VR-26

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief is requested per revision 5 submittal.

b. Added additional technical information and justification, Rev. 5a.

c. Approved per SE dated 9/14/93 with provision to investigate non-intrusives.

RELIEF REQUEST VR-27

1. Valve Numbers: 1/2WO007A, 1/2WO007B

2. Number of Valves: 4

3. ASME Code Category: AC

4. ASME Code, Section XI Requirement:

   Exercise check valves to the position required to fulfill their function (Bt/Closed), unless such operation is not practical during plant operation, per IWV-3522.

5. Basis for Relief:

   The 1/2WO007A, B check valves are located inside containment in the supply lines to the Reactor Containment Fan Coolers (RCFC) chilled water coils. These valves are normally open valves requiring a closure test quarterly or during cold shutdown per the Code. These valves are not required for safe shutdown, their only safety function is to close for containment isolation purposes. This is also a redundant function to the outboard motor operated valve's containment isolation function (1/2WO006A/B).

   The Code requires that these check valves be tested in the closed direction to verify their seating capability. However, these valves can only be verified closed by performing the Appendix J, Type C local leakage rate test (LLRT). Performing the LLRT requires placing the system in an inoperable status (removed from service) for an extended period of time due to the need to isolate and drain portions of the system, and connecting a leak rate monitor (LRM).

   This would cause undue hardship with no compensating increase in plant or component safety, if the Code requirements were imposed.

6. Alternate Testing:

   These check valves will be back flow tested each refueling outage by the performance of their Appendix J, Type C seat leakage test.

7. Justification:

   Performance of leakage testing on a two year (refueling) frequency is adequate to demonstrate structural integrity and valve seating capability per both Appendix J and ASME Section XI requirements. There is no reason to perform the Appendix J, Type C (low pressure air at approximately 45 psig) seat leakage test more often than that already required by 10CFR50. This low pressure air test is adequate to monitor the valve's ability to seat; the smallest amounts of dirt, general corrosion, and foreign material can be detected between the seating surfaces by this test.

RELIEF REQUEST VR-27

7. Justification: (continued)

When a valve fails to meet its leakage criteria and repairs are required which make the internals accessible for inspection, a detailed visual inspection is performed per station procedures. The disassembled valve disc is verified to be capable of being full stroked and is checked for binding or failure of valve internals. Trained check valve inspectors are utilized for this examination and the results are reviewed and evaluated by the station's Check Valve Coordinator. This is in addition to the root cause analysis performed per station requirements.

To perform an LLRT on a quarterly or cold shutdown basis would require that the containment chilled water (WO) system be removed from service and placed in an inoperable condition for an extended period of time. It is impractical to perform this test during power operation because the WO system is needed to keep containment temperatures below 120°F. This is based on the environmental qualification of components inside containment and accident analysis assumptions.

Quarterly and cold shutdown testing requires a containment entry which would conflict with station ALARA goals and radiation practices in reducing exposure, and it is not prudent from a personnel safety standpoint. For personnel safety considerations, two individuals must always enter containment together, whenever containment integrity is set. The performance of this test would require a minimum of ten (10) shifts (six shifts to drain the piping, 1 shift to test, and one day to fill and vent) with personnel working in a high radiation area.

The leak rate monitors (LRM) used for Type C LLRTs are required to be shipped off-site for calibration. During operation and cold shutdown when containment integrity is set, the LRM(s) would need to be taken inside the containment. If the LRM is contaminated and then unable to be decontaminated, this would prevent its calibration and render it unusable. This equipment is expensive and the number of monitors available for use is limited. During refueling outages, a staging area is set up outside containment in a low dose, non-contaminated area and hoses are run inside to the various containment isolation valves. These precautions are taken to prevent the LRMs from becoming contaminated.

This alternate test method is sufficient to insure the safety function of these valves is maintained at an acceptable level.

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief is requested per revision 5 submittal.

b. Added additional technical information and justification, Rev. 5a.

c. Approved per SE dated 9/14/93 with provision to investigate non-intrusives.

RELIEF REQUEST VR-28

1. Valve Number: 1CS0011A/B 2SC0011A/B

2. Number of Items: 4

3. ASME Code Category: C

4. ASME Code, Section XI Requirements:

Exercise check valves to the position required to fulfill their function (Open/Ct; closed/Bt), unless such operation is not practical during plant operation, per IWV-3522.

5. Basis for Relief:

The 1/2CS011A/B check valves are on the discharge of the eductor and the safety function in the open direction is to allow flow from the discharge of the CS pump and the spray additive tank back to the suction of the CS pump. They function in the closed direction to prevent backflow into the eductor from the CS pump suction side. These valves cannot be full or design flow (185 gpm is the design flow rate: 130 gpm eductor flow plus 55 gpm NaOH flow) tested as a matter of course during unit operation or cold shutdown as NaOH from the spray additive tank would be discharged throughout the CS system causing undesirable chemical effects on the reactor make-up supply (RWST) and associated systems. However, they are partial flow tested (> 130 gpm) on a quarterly basis.

Non-intrusive techniques (NIT) using acoustics and magnetics have not been successful in proving full stroke of the disk plates. The reason is that the critical flow rate is 10 feet per second (the amount of flow which is required to full-stroke the disks) and cannot be obtained based on current system design.

It is considered to be impractical and burdensome to attempt to disassemble valves in both trains every outage. Large amounts of reactor grade water needs to be reprocessed due to the need to drain the entire system before removing the valve from the system.

6. Alternate Testing:

The A and B train valve are of the same design (manufacturer, size, model number, and materials of construction) and have the same service conditions, including orientation, therefore they form a sample disassembly group.

One valve from each group, on a per unit basis, will be examined each refueling outage. If the disassembled valve is not capable of being manually full stroked exercised or if there is binding or failure of internals, the remaining valve on the affected unit will be inspected.

In addition to the above, the 1/2CS011A,B valves will partial stroke tested during the quarterly pumps surveillance and after maintenance in order to verify that it was installed correctly.

RELIEF REQUEST VR-28 (continued)

7. Justification:

The 1/2CS011A,B valves are removed from the system and visually examined per the strict detailed inspection requirements of the Station Check Valve Program. This inspection adequately verifies that the valves are maintained in a state of operational readiness and that their performance parameters are adequately assessed. The valves are verified to be functional by performing a thorough visual inspection of the internals and by performing manual full-stroke exercise of each disc.

The wafer type design of the valve body for these valves makes their removal a simple process, with little chance of damage to their internals. Also, there is no disassembly of internal parts required; all wear surfaces are accessible to visual examination. After inspection and manual stoke testing, the valve is reinstalled into the line and post maintenance testing is performed by partial flow testing the valve.

The alternate test frequency is justifiable in that maintenance history and previous inspections of these valves at both Byron and Braidwood stations has shown no evidence of degradation or physical impairments. In addition, industry experience, as documented in NPRDS, show no history of problems with these types of valves in this service. This data indicates that there is no significant decrease in plant safety by performing sample disassembly.

The alternate test method is sufficient to ensure operability of these valves and is consistent with Generic Letter 89-04, Position 2. The hardship involved with full stroke exercising these check valves, if the Code requirements were imposed, does not provide a compensated increase in safety of these CS system check valves.

8. Applicable Time Period:

This relief is requested once per quarter during the first inspection interval.

9. Approval Status:

a. Relief is granted based on NRC Gene·, Letter 89-04, Position 2.