INSERVICE TESTING PROGRAM PLAN

PUMPS AND VALVES

BRAIDWOOD NUCLEAR GENERATING STATION

UNITS #1 AND #2

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REVISION SUMMARY SHEET

Revision	Date of Revision	Page(s) Revised	Reason for Revision
0	Jan. 98	All	Initial 2nd Ten Year Interval Submittal

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SECTION 1.0

IST INFORMATION COMMON TO

PUMPS AND VALVES

1.1 INTRODUCTION AND PROGRAM DESCRIPTION

The Braidwood 2nd Interval Inservice Testing Plan for pumps and valves was developed in accordance with the inservice testing requirements from the 1989 Edition of the ASME Boiler and Pressure Vessel Code, Section XI, Subsections IWP and IWV as required by 10CFR50.55a. The 1989 Edition of ASME Section XI subsequently references ASME/ANSI OM (Part 6) for pump testing, and ASME/ANSI OM (Part 10) for valve testing. The version of ASME/ANSI OM Part 6 and Part 10 adopted shall be the OMa-1988 Addenda to the OM-1987 Edition. Where these requirements are determined to be impractical, specific relief is requested.

This Inservice Testing Plan will be effective for U-1 and U-2 from July 29, 1998 through and including July 28, 2008 (pending approval from the NRC for concurrent intervals).

The Commercial Service Date for Braidwood Unit 1 is July 29, 1988 and for Braidwood Unit 2 is October 17, 1988.

The key features of this Plan are: the Pump and Valve table listings, Relief Requests, Refueling Outage Justifications, Cold Shutdown Justifications, and Technical Positions. Administrative procedures, surveillance testing procedures, and other records required to define and execute the Inservice Testing Plan are all retained and available at Braidwood Station.

SECTION 2.0

IST PUMP PLAN

2.1 PUMP COMPONENTS AND TESTING INFORMATION

2.1.1 PUMP TABLE DESCRIPTIONS

The following information is included in the pump program tables:

PUMP NUMBER: The unique Braidwood Station Equipment Piece Number

PUMP NAME: The common name for the pump

CLASS: The ASME Code Class
1 - ASME Section III Class 1
2 - ASME Section III Class 2
3 - ASME III Class 3
G - Non Code or Codes other than ASME Section III, for the Diesel Oil Transfer pumps it will be treated as ASME Section III Class 3 for IST purposes.

P&ID: The Piping and Instrument Drawing number. If the pump appears on multiple P&ID's, the primary P&ID will be listed.

SPEED: "Yes" signifies that speed will be measured; "no" signifies a constant speed pump and speed will not be measured.

PRESSURE: "ΔP" indicates that differential pressure will be measured; "P" indicates that discharge pressure will be measured (positive displacement pumps). Relief requests or Technical Positions are indicated where applicable.

FLOW RATE: The flow rate of the pump. "Q" indicates that the flow rate will be measured.

VIBRATION: Pump vibration measurements. A "V" indicates that vibration measurements will be taken on reference points clearly identified on the pump to permit subsequent duplication in both plane and location. All vibration readings are in velocity.

TEST INTERVAL: Indicates the frequency of performing the Inservice Tests. (Frequency may be longer when the pump is not required to be operable.) 3M indicates testing is performed once every 3 months (92 days).

SECTION 2.1.2

PUMP TABLES

			TEST PARAMETERS					
PUMP NUMBER	PUMP NAME	CLASS	P&ID	SPEED	PRESSURE	FLOW RATE	VIBRATION	TEST INTERVAL
1AF01PA	Auxiliary Feedwater Pump (Motor Driven)	3	M-37	No	ΔP	Q	V	3M
1AF01PB	Auxiliary Feedwater Pump (Diesel Driven)	3	M-37	Yes	ΔP	Q	V	3M
2AF01PA	Auxiliary Feedwater Pump (Motor Driven)	3	M-122	No	ΔP	Q	V	3M
2AF01PB	Auxiliary Feedwater Pump (Diesel Driven)	3	M-122	Yes	ΔP	Q	V	3M
0CC01P	Component Cooling Pump	3	M-66-3A	No	ΔP	Q	V	3M
1CC01PA	Component Cooling Pump	3	M-66-3A	No	ΔP	Q	V	3M
1CC01PB	Component Cooling Pump	3	M-66-3A	No	ΔP	Q	V	3M
2CC01PA	Component Cooling Pump	3	M-66-3A	No	ΔP	Q	V	3M
2CC01PB	Component Cooling Pump	3	M-66-3A	No	ΔP	Q	V	3M
1CS01PA	Containment Spray Pump	2	M-46-1A	No	ΔP	Q	V	3M
1CS01PB	Containment Spray Pump	2	M-46-1A	No	ΔP	Q	V	3M

			TEST PARAMETERS					
PUMP NUMBER	PUMP NAME	CLASS	P&ID	SPEED	PRESSURE	FLOW RATE	VIBRATION	TEST INTERVAL
2CS01PA	Containment Spray Pump	2	M-129-1A	No	ΔP	Q	V	3M
2CS01PB	Containment Spray Pump	2	M-129-1A	No	ΔP	Q	V	3M
1CV01PA	Centrifugal Charging Pump	2	M-64-3A	No	ΔP	Q	V	3M
1CV01PB	Centrifugal Charging Pump	2	M-64-3A	No	ΔP	Q	V	3M
2CV01PA	Centrifugal Charging Pump	2	M-138-3A	No	ΔP	Q	V	3M
2CV01PB	Centrifugal Charging Pump	2	M-138-3A	No	ΔP	Q	V	3M
1DO01PA	Diesel Oil Transfer Pump	G	M-50-1B	No	P	Q	V	3M
1DO01PB	Diesel Oil Transfer Pump	G	M-50-1A	No	P	Q	V	3M
1DO01PC	Diesel Oil Transfer Pump	G	M-50-1B	No	P	Q	V	3M
1DO01PD	Diesel Oil Transfer Pump	G	M-50-1A	No	P	Q	V	3M
2DO01PA	Diesel Oil Transfer Pump	G	M-130-1A	No	P	Q	V	3M

			TEST PARAMETERS					
PUMP NUMBER	PUMP NAME	CLASS	P&ID	SPEED	PRESSURE	FLOW RATE	VIBRATION	TEST INTERVAL
2DO01PB	Diesel Oil Transfer Pump	G	M-130-1B	No	P	Q	V	3M
2DO01PC	Diesel Oil Transfer Pump	G	M-130-1A	No	P	Q	V	3M
2DO01PD	Diesel Oil Transfer Pump	G	M-130-1B	No	P	Q	V	3M
1RH01PA	Residual Heat Removal Pump	2	M-62	No	ΔP	Q	V	3M
1RH01PB	Residual Heat Removal Pump	2	M-62	No	ΔP	Q	V	3M
2RH01PA	Residual Heat Removal Pump	2	M-137	No	ΔP	Q	V	3M
2RH01PB	Residual Heat Removal Pump	2	M-137	No	ΔP	Q	V	3M
1SI01PA	Safety Injection Pump	2	M-61-1A	No	ΔP	Q	V	3M
1SI01PB	Safety Injection Pump	2	M-61-1A	No	ΔP	Q	V	3M
2SI01PA	Safety Injection Pump	2	M-136-1	No	ΔP	Q	V	3M
2SI01PB	Safety Injection Pump	2	M-136-1	No	ΔP	Q	V	3M

			TEST PARAMETERS					
PUMP NUMBER	PUMP NAME	CLASS	P&ID	SPEED	PRESSURE	FLOW RATE	VIBRATION	TEST INTERVAL
1SX01PA	Essential Service Water Pump	3	M-42-1B	No	ΔP	Q	V	3M
1SX01PB	Essential Service Water Pump	3	M-42-1A	No	ΔP	Q	V	3M
2SX01PA	Essential Service Water Pump	3	M-42-1B	No	ΔP	Q	V	3M
2SX01PB	Essential Service Water Pump	3	M-42-1A	No	ΔP	Q	V	3M
1SX04P	1B AFW SX Booster Pump	3	M-42-3	Yes	ΔP	Q	V	3M
2SX04P	2B AFW SX Booster Pump	3	M-126-1	Yes	ΔP	Q	V	3M
0WO01PA	Control Room Chilled Water Pump	3	M-118-1	No	ΔP	Q	V	3M
0WO01PB	Control Room Chiller Water Pump	3	M-118-1	No	ΔP	Q	V	3M

SECTION 2.2

PUMP TECHNICAL POSITIONS

2.2.1 PUMP TECHNICAL POSITION SUMMARY

Number	Component(s)	Description
PA-01	0/1/2AB03P	Gives basis for the exclusion of the Boric Acid Transfer Pumps from the IST Program. However, they will continue to be tested outside of the IST program.

PUMP TECHNICAL POSITION
PA-01

PUMP NUMBER: 0AB03P, 1AB03P, 2AB03P

ASME CODE CLASS: 3

POSITION:

The Boric Acid Transfer Pumps fall outside the scope of the IST Pump Program statement of OMa-1988, Part 6 because they are not provided with an emergency power source (non-ESF buses supply/feed these pumps). Braidwood Station is analyzed as a "hot shutdown" plant, and these pumps are not required to maintain hot shutdown conditions. Therefore, the Boric Acid Transfer Pumps are not required to be included in the IST Program. Engineering correspondence CHRON #161733 dated January 17, 1991 supports these conclusions. However, because of the operating significance of these pumps, Braidwood Station has developed a testing program for these pumps outside the IST Program.

SECTION 2.3

PUMP RELIEF REQUESTS

2.3.1 Relief Request Summary Sheet

Status: A = Approved
P = Pending NRC Approval
W = Withdrawn

Rev: Revision Submitted

Number	Status	Rev.	Component(s)	Summary:
None				

RELIEF REQUEST

PR

NONE REQUESTED

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SECTION 2.4

PUMP REFERENCES

PUMP REFERENCE LIST

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, 1989 Edition.

3. ASME/ANSI OM-1987, Operation and Maintenance of Nuclear Power Plants, including 1988 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. Byron/Braidwood Station UFSAR, Section 3.9.6.1, Inservice Testing of Pumps.

6. Braidwood Station Technical Specification, 3/4.0.5, ASME XI Program Requirement.

> **NOTE**
>
> When the improved Technical Specifications are implemented, 3/4.0.5 will be 5.5.8.

7. NRC Safety Evaluation Reports (SER's)

   a. SER dated October 15, 1991 for revision 4/4a of first 10 year Interval Inservice Testing Program Plan.

   b. SER dated September 14, 1993 for revision 5/5a of first 10 year Interval Inservice Testing Program Plan.

8. IST Pump Scoping Basis Document - This document provides additional/amplifying information as to bases of component inclusion or exclusion.

SECTION 3.0

IST VALVE PLAN

3.1 VALVE COMPONENTS AND TESTING INFORMATION

3.1.1 Valve Table Descriptions

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 pages.

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 following the Unit 1 P&ID number, where applicable.

E. CLASS

The ASME Code Class:
1 - ASME Section III Class 1
2 - ASME Section III Class 2
3 - ASME Section III Class 3
N - Non-Code

F. VALVE CATEGORY

The valve category identifies the valve category defined in OMa-1988, Part 10, paragraph 1.4 as follows:

Category A - valves for which seat leakage is limited to a specific maximum amount in the closed position for fulfillment of their required function(s).

3.1.1 Valve Table Descriptions (continued)

F. **VALVE CATEGORY (continued)**

Category B - valves for which seat leakage in the closed position is inconsequential for fulfillment of the required function(s).

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

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

G. **VALVE SIZE**

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

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

3.1.1 Valve Table Descriptions (continued)

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**

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(s) designated to perform its safety function(s). Therefore, the program plan specifies only the direction(s) in which valves must be stroke timed.

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(s). O for open, and C for closed. This identifies the direction(s) the valve stem will move when tested.

3.1.1 Valve Table Descriptions(continued)

L. TEST METHOD

The test method column identifies specific tests which will be performed on specific valves to fulfill the requirements of OMa-1988, Part 10. The test and abbreviations used are as follows:

(Bt) Check Valve Back Flow Test

The check valve disc will be exercised or examined in a manner which verifies disc travel to the closed position required to fulfill its safety function.

(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. Alternatives to full flow testing, per NRC Generic Letter 89-04, Attachment 1, Positions 1 and 2, may also be used in specific cases.

(Fo) Fail Safe Test Open or (Fc) Fail Safe Test Closed

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 OMa-1988, Part 10, paragraph 4.2.1.6.

In general, 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 OMa-1988, Part 10, paragraph 4.2.1.6.

3.1.1 Valve Table Description (continued)

L. TEST METHOD (continued)

(It) Position Indication Verification

Valves which are identified to require a Position Indication Test will be inspected in accordance with OMa-1988, Part 10, paragraph 4.1.

(Lt) Seat Leakage Test

The seat leakage tests will meet the requirements of OMa-1988, Part 10, paragraph 4.2.2 for Category A valves. In addition, per 10CFR50.55a(b)(2)(vii) for Category A containment isolation valves that do not provide a reactor coolant system pressure isolation function must be analyzed in accordance with paragraph 4.2.2.3(e) of part 10, and corrective actions for these valves must be made in accordance with paragraph 4.2.2.3(f). On these valves, seat leakage is limited to a specific maximum amount in the closed position for fulfillment of their safety function.

(Rt) Safety Valve and Relief Valve Setpoint Test

Safety valve and relief valve setpoints will be verified in accordance with OM-1, as referenced in OMa-1988, Part 10, Paragraph 4.3.1.

(St) Full Stroke Test (for power operated valves only this is also called Stroke Time Test)

Valve exercising tests of Category A and B valves will be performed in accordance with OMa-1988, Part 10, paragraph 4.2. The test will include full stroke testing to verify operability in the direction required to fulfill the required safety function.

(Xt) Partial-Stroke Test

If only limited operation is practical during certain plant conditions, the valves shall be partial-stroke (Xt) exercised when plant conditions allow and full-stroke exercised when plant conditions allow in accordance with OMa-1988, Part 10, paragraph 4.2.1.2 or 4.3.2.2.

3.1.1 Valve Table Description (continued)

M. TEST FREQUENCY

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

Quarterly (Q)

Tests designated "Q" will be performed a minimum of once every 92 days, except in those plant operating modes in which the valve is not required to be operable.

Cold Shutdown (CS)

Valve testing will commence within 48 hours of achieving cold shutdown, with completion of cold shutdown valve testing not being a prerequisite to plant startup.

Per OMa-1988, Part 10, paragraph 4.2.1.2(g), for extended outages, testing need not be commenced in 48 hours provided all valves required to be tested during cold shutdown will be tested prior to plant startup. However, it is not the intent of this part to keep the plant in cold shutdown in order to complete this testing. 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.

Two Years (2Y)

Tests with this designation will be conducted a minimum of once every two years.

Five Years (5Y)

Tests with this designation, generally involving Class 1 pressure relief devices, will be tested a minimum of once every 5 years. Test expansions will be conducted in accordance with OM-1, where applicable.

Ten Years (10Y)

Tests with this designation, generally involving class 2 and 3 pressure relief devices, will be tested a minimum of once every 10 years. Test expansions will be conducted in accordance with OM-1, where applicable.

3.1.1 Valve Table Description (continued)

M. **TEST FREQUENCY (continued)**

Appendix J Test Frequency (AJ)

Tests with this designation will be conducted at a frequency consistent with the Appendix J leak test frequency.

Sample Disassembly (SD)

Tests with this designation follow sample disassembly plans originated from GL 89-04. Refer to the appropriate Relief Request or Technical Position.

N. **NOTES**

Notes provide a short explanation concerning a particular IST valve. All notes are included in Section 3.1.3.

O. **TECHNICAL POSITIONS**

Technical positions provide detailed discussions on a particular IST topic. All Technical positions are included in Section 3.2.

3.1.1 Valve Table Description (continued)

P. COLD SHUTDOWN JUSTIFICATION

In accordance with paragraphs 4.2.1.2 or 4.3.2.2 of OMa-1988, Part 10, Braidwood Station will exercise certain valves during cold shutdowns if the valve cannot be exercised during normal operation. The technical justification for exercising a valve during cold shutdown rather than normal operation is provided in a cold shutdown justification. All cold shutdown justifications are included in section 3.3.

Q. REFUELING OUTAGE JUSTIFICATION

In accordance with paragraphs 4.2.1.2 and 4.3.2.2 of Part 10 of the OM Code, Braidwood Station will exercise certain valves during reactor refueling outages if it is not practical for the valve to be exercised during normal operation or during cold shutdowns. The technical justification for exercising a valve during reactor refueling outages is provided in a refueling outage justification. The refueling outage justifications are included in Section 3.4.

R. RELIEF REQUEST

Relief requests reference a specific request for relief from code requirements. All relief requests are included in Section 3.5.

SECTION 3.1.2

VALVE TABLES

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2AF001A	M-37	3	C	6.0	CK	S.A.	C	O	Xt/Ct	Q/CS				ROJ-15	
	M-122							C	Bt	RR				ROJ-15	
1/2AF001B	M-37	3	C	6.0	CK	S.A.	C	O	Xt/Ct	Q/CS				ROJ-15	
	M-122							C	Bt	RR				ROJ-15	
1/2AF003A	M-37	3	C	6.0	CK	S.A.	C	O	Xt	Q			VC-11		
	M-122								Ct	CS			VC-11		
1/2AF003B	M-37	3	C	6.0	CK	S.A.	C	O	Xt	Q			VC-11		
	M-122								Ct	CS			VC-11		
1/2AF006A	M-37	3	B	6.0	GA	M.O.	C	O	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF006B	M-37	3	B	6.0	GA	M.O.	C	O	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF013A	M-37	2	B	4.0	GL	M.O.	O	C	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF013B	M-37	2	B	4.0	GL	M.O.	O	C	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF013C	M-37	2	B	4.0	GL	M.O.	O	C	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF013D	M-37	2	B	4.0	GL	M.O.	O	C	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF013E	M-37	2	B	4.0	GL	M.O.	O	C	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF013F	M-37	2	B	4.0	GL	M.O.	O	C	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF013G	M-37	2	B	4.0	GL	M.O.	O	C	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF013H	M-37	2	B	4.0	GL	M.O.	O	C	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF014A	M-37	2	C	4.0	CK	S.A.	C	O	Ct	CS			VC-11		
	M-122							C	Bt	CS			VC-11		
1/2AF014B	M-37	2	C	4.0	CK	S.A.	C	O	Ct	CS			VC-11		
	M-122							C	Bt	CS			VC-11		
1/2AF014C	M-37	2	C	4.0	CK	S.A.	C	O	Ct	CS			VC-11		
	M-122							C	Bt	CS			VC-11		
1/2AF014D	M-37	2	C	4.0	CK	S.A.	C	O	Ct	CS			VC-11		
	M-122							C	Bt	CS			VC-11		
1/2AF014E	M-37	2	C	4.0	CK	S.A.	C	O	Ct	CS			VC-11		
	M-122							C	Bt	CS			VC-11		
1/2AF014F	M-37	2	C	4.0	CK	S.A.	C	O	Ct	CS			VC-11		
	M-122							C	Bt	CS			VC-11		

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2AF014G	M-37	2	C	4.0	CK	S.A.	C	O	Ct	CS			VC-11		
	M-122							C	Bt	CS			VC-11		
1/2AF014H	M-37	2	C	4.0	CK	S.A.	C	O	Ct	CS			VC-11		
	M-122							C	Bt	CS			VC-11		
1/2AF017A	M-37	3	B	6.0	GA	M.O.	C	O	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF017B	M-37	3	B	6.0	GA	M.O.	C	O	St	Q		1,3			
	M-122								It	2Y		4			
1/2AF029A	M-37	3	C	6.0	CK	S.A.	C	O	Ct	CS			VC-11		
	M-122														
1/2AF029B	M-37	3	C	6.0	CK	S.A.	C	O	Ct	CS			VC-11		
	M-122														

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2CC685	M-66-1A M-139-1	2	A	3.0	GA	M.O.	O	C	St It Lt	CS/RR 2Y AJ	 1	1,3 4		ROJ-21	
1/2CC9412A	M-66-2 M-139-2	3	B	12.0	GA	M.O.	C	O	St It	Q 2Y		1,3 4			
1/2CC9412B	M-66-2 M-139-2	3	B	12.0	GA	M.O.	C	O	St It	Q 2Y		1,3 4			
1/2CC9413A	M-66-1A M-139-1	2	A	6.0	GA	M.O.	O	C	St It Lt	CS/RR 2Y AJ	 1	1,3 4		ROJ-21	
1/2CC9414	M-66-1A M-139-1	2	A	6.0	GA	M.O.	O	C	St It Lt	CS/RR 2Y AJ	 1	1,3 4		ROJ-21	
1/2CC9415	M-66-40	3	B	16.0	GA	M.O.	O	C/O	St It	CS 2Y		1,3 4	VC-19		
1/2CC9416	M-66-1A M-139-1	2	A	6.0	GA	M.O.	O	C	St It Lt	CS/RR 2Y AJ	 1	1,3 4		ROJ-21	
0CC9432	M-66-3A	3	C	0.75x1	RV	S.A.	C	C/O	Rt	10Y					
1/2CC9437A	M-66-1A M-139-1	2	B	3.0	GL	A.O.	C	C/O	St/Fc It	Q 2Y		1,2,3 4			
1/2CC9437B	M-66-1A M-139-1	2	B	3.0	GL	A.O.	O	C/O	St/Fc It	Q 2Y		1,2,3 4			
1/2CC9438	M-66-1A M-139-1	2	A	4.0	GA	M.O.	O	C	Lt It St	AJ 2Y CS/RR	1	 4 1,3		 ROJ-21	
1/2CC9458	M-66-3B	3	B	16.0	GA	M	O	O/C	St	RR	6			ROJ-3	
1/2CC9459A	M-66-3A	3	B	16.0	GA	M	O	O/C	St	RR	6			ROJ-3	
1CC9459B	M-66-3A	3	B	16.0	GA	M	O	O/C	St	RR	6			ROJ-3	
2CC9459B	M-66-3A	3	B	16.0	GA	M	C	O/C	St	RR	6			ROJ-3	
1/2CC9463A	M-66-3B	3	C	12.0	CK	S.A.	C	O C	Ct Bt	Q Q					
1/2CC9463B	M-66-3B	3	C	12.0	CK	S.A.	C	O C	Ct Bt	Q Q					
0CC9464	M-66-3B	3	C	12.0	CK	S.A.	C	O C	Ct Bt	Q Q					

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2CC9467A	M-66-4D	3	B	16.0	GA	M	O	O/C	St	RR	6			ROJ-3	
1CC9467B	M-66-4D	3	B	16.0	GA	M	O	O/C	St	RR	6			ROJ-3	
2CC9467B	M-66-4D	3	B	16.0	GA	M	C	O/C	St	RR	6			ROJ-3	
1/2CC9467C	M-66-3B	3	B	16.0	GA	M	O	O/C	St	RR	6			ROJ-3	
1/2CC9473A	M-66-3B	3	B	16.0	GA	M.O.	C	C/O	St It	Q 2Y		1,3 4			
1/2CC9473B	M-66-3B	3	B	16.0	GA	M.O.	C	C/O	St It	Q 2Y		1,3 4			
1/2CC9486	M-66-1A M-139-1	2	AC	6.0	CK	S.A.	O	C	Lt/Bt	RR	1			ROJ-21	
1/2CC9495A	M-66-1B M-139-1	3	BC	2.00	CK	S.A.	O	C	Bt	SD					VR-3
1/2CC9495B	M-66-1B M-139-1	3	BC	2.00	CK	S.A.	O	C	Bt	SD					VR-3
1/2CC9495C	M-66-1B M-139-1	3	BC	2.00	CK	S.A.	O	C	Bt	SD					VR-3
1/2CC9495D	M-66-1B M-139-1	3	BC	2.00	CK	S.A.	O	C	Bt	SD					VR-3
1/2CC9518	M-66-1A M-139-1	2	AC	0.75	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	1 8			ROJ-21 ROJ-21	
1/2CC9534	M-66-1A M-139-1	2	AC	0.75	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	1 8			ROJ-21 ROJ-21	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2CS001A	M-61-4 M-136-4	2	B	14.0	GA	M.O.	O	C	St It	Q 2Y		1,3 4			
1/2CS001B	M-61-4 M-136-4	2	B	14.0	GA	M.O.	O	C	St It	Q 2Y		1,3 4			
1/2CS003A	M-46-1A M-129-1A	2	C	10.0	CK	S.A.	C	O	Xt Ct	Q SD					VR-2
1/2CS003B	M-46-1A M-129-1A	2	C	10.0	CK	S.A.	C	O	Xt Ct	Q SD					VR-2
1/2CS007A	M-46-1C M-129-1C	2	A	10.0	GA	M.O.	C	O/C	Lt St It	AJ Q 2Y	1	 1,3 4			
1/2CS007B	M-46-1C M-129-1C	2	A	10.0	GA	M.O.	C	O/C	Lt St It	AJ Q 2Y	1	 1,3 4			
1/2CS08MA	M-46-1B M-129-1B	2	C	1.0	RV	S.A.	C	O	Rt	10Y					
1/2CS08MB	M-46-1B M-129-1B	2	C	1.0	RV	S.A.	C	O	Rt	10Y					
1/2CS008A	M-46-1C M-129-1C	2	AC	10.0	CK	S.A.	C	O C	Ct/Bt Lt	SD AJ	 1				VR-2
1/2CS008B	M-46-1C M-129-1C	2	AC	10.0	CK	S.A.	C	O C	Ct/Bt Lt	SD AJ	 1				VR-2
1/2CS009A	M-61-4 M-136-4	2	B	16.0	GA	M.O.	C	O	St It	Q 2Y		1,3 4			
1/2CS009B	M-61-4 M-136-4	2	B	16.0	GA	M.O.	C	O	St It	Q 2Y		1,3 4			
1/2CS011A	M-46-1A M-129-1A	2	C	6.0	CK	S.A.	C	O	Xt Ct	Q SD					VR-2
1/2CS011B	M-46-1A M-129-1A	2	C	6.0	CK	S.A.	C	O	Xt Ct	Q SD					VR-2
1/2CS019A	M-46-1B M-129-1B	2	B	3.0	GA	M.O.	C	O/C	St It	Q 2Y		1,3 4			
1/2CS019B	M-46-1B M-129-1B	2	B	3.0	GA	M.O.	C	O/C	St It	Q 2Y		1,3 4			
1/2CS020A	M-46-1B M-129-1A	2	C	3.0	CK	S.A.	C	O C	Ct Bt	SD Q					VR-2
1/2CS020B	M-46-1B M-129-1A	2	C	3.0	CK	S.A.	C	O C	Ct Bt	SD Q					VR-2

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2CV112B	M-64-4A M-138-4	2	B	4.0	GA	M.O.	O	C	St It	CS 2Y		1,3 4	VC-4		
1/2CV112C	M-64-4A M-138-4	2	B	4.0	GA	M.O.	O	C	St It	CS 2Y		1,3 4	VC-4		
1/2CV112D	M-64-4B M-138-4	2	B	8.0	GA	M.O.	C	O/C	St It	CS 2Y		1,3 4	VC-2		
1/2CV112E	M-64-4B M-138-4	2	B	8.0	GA	M.O.	C	O/C	St It	CS 2Y		1,3 4	VC-2		
1/2CV128	M-64-5 M-138-5A	2	B	2.0	GL	A.O.	C	C	St/Fc	Q	4	1,2,3			
1/2CV459	M-64-5 M-138-5B	1	B	3.0	GL	A.O.	O	C	St/Fc It	CS 2Y		1,2,3 4	VC-10		
1/2CV460	M-64-5 M-138-5B	1	B	3.0	GL	A.O.	O	C	St/Fc It	CS 2Y		1,2,3 4	VC-10		
1/2CV8100	M-64-2 M-138-2	2	A	2.0	GL	M.O.	O	C	St It Lt	CS/RR 2Y AJ	 1	1,3 4		ROJ-20	
1/2CV8104	M-64-4B M-138-4	2	B	3.0	GL	M.O.	C	O	St It	CS 2Y		1,3 4	VC-2		
1/2CV8105	M-64-3B M-138-3B	2	B	3.0	GA	M.O.	O	C	St It	CS 2Y		1,3 4	VC-4		
1/2CV8106	M-64-3B M-138-3B	2	B	3.0	GA	M.O.	O	C	St It	CS 2Y		1,3 4	VC-4		
1/2CV8110	M-64-3A M-138-3	2	B	2.0	GL	M.O.	O	C/O	St It	Q 2Y		1,3 4			
1/2CV8111	M-64-3A M-138-3	2	B	2.0	GL	M.O.	O	C/O	St It	Q 2Y		1,3 4			
1/2CV8112	M-64-2 M-138-2	2	A	2.0	GL	M.O.	O	C	St It Lt	CS/RR 2Y AJ	 1	1,3 4		ROJ-20	
1/2CV8113	M-64-2 M-138-2	2	AC	0.75	CK	S.A.	C	C O	Lt/Bt Ct	RR RR	1 8			ROJ-20 ROJ-20	
1/2CV8114	M-64-3A M-138-3	2	B	2.0	GL	S.O.	O	C/O	St/Fo It	Q 2Y	 5	1,3 4			
1/2CV8116	M-64-3A M-138-3	2	B	2.0	GL	S.O.	O	C/O	St/Fo It	Q 2Y	 5	1,3 4			
1/2CV8117	M-64-5 M-138-5B	2	C	2.0x3.0	RV	S.A.	C	C/O	Rt	10Y					
1/2CV8118	M064-3A M138-3A	2	C	0.75x1.0	RV	S.A.	C	C/O	Rt	10Y					

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2CV8121	M-64-2 M-138-2	2	C	2.0x3.0	RV	S.A.	C	C/O	Rt	10Y					
1/2CV8124	M-64-4B M-138-4	2	C	0.75x1.0	RV	S.A.	C	C/O	Rt	10Y					
1/2CV8149A	M-64-5 M-138-5B	2	B	3.0	GL	A.O.	C	C	St/Fc It	CS 2Y		1,2,3 4	VC-10		
1/2CV8149B	M-64-5 M-138-5B	2	B	3.0	GL	A.O.	O	C	St/Fc It	CS 2Y		1,2,3 4	VC-10		
1/2CV8149C	M-64-5 M-138-5B	2	B	3.0	GL	A.O.	C	C	St/Fc It	CS 2Y		1,2,3 4	VC-10		
1/2CV8152	M-64-5 M-138-5A	2	A	3.0	GL	A.O.	O	C/O	St It Fc Lt	CS 2Y CS AJ	 1	1,3 4 2	VC-4 VC-4		
1/2CV8153A	M-64-2 M-138-2	1	B	1.0	GL	A.O.	O	C	St/Fc It	Q 2Y		1,2,3 4			
1/2CV8153B	M-64-2 M-138-2	1	B	1.0	GL	A.O.	C	C	St/Fc It	Q 2Y		1,2,3 4			
1/2CV8160	M-64-5 M-138-5A	2	A	3.0	GL	A.O.	O	C/O	St It Fc Lt	CS 2Y CS AJ	 1	1,3 4 2	VC-4 VC-4		
1/2CV8348	M-64-3B M-138-3B	2	C	2.0	CK	S.A.	C	C	Bt	RR				ROJ-11	
1/2CV8355A	M-64-1 M-138-1	2	B	2.0	GL	M.O.	O	C	St It	CS 2Y		1,3 4	VC-22		
1/2CV8355B	M-64-1 M-138-1	2	B	2.0	GL	M.O.	O	C	St It	CS 2Y		1,3 4	VC-22		
1/2CV8355C	M-64-2 M-138-2	2	B	2.0	GL	M.O.	O	C	St It	CS 2Y		1,3 4	VC-22		
1/2CV8355D	M-64-2 M-138-2	2	B	2.0	GL	M.O.	O	C	St It	CS 2Y		1,3 4	VC-22		
1/2CV8368A	M-64-1 M-138-1	2	C	2.0	CK	S.A.	O	C	Bt	RR				ROJ-12	
1/2CV8368B	M-64-1 M-138-1	2	C	2.0	CK	S.A.	O	C	Bt	RR				ROJ-12	
1/2CV8368C	M-64-2 M-138-2	2	C	2.0	CK	S.A.	O	C	Bt	RR				ROJ-12	
1/2CV8368D	M-64-2 M-138-2	2	C	2.0	CK	S.A.	O	C	Bt	RR				ROJ-12	

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1/2CV8440	M-64-4B	2	C	4.0	CK	S.A.	O	C	Bt	RR				ROJ-22	
	M-138-4B							O	Ct	Q					
1/2CV8442	M-64-4B	2	C	2.0	CK	S.A.	C	O	Ct	CS			VC-2		
	M-138-4														
1/2CV8480A	M-64-3A	2	C	2.0	CK	S.A.	C	O	Ct	Q					
	M-138-3							C	Bt	Q					
1/2CV8480B	M-64-3A	2	C	2.0	CK	S.A.	C	O	Ct	Q					
	M-138-3							C	Bt	Q					
1/2CV8481A	M-64-3A	2	C	4.0	CK	S.A.	C	O	Ct/Xt	RR/Q				ROJ-7	
	M-138-3A							C	Bt	RR				ROJ-7	
1/2CV8481B	M-64-3A	2	C	4.0	CK	S.A.	C	O	Ct/Xt	RR/Q				ROJ-7	
	M-138-3A							C	Bt	RR				ROJ-7	
1/2CV8546	M-64-4B	2	C	8.0	CK	S.A.	C	O	Ct	RR				ROJ-7	
	M-138-4							C	Bt	RR				ROJ-7	
1/2CV8804A	M-64-4B	2	B	8.0	GA	M.O.	C	O	St	CS		1,3	VC-2		
	M-138-4								It	2Y		4			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2DG5182A	M-152-20 (TYPICAL)	NONE	B	3.0	GA	S.O.	C	O	St	Q					VR-4
1/2DG5182B	M-152-20 (TYPICAL)	NONE	B	3.0	GA	S.O.	C	O	St	Q					VR-4
1/2DG5183A	M-152-20 (TYPICAL)	NONE	B	3.0	GA	S.O.	C	O	St	Q					VR-4
1/2DG5183B	M-152-20 (TYPICAL)	NONE	B	3.0	GA	S.O.	C	O	St	Q					VR-4
1/2DG5184A	M-152-20 (TYPICAL)	NONE	C	3.0	CK	S.A.	C	O	Ct						VR-4
1/2DG5184B	M-152-20 (TYPICAL)	NONE	C	3.0	CK	S.A.	C	O	Ct	Q					VR-4
1/2DG5185A	M-152-20 (TYPICAL)	NONE	C	3.0	CK	S.A.	C	O	Ct	Q					VR-4
1/2DG5185B	M-152-20 (TYPICAL)	NONE	C	3.0	CK	S.A.	C	O	Ct	Q					VR-4

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2DO003A	M-50-1B M-130-1A	3	C	1.5	CK	S.A.	C	O C	Ct Bt	Q Q					
1/2DO003B	M-50-1A M-130-1B	3	C	1.5	CK	S.A.	C	O C	Ct Bt	Q Q					
1/2DO003C	M-50-1B M-130-1A	3	C	1.5	CK	S.A.	C	O C	Ct Bt	Q Q					
1/2DO003D	M-50-1A M-130-1B	3	C	1.5	CK	S.A.	C	O C	Ct Bt	Q Q					
1/2DO020A	M-50-1B M-130-1A	3	C	1.5x2.5	RV	S.A.	C	C/O	Rt	10Y					
1/2DO020B	M-50-1A M-130-1B	3	C	1.5x2.5	RV	S.A.	C	C/O	Rt	10Y					
1/2DO020C	M-50-1A M-130-1B	3	C	1.5x2.5	RV	S.A.	C	C/O	Rt	10Y					
1/2DO020D	M-50-1A M-130-1B	3	C	1.5x2.5	RV	S.A.	C	C/O	Rt	10Y					

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2FC009	M-63-1A	2	A	4.0	P	M	C	C	Lt	AJ	1				
1/2FC010	M-63-1A	2	A	4.0	P	M	C	C	Lt	AJ	1				
1/2FC011	M-63-1B M-63-1C	2	A	3.0	P	M	C	C	Lt	AJ	1				
1/2FC012	M-63-1B M-63-1C	2	A	3.0	P	M	C	C	Lt	AJ	1				

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2FP010	M-52-1	2	B	4.0	GA	A.O.	O	C	St	Q		1,3			
									It	2Y		4			
									Fc	Q		2			
1/2FP345	M-52-1	2	C	6	CK	S.A.	C	C	Bt	RR				ROJ-10	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2FW009A	M-36-1C M-121-1B	2	B	16.0	GA	H.O.	O	C	St It	CS 2Y		1,3 4	VC-3		
1/2FW009B	M-36-1A M-121-1D	2	B	16.0	GA	H.O.	O	C	St It	CS 2Y		1,3 4	VC-3		
1/2FW009C	M-36-1D M-121-1A	2	B	16.0	GA	H.O.	O	C	St It	CS 2Y		1,3 4	VC-3		
1/2FW009D	M-36-1B M-121-1C	2	B	16.0	GA	H.O.	O	C	St It	CS 2Y		1,3 4	VC-3		
1/2FW034A	M-36-1C M-121-1B	NONE	B	2.0	GL	A.O.	O	C	Fc	RR		2		ROJ-14	
1/2FW034B	M-36-1A M-121-1D	NONE	B	2.0	GL	A.O.	O	C	Fc	RR		2		ROJ-14	
1/2FW034C	M-36-1D M-121-1A	NONE	B	2.0	GL	A.O.	O	C	Fc	RR		2		ROJ-14	
1/2FW034D	M-36-1B M-121-1C	NONE	B	2.0	GL	A.O.	O	C	Fc	RR		2		ROJ-14	
1/2FW035A	M-36-1C M-121-1B	2	B	3.0	GL	A.O.	O	C	St It Fc	Q 2Y Q		1,3 4 2			
1/2FW035B	M-36-1A M-121-1D	2	B	3.0	GL	A.O.	O	C	St It Fc	Q 2Y Q		1,3 4 2			
1/2FW035C	M-36-1D M-121-1A	2	B	3.0	GL	A.O.	O	C	St It Fc	Q 2Y Q		1,3 4 2			
1/2FW035D	M-36-1B M-121-1C	2	B	3.0	GL	A.O.	O	C	St It Fc	Q 2Y Q		1,3 4 2			
1/2FW036A	M-36-1C M-121-1B	2	C	3.0	CK	S.A.	O	C	Bt	CS			VC-20		
1/2FW036B	M-36-1A M-121-1A	2	C	3.0	CK	S.A.	O	C	Bt	CS			VC-20		
1/2FW036C	M-36-1D M-121-1C	2	C	3.0	CK	S.A.	O	C	Bt	CS			VC-20		
1/2FW036D	M-36-1B M-121-1C	2	C	3.0	CK	S.A.	O	C	Bt	CS			VC-20		

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2FW039A	M-36-1C	2	B	6.0	GA	A.O.	O	C	St	CS		1,3	VC-9		
	M-121-1B								It	2Y		4			
									Fc	CS		2	VC-9		
1/2FW039B	M-36-1A	2	B	6.0	GA	A.O.	O	C	St	CS		1,3	VC-9		
	M-121-1B								It	2Y		4			
									Fc	CS		2	VC-9		
1/2FW039C	M-36-1D	2	B	6.0	GA	A.O.	O	C	St	CS		1,3	VC-9		
	M-121-1A								It	2Y		4			
									Fc	CS		2	VC-9		
1/2FW039D	M-36-1B	2	B	6.0	GA	A.O.	O	C	St	CS		1,3	VC-9		
	M-121-1C								It	2Y		4			
									Fc	CS		2	VC-9		
1/2FW043A	M-36-1C	2	B	3.0	GL	A.O.	C	C	St	Q		1,3			
	M-121-1B								It	2Y		4			
									Fc	Q		2			
1/2FW043B	M-36-1A	2	B	3.0	GL	A.O.	C	C	St	Q		1,3			
	M-121-1D								It	2Y		4			
									Fc	Q		2			
1/2FW043C	M-36-1D	2	B	3.0	GL	A.O.	C	C	St	Q		1,3			
	M-121-1A								It	2Y		4			
									Fc	Q		2			
1/2FW043D	M-36-1B	2	B	3.0	GL	A.O.	C	C	St	Q		1,3			
	M-121-1C								It	2Y		4			
									Fc	Q		2			
1/2FW079A	M-36-1C	2	C	16.0	CK	S.A.	O	C	Bt	SD					VR-1
	M-121-1B														
1/2FW079B	M-36-1A	2	C	16.0	CK	S.A.	O	C	Bt	SD					VR-1
	M-121-1D														
1/2FW079C	M-36-1D	2	C	16.0	CK	S.A.	O	C	Bt	SD					VR-1
	M-121-1A														
1/2FW079D	M-36-1B	2	C	16.0	CK	S.A.	O	C	Bt	SD					VR-1
	M-121-1C														
1/2FW510	M-36-1C	NONE	B	16.0	AN	A.O.	O	C	Fc	RR		2		ROJ-14	
	M-121-1														
1/2FW510A	M-36-1C	NONE	B	4.0	GA	A.O.	C	C	Fc	RR		2		ROJ-14	
	M-121-1														
1/2FW520	M-36-1A	NONE	B	16.0	AN	A.O.	O	C	Fc	RR		2		ROJ-14	
	M-121-1														
1/2FW520A	M-36-1A	NONE	B	4.0	GA	A.O.	C	C	Fc	RR		2		ROJ-14	
	M-121-1														

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2FW530	M-36-1D M-121-1	NONE	B	16.0	AN	A.O.	O	C	Fc	RR		2		ROJ-14	
1/2FW530A	M-36-1D M-121-1	NONE	B	4.0	GA	A.O.	C	C	Fc	RR		2		ROJ-14	
1/2FW540	M-36-1B M-121-1	NONE	B	16.0	AN	A.O.	O	C	Fc	RR		2		ROJ-14	
1/2FW540A	M-36-1B M-121-1	NONE	B	4.0	GA	A.O.	C	C	Fc	RR		2		ROJ-14	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
0GW9300A	M-69-1	3	C	1.0x2.0	RV	S.A.	C	O/C	Rt	10Y					
0GW9300B	M-69-1	3	C	1.0x2.0	RV	S.A.	C	O/C	Rt	10Y					
0GW9300C	M-69-1	3	C	1.0x2.0	RV	S.A.	C	O/C	Rt	10Y					
0GW9300D	M-69-1	3	C	1.0x2.0	RV	S.A.	C	O/C	Rt	10Y					
0GW9300E	M-69-1	3	C	1.0x2.0	RV	S.A.	C	O/C	Rt	10Y					
0GW9300F	M-69-1	3	C	1.0x2.0	RV	S.A.	C	O/C	Rt	10Y					

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITIO	STROKE DIRECT	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2IA065	M-55-4	2	A	3.0	GL	A.O.	O	C	Lt	AJ	1				
	M-55-5								St	RR		1,3		ROJ-5	
									Fc	RR		2		ROJ-5	
									It	2Y		4			
1/2IA066	M-55-4	2	A	3.0	GL	A.O.	O	C/O	Lt	AJ	1			ROJ-5	
	M-55-5								St	RR		1,3		ROJ-5	
									Fc	RR		2		ROJ-5	
									It	2Y		4			
1/2IA091	M-55-4	2	AC	0.75	CK	S.A.	C	C	Lt/Bt	RR	1			ROJ-5	
	M-55-5							O	Ct	RR				ROJ-5	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2MS001A	M-35-2 M-120-2A	2	B	30.25	GA	H.O.	O	C	St It	CS 2Y		1,3 4	VC-1		
1/2MS001B	M-35-1 M-120-1	2	B	32.75	GA	H.O.	O	C	St It	CS 2Y		1,3 4	VC-1		
1/2MS001C	M-35-2 M-120-2B	2	B	32.75	GA	H.O.	O	C	St It	CS 2Y		1,3 4	VC-1		
1/2MS001D	M-35-1 M-120-1	2	B	30.25	GA	H.O.	O	C	St It	CS 2Y		1,3 4	VC-1		
1/2MS013A	M-35-2 M-120-2A	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS013B	M-35-1 M-120-1	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS013C	M-35-2 M-120-2B	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS013D	M-35-1 M-120-1	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS014A	M-35-2 M-120-2A	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS014B	M-35-1 M-120-1	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS014C	M-35-2 M-120-2B	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS014D	M-35-1 M-120-1	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS015A	M-35-2 M-120-2A	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS015B	M-35-1 M-120-1	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS015C	M-35-2 M-120-2B	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS015D	M-35-1 M-120-1	2	C	6.0 x 10.0	SV	S.A.	C	O/C	Rt	5Y	15				
1/2MS016A	M-35-2 M-120-2A	2	C	6.0 x 10.0	SV	S.A.	O	O/C	Rt	5Y	15				
1/2MS016B	M-35-1 M-120-1	2	C	6.0 x 10.0	SV	S.A.	O	O/C	Rt	5Y	15				
1/2MS016C	M-35-2 M-120-2B	2	C	6.0 x 10.0	SV	S.A.	O	O/C	Rt	5Y	15				
1/2MS016D	M-35-1 M-120-1	2	C	6.0 x 10.0	SV	S.A.	O	O/C	Rt	5Y	15				

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2MS017A	M-35-2 M-120-2A	2	C	6.0 x 10.0	SV	S.A.	O	O/C	Rt	5Y	15				
1/2MS017B	M-35-1 M-120-1	2	C	6.0 x 10.0	SV	S.A.	O	O/C	Rt	5Y	15				
1/2MS017C	M-35-2 M-120-2B	2	C	6.0 x 10.0	SV	S.A.	O	O/C	Rt	5Y	15				
1/2MS017D	M-35-1 M-120-1	2	C	6.0 x 10.0	SV	S.A.	O	O/C	Rt	5Y	15				
1/2MS018A	M-35-2 M-120-2A	2	B	6.0 x 6.0	PORV	H.O.	C	C/O	St It Fc	Q 2Y Q		1,3 4 2			
1/2MS018B	M-35-1 M-120-1	2	B	6.0 x 6.0	PORV	H.O.	C	C/O	St It Fc	Q 2Y Q		1,3 4 2			
1/2MS018C	M-35-2 M-120-2B	2	B	6.0 x 6.0	PORV	H.O.	C	C/O	St It Fc	Q 2Y Q		1,3 4 2			
1/2MS018D	M-35-1 M-120-1	2	B	6.0 x 6.0	PORV	H.O.	C	C/O	St It Fc	Q 2Y Q		1,3 4 2			
1/2MS019A	M-35-2 M-120-2A	2	B	8.0	GA	M	O	C	St	Q	6				
1/2MS019B	M-35-1 M-120-1	2	B	8.0	GA	M	O	C	St	Q	6				
1/2MS019C	M-35-2 M-120-2B	2	B	8.0	GA	M	O	C	St	Q	6				
1/2MS019D	M-35-1 M-120-1	2	B	8.0	GA	M	O	C	St	Q	6				
1/2MS101A	M-35-2 M-120-2A	2	B	4.0	GA	A.O.	C	C	St It Fc	Q 2Y Q		1,3 4 2			
1/2MS101B	M-35-1 M-120-1	2	B	4.0	GA	A.O.	C	C	St It Fc	Q 2Y Q		1,3 4 2			
1/2MS101C	M-35-1 M-120-2B	2	B	4.0	GA	A.O.	C	C	St It Fc	Q 2Y Q		1,3 4 2			
1/2MS101D	M-35-1 M-120-1	2	B	4.0	GA	A.O.	C	C	St It Fc	Q 2Y Q		1,3 4 2			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2OG057A	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	AJ Q 2Y	1	1,3 4			
0OG059	M-47-2	2	B	2.0	BTF	M.O.	C	O	St It	Q 2Y		1,3 4			
0OG061	M-47-2	2	B	2.0	BTF	M.O.	C	O	St It	Q 2Y		1,3 4			
0OG062	M-47-2	2	B	2.0	BTF	M.O.	C	O	St It	Q 2Y		1,3 4			
0OG063	M-47-2	2	B	2.0	BTF	M.O.	C	O	St It	Q 2Y		1,3 4			
0OG064	M-47-2	2	B	2.0	BTF	M.O.	C	O	St It	Q 2Y		1,3 4			
0OG065	M-150-2	2	B	2.0	BTF	M.O.	C	O	St It	Q 2Y		1,3 4			
1/2OG079	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	AJ Q 2Y	1	1,3 4			
1/2OG080	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	AJ Q 2Y	1	1,3 4			
1/2OG081	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	AJ Q 2Y	1	1,3 4			
1/2OG082	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	AJ Q 2Y	1	1,3 4			
1/2OG083	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	AJ Q 2Y	1	1,3 4			
1/2OG084	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	AJ Q 2Y	1	1,3 4			
1/2OG085	M-47-2 M-150-2	2	A	3.0	BTF	M.O.	C	C/O	Lt St It	AJ Q 2Y	1	1,3 4			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2PR001A	M-78-10 M-151-1	2	A	1.0	GL	A.O.	O	C	Lt Fc St It	AJ Q Q 2Y	1	 2 1,3 4			
1/2PR001B	M-78-10 M-151-1	2	A	1.0	GL	A.O.	O	C	Lt Fc St It	AJ Q Q 2Y	1	 2 1,3 4			
1/2PR002E	M-78-6	2	A	2.0	GL	M	C	C	Lt	AJ	1				
1/2PR002F	M-78-6	2	A	2.0	GL	M	C	C	Lt	AJ	1				
1/2PR002G	M-78-6	2	AC	2.0	CK	S.A.	C	C	Lt/Bt	RR	1			ROJ-23	
1/2PR002H	M-78-6	2	AC	2.0	CK	S.A.	C	C	Lt/Bt	RR	1			ROJ-23	
1/2PR032	M-78-10 M-151-1	2	AC	1.0	CK	S.A.	C	C	Lt/Bt	RR	1			ROJ-16	
1/2PR033A	M-78-6	2	A	2.0	GL	M	C	C	Lt	AJ	1				
1/2PR033B	M-78-[illegible]	2	A	2.0	GL	M	C	C	Lt	AJ	1				
1/2PR033C	M-78-6	2	A	2.0	GL	M	C	C	Lt	AJ	1				
1/2PR033D	M-78-6	2	A	2.0	GL	M	C	C	Lt	AJ	1				
1/2PR066	M-78-10 M-151-1	2	A	1.0	GL	A.O.	O	C	Lt Fc It St	AJ Q 2Y Q	1	 2 4 1,3			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2PS228A	M-68-7 M-140-6	2	A	0.5	GL	S.O.	O	C/O	Lt St Fc It	AJ Q Q 2Y	1 5	 1,3 2 4			
1/2PS228B	M-68-7 M-140-6	2	A	0.5	GL	S.O.	O	C/O	Lt St Fo It	AJ Q Q 2Y	1 5	 1,3 2 4			
1/2PS229A	M-68-7 M-140-6	2	A	0.5	GL	S.O.	O	C/C	Lt St Fo It	AJ Q Q 2Y	1 5	 1,3 2 4			
1/2PS229B	M-68-7 M-140-6	2	A	0.5	GL	S.O.	O	C/O	Lt St Fc It	AJ Q Q 2Y	1 5	 1,3 2 4			
1/2PS230A	M-68-7 M-140-6	2	A	1.0	GL	S.O.	C	C/O	Lt St Fc It	AJ Q Q 2Y	1 5	 1,3 2 4			
1/2PS230B	M-68-7 M-140-6	2	A	1.0	GL	S.O.	C	C/O	Lt St Fc It	AJ Q Q 2Y	1 5	 1,3 2 4			
1/2PS231A	M-68-7 M-140-6	2	A/C	.75	CK	S.A.	C	C O	Lt/Bt Ct	RR Q	1 2			ROJ-17	
1/2PS231B	M-68-7 M-140-6	2	A/C	.75	CK	S.A.	C	C O	Lt/Bt Ct	RR Q	1 2			ROJ-17	
1/2PS9354A	M-68-1B M-140-1	2	A	.375	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	 1 	1,3 4 2			
1/2PS9354B	M-68-1B M-140-1	2	A	.375	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	 1 	1,3 4 2			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2PS9355A	M-68-1B M-140-1	2	A	.375	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	1	1,3 4 2			
1/2PS9355B	M-68-1B M-140-1	2	A	.375	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	1	1,3 4 2			
1/2PS9356A	M-68-1A M-140-1	2	A	.375	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	1	1,3 4 2			
1/2PS9356B	M-68-1A M-140-1	2	A	.375	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	1	1,3 4 2			
1/2PS9357A	M-68-1B M-140-1	2	A	.375	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	1	1,3 4 2			
1/2PS9357B	M-68-1B M-140-1	2	A	.375	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	1	1,3 4 2			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2RC014A	M-60-1B	1	B	1.0	GL	S.O.	C	O/C	St	CS		1,3	VC-6		
	M-135-1B								Fc	CS		2	VC-6		
									It	2Y	5	4			
1/2RC014B	M-60-1B	1	B	1.0	GL	S.O.	C	O/C	St	CS		1,3	VC-6		
	M-135-1B								Fc	CS		2	VC-6		
									It	2Y	5	4			
1/2RC014C	M-60-1B	1	B	1.0	GL	S.O.	C	O/C	St	CS		1,3	VC-6		
	M-135-1B								Fc	CS		2	VC-6		
									It	2Y	5	4			
1/2RC014D	M-60-1B	1	B	1.0	GL	S.O.	C	O/C	St	CS		1,3	VC-6		
	M-135-1B								Fc	CS		2	VC-6		
									It	2Y	5	4			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2RE1003	M-70-1 M-141-1	2	A	3.0	D	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	 1 	1,3 4 2			
1/2RE9157	M-70-1 M-141-1	2	A	1.0	D	A.O.	O	C	St Lt It Fc	Q AJ 2Y Q	 1 	1,3 4 2			
1/2RE9159A	M-70-1 M-141-1	2	A	.75	D	A.O.	O	C	St Lt It Fc	Q AJ 2Y Q	 1 	1,3 4 2			
1/2RE9159B	M-70-1 M-141-1	2	A	.75	D	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	 1 	1,3 4 2			
1/2RE9160A	M-70-1 M-141-1	2	A	1.0	D	A.O.	O	C	St Lt It Fc	Q AJ 2Y Q	 1 	1,3 4 2			
1/2RE9160B	M-70-1 M-141-1	2	A	1.0	D	A.O.	O	C	St Lt It Fc	Q AJ 2Y Q	 1 	1,3 4 2			
1/2RE9170	M-70-1 M-141-1	2	A	3.0	D	A.O.	O	C	St Lt It Fc	Q AJ 2Y Q	 1 	1,3 4 2			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2RF026	M-48-6B	2	A	2.0	P	A.O.	O	C	St	Q		1,3			
									Lt	AJ	1				
									It	2Y		4			
									Fc	Q		2			
1/2RF027	M-48-6A	2	A	2.0	P	A.O.	O	C	St	Q		1,3			
									Lt	AJ	1				
									It	2Y		4			
									Fc	Q		2			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2RH610	M-62	2	B	3.0	GA	M.O.	O	C/O	St	Q		1,3			
	M-137								It	2Y		4			
1/2RH611	M-62	2	B	3.0	GA	M.O.	O	C/O	St	Q		1,3			
	M-137								It	2Y		4			
1/2RH8701A	M-62	1	A	12.0	GA	M.O.	C	O/C	St	CS		1,3	VC-5		
	M-137								It	2Y		4			
									Lt	RR	16				
1/2RH8701B	M-62	1	A	12.0	GA	M.O.	C	O/C	St	CS		1,3	VC-5		
	M-137								It	2Y		4			
									Lt	RR	16				
1/2RH8702A	M-62	1	A	12.0	GA	M.O.	C	O/C	St	CS		1,3	VC-5		
	M-137								It	2Y		4			
									Lt	RR	16				
1/2RH8702B	M-62	1	A	12.0	GA	M.O.	C	O/C	St	CS		1,3	VC-5		
	M-137								It	2Y		4			
									Lt	RR	16				
1/2RH8705A	M-62	2	AC	.75	CK	S.A.	C	C	Lt/Bt	RR	16			ROJ-9	
	M-137							O	Ct	RR	8			ROJ-9	
1/2RH8705B	M-62	2	AC	.75	CK	S.A.	C	C	Lt/Bt	RR	16			ROJ-9	
	M-137							O	Ct	RR	8			ROJ-9	
1/2RH8708A	M-62	2	C	3.0 x	RV	S.A.	C	O	Rt	10Y					
	M-137			4.0				C							
1/2RH8708B	M-62	2	C	3.0 x	RV	S.A.	C	O	Rt	10Y					
	M-137			4.0				C							
1/2RH8716A	M-62	2	B	8.0	GA	M.O.	O	C/O	St	CS		1,3	VC-18		
	M-137								It	2Y		4			
1/2RH8716B	M-62	2	B	8.0	GA	M.O.	O	C/O	St	CS		1,3	VC-18		
	M-137								It	2Y		4			
1/2RH8730A	M-62	2	C	8.0	CK	S.A.	C	O	Ct/Xt	CS/Q			VC-7		
	M-137							C	Bt	CS			VC-7		
1/2RH8730B	M-62	2	C	8.0	CK	S.A.	C	O	Ct/Xt	CS/Q			VC-7		
	M-137							C	Bt	CS			VC-7		

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2RY030A	M-60-8 M-135-8	3	C	0.75x1.0	RV	S.A.	C	O/C	Rt	10Y					
1/2RY030B	M-60-8 M-135-8	3	C	0.75x1.0	RV	S.A.	C	O/C	Rt	10Y					
1/2RY075	M-2060-6 M-2135-6	2	A	0.5	GL	M	C	C	Lt	AJ	1				
1/2RY455A	M-60-5 M-135-5	1	B	3.0	PORV	A.O.	C	O/C	St	CS		1,3	VC-14		
									It	RR	12	4			
									Fc	CS		2	VC-14		
1/2RY456	M-60-5 M-135-5	1	B	3.0	PORV	A.O.	C	O/C	St	CS		1,3	VC-14		
									It	RR	12	4			
									Fc	CS		2	VC-14		
1/2RY8000A	M-60-5 M-135-5	1	B	3.0	GA	M.O.	O	C	St	Q		1,3			
									It	RR		4			
1/2RY8000B	M-60-5 M-135-5	1	B	3.0	GA	M.O.	O	C	St	Q		1,3			
									It	RR		4			
1/2RY8010A	M-60-5 M-135-5	1	C	6.0	SV	S.A.	C	O/C	Rt	5Y					
									It	RR		4			
1/2RY8010B	M-60-5 M-135-5	1	C	6.0	SV	S.A.	C	O/C	Rt	5Y					
									It	RR		4			
1/2RY8010C	M-60-5 M-135-5	1	C	6.0	SV	S.A.	C	O/C	Rt	5Y					
									It	RR		4			
1/2RY8025	M-60-6 M-135-6	2	A	.375	GL	A.O.	C	C	St	Q		1,3			
									Lt	AJ	1				
									It	RR		4			
									Fc	Q		2			
1/2RY8026	M-60-6 M-135-6	2	A	.375	GL	A.O.	O	C	St	Q		1,3			
									Lt	AJ	1				
									It	RR		4			
									Fc	Q		2			
1/2RY8028	M-60-6 M-135-6	2	A	.75	D	A.O.	O	C	St	Q		1,3			
									Lt	AJ	1				
									It	RR		4			
									Fc	Q		2			
1/2RY8033	M-60-6 M-135-6	2	A	.75	D	A.O.	O	C	St	Q		1,3			
									Lt	AJ	1				
									It	RR		4			
									Fc	Q		2			
1/2RY8046	M-60-6 M-135-6	2	AC	3.0	CK	S.A.	C	C	Lt/Bt	RR	1			ROJ-18	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2RY8047	M-60-6 M-135-6	2	AC	0.75	CK	S.A.	C	C	Lt/Bt	RR	1			ROJ-18	

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1/2SA032	M-54-2	2	A	1.5	GL	A.O.	O	C	Lt St It Fc	AJ Q 2Y Q	1	 1,3 4 2			
1/2SA033	M-54-2	2	A	1.5	GL	A.O.	O	C	Lt St It Fc	AJ Q 2Y Q	1	 1,3 4 2			
1/2SA148A	M-54-4A M-54-4B	3	C	0.75	RV	S.A.	C	O/C	Rt	10Y	13				
1/2SA148B	M-54-4A M-54-4B	3	C	0.75	RV	S.A.	C	O/C	Rt	10Y	13				
1/2SA148C	M-54-4A M-54-4B	3	C	0.75	RV	S.A.	C	O/C	Rt	10Y	13				
1/2SA148D	M-54-4A M-54-4B	3	C	0.75	RV	S.A.	C	O/C	Rt	10Y	13				

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1/2SD002A	M 48 5A/B	2	A	2.0	GL	A.O.	O	C	Lt	RR	11				
									St	Q		1,3			
									It	2Y		4			
									Fc	Q		2			
1/2SD002B	M 48 5A/B	2	A	2.0	GL	A.O.	O	C	Lt	RR	11				
									St	Q		1,3			
									It	2Y		4			
									Fc	Q		2			
1/2SD002C	M 48 5A/B	2	A	2.0	GL	A.O.	O	C	Lt	RR	11				
									St	Q		1,3			
									It	2Y		4			
									Fc	Q		2			
1/2SD002D	M 48 5A/B	2	A	2.0	GL	A.O.	O	C	Lt	RR	11				
									St	Q		1,3			
									It	2Y		4			
									Fc	Q		2			
1/2SD002E	M 48 5A/B	2	A	2.0	GL	A.O.	O	C	Lt	RR	11				
									St	Q		1,3			
									It	2Y		4			
									Fc	Q		2			
1/2SD002F	M 48 5A/B	2	A	2.0	GL	A.O.	O	C	Lt	RR	11				
									St	Q		1,3			
									It	2Y		4			
									Fc	Q		2			
1/2SD002G	M 48 5A/B	2	A	2.0	GL	A.O.	O	C	Lt	RR	11				
									St	Q		1,3			
									It	2Y		4			
									Fc	Q		2			
1/2SD002H	M 48 5A/B	2	A	2.0	GL	A.O.	O	C	Lt	RR	11				
									St	Q		1,3			
									It	2Y		4			
									Fc	Q		2			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2SD005A	M 48 5A/B	2	A	0.375	GL	A.O.	O	C	St Lt It Fc	Q RR 2Y Q	 11 	1,3 4 2			
1/2SD005B	M 48 5A/B	2	A	0.375	GL	A.O.	O	C	St Lt It Fc	Q RR 2Y Q	 11 	1,3 4 2			
1/2SD005C	M 48 5A/B	2	A	0.375	GL	A.O.	O	C	St Lt It Fc	Q RR 2Y Q	 11 	1,3 4 2			
1/2SD005D	M 48 5A/B	2	A	0.375	GL	A.O.	O	C	St Lt It Fc	Q RR 2Y Q	 11 	1,3 4 2			
1SD054A	M 48 5A	2	B	2.0	GL	A.O.	O	C	St/Fc	CS	4	1,2,3	VC-23		
1/2SD054B	M 48 5A M 48 5B	2	B	2.0	GL	A.C.	O	C	St/Fc	CS	4	1,2,3	VC-23		
1SD054C	M 48 5A	2	B	2.0	GL	A.O.	O	C	St/Fc	CS	4	1,2,3	VC-23		
1/2SD054D	M 48 5A M 48 5B	2	B	2.0	GL	A.O.	O	C	St/Fc	CS	4	1,2,3	VC-23		
1SD054E	M 48 5A	2	B	2.0	GL	A.O.	O	C	St/Fc	CS	4	1,2,3	VC-23		
1/2SD054F	M 48 5A M 48 5B	2	B	2.0	GL	A.O.	O	C	St/Fc	CS	4	1,2,3	VC-23		
1SD054G	M 48 5A	2	B	2.0	GL	A.O.	O	C	St/Fc	CS	4	1,2,3	VC-23		
1/2SD054H	M 48 5A M 48 5B	2	B	2.0	GL	A.O.	O	C	St/Fc	CS	4	1,2,3	VC-23		

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1/2SI121A	M-61-4 M-136-4	2	C	0.75x1.0	RV	S.A.	C	O/C	Rt	10Y	14				
1/2SI121B	M-61-4 M-136-4	2	C	0.75x1.0	RV	S.A.	C	O/C	Rt	10Y	14				
1/2SI8801A	M-61-2 M-136-2	2	B	4.0	GA	M.O.	C	O/C	St lt	CS 2Y		1,3 4	VC-12		
1/2SI8801B	M-61-2 M-136-2	2	B	4.0	GA	M.O.	C	O/C	St lt	CS 2Y		1,3 4	VC-12		
1/2SI8802A	M-61-3 M-136-3	2	B	4.0	GA	M.O.	C	O/C	St lt	CS 2Y		1,3 4	VC-13		
1/2SI8802B	M-61-3 M-136-3	2	B	4.0	GA	M.O.	C	O/C	St lt	CS 2Y		1,3 4	VC-13		
1/2SI8804B	M-61-1A M-136-1	2	B	8.0	GA	M.O.	C	O	St lt	Q 2Y		1,3 4			
1/2SI8806	M-61-1A M-136-1	2	B	8.0	GA	M.O.	O	C	St lt	CS 2Y		1,3 4	VC-13		
1/2SI8807A	M-61-1A M-136-1	2	B	6.0	GA	M.O.	C	O	St lt	Q 2Y		1,3 4			
1/2SI8807B	M-61-1A M-136-1	2	B	6.0	GA	M.O.	C	O	St lt	Q 2Y		1,3 4			
1/2SI8808A	M-61-5 M-136-5	1	B	10.0	GA	M.O.	O	O/C	St lt	CS 2Y		1,3 4	VC-21		
1/2SI8808B	M-61-5 M-136-5	1	B	10.0	GA	M.O.	O	O/C	St lt	CS 2Y		1,3 4	VC-21		
1/2SI8808C	M-61-6 M-136-6	1	B	10.0	GA	M.O.	O	O/C	St lt	CS 2Y		1,3 4	VC-21		
1/2SI8808D	M-61-6 M-136-6	1	B	10.0	GA	M.O.	O	O/C	St lt	CS 2Y		1,3 4	VC-21		
1/2SI8809A	M-61-4 M-136-4	2	B	8.0	GA	M.O.	O	O/C	St lt	CS 2Y		1,3 4	VC-13		
1/2SI8809B	M-61-4 M-136-4	2	B	8.0	GA	M.O.	O	O/C	St lt	CS 2Y		1,3 4	VC-13		
1/2SI8811A	M-61-4 M-136-4	2	B	24.0	GA	M.O.	C	O/C	St lt	RR 2Y		1,3 4		ROJ-4	
1/2SI8811B	M-61-4 M-136-4	2	B	24.0	GA	M.O.	C	O/C	St lt	RR 2Y		1,3 4		ROJ-4	
1/2SI8812A	M-61-4 M-136-4	2	B	12.0	GA	M.O.	O	C	St lt	Q 2Y		1,3 4			
1/2SI8812B	M-61-4 M-136-4	2	B	12.0	GA	M.O.	O	C	St lt	Q 2Y		1,3 4			

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1/2SI8813	M-61-1B	2	B	2.0	GL	M.O.	O	C	St	CS		1,3	VC-13		
	M-136-1								It	2Y		4			
1/2SI8814	M-61-1A	2	B	1.5	GL	M.O.	O	C	St	Q		1,3			
	M-136-1								It	2Y		4			
1/2SI8815	M-61-2	1	AC	3.0	CK	S.A.	C	O/C	Ct/Bt	RR				ROJ-7	
	M-136-2								Lt	RR	16				
1/2SI8818A	M-61-4	1	AC	6.0	CK	S.A.	C	O/C	Ct/Bt	CS			VC-8		
	M-136-4								Lt	RR	7,16				
1/2SI8818B	M-61-4	1	AC	6.0	CK	S.A.	C	O/C	Ct/Bt	CS			VC-8		
	M-136-4								Lt	RR	7,16				
1/2SI8818C	M-61-4	1	AC	6.0	CK	S.A.	C	O/C	Ct/Bt	CS			VC-8		
	M-136-4								Lt	RR	7,16				
1/2SI8818D	M-61-4	1	AC	6.0	CK	S.A.	C	O/C	Ct/Bt	CS			VC-8		
	M-136-4								Lt	RR	7,16				
1/2SI8819A	M-61-3	1	AC	2.0	CK	S.A.	C		Lt	RR	7,16				
	M-136-3							O/C	Ct/Bt	RR				ROJ-6	
1/2SI8819B	M-61-3	1	AC	2.0	CK	S.A.	C		Lt	RR	7,16				
	M-136-3							O/C	Ct/Bt	RR				ROJ-6	
1/2SI8819C	M-61-3	1	AC	2.0	CK	S.A.	C		Lt	RR	7,16				
	M-136-3							O/C	Ct/Bt	RR				ROJ-6	
1/2SI8819D	M-61-3	1	AC	2.0	CK	S.A.	C		Lt	RR	7,16				
	M-136-3							O/C	Ct/Bt	RR				ROJ-6	
1/2SI8821A	M-61-3	2	B	4.0	GA	M.O.	O	C/O	St	Q		1,3			
	M-136-3								It	2Y		4			
1/2SI8821B	M-61-3	2	B	4.0	GA	M.O.	O	C/O	St	Q		1,3			
	M-136-3								It	2Y		4			
1/2SI8835	M-61-3	2	B	4.0	GA	M.O.	O	C/O	St	CS		1,3	VC-13		
	M-136-3								It	2Y		4			
1/2SI8840	M-61-3	2	B	12.0	GA	M.O.	C	C/O	St	CS		1,3	VC-13		
	M-136-3								It	2Y		4			
1/2SI8841A	M-61-3	1	AC	8.0	CK	S.A.	C		Lt	RR		7,16			
	M-136-3							O/C	Ct/Bt	RR				ROJ-8	
1/2SI8841B	M-61-3	1	AC	8.0	CK	S.A.	C		Lt	RR		7,16			
	M-136-3							O/C	Ct/Bt	RR				ROJ-8	
1/2SI8842	M-61-3	2	C	0.75x1.0	RV	S.A.	C	O/C	Rt	10Y					
	M-136-3														
1/2SI8851	M-61-3	2	C	0.75x1.0	RV	S.A.	C	O/C	Rt	10Y					
	M-136-3														
1/2SI8853A	M-61-3	2	C	0.75x1.0	RV	S.A.	C	O/C	Rt	10Y					
	M-136-3														

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1/2SI8853B	M-61-3 M-136-3	2	C	0.75x1.0	RV	S.A.	C	O/C	Rt	10Y					
1/2SI8855A	M-61-5 M-136-5	2	C	2.0x1.0	RV	S.A.	C	O/C	Rt	10Y					
1/2SI8855B	M-61-5 M-136-5	2	C	2.0x1.0	RV	S.A.	C	O/C	Rt	10Y					
1/2SI8855C	M-61-6 M-136-6	2	C	2.0x1.0	RV	S.A.	C	O/C	Rt	10Y					
1/2SI8855D	M-61-6 M-136-6	2	C	2.0x1.0	RV	S.A.	C	O/C	Rt	10Y					
1/2SI8856A	M-61-4 M-136-4	2	C	2.0x3.0	RV	S.A.	C	O/C	Rt	10Y					
1/2SI8856B	M-61-4 M-136-4	2	C	2.0x3.0	RV	S.A.	C	O/C	Rt	10Y					
1/2SI8858	M-61-1A M-136-1	2	C	1.0x0.75	RV	S.A.	C	O/C	Rt	10Y					
1/2SI8871	M-61-6 M-136-6	2	A	.75	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	 1	1,3 4 2			
1/2SI8880	M-61-6 M-136-6	2	A	1.0	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	 1	1,3 4 2			
1/2SI8888	M-61-3 M-136-3	2	A	.75	GL	A.O.	C	C	St Lt It Fc	Q AJ 2Y Q	 1	1,3 4 2			
1/2SI8900A	M-61-2 M-136-2	1	AC	1.5	CK	S.A.	C	O/C	Ct/Bt Lt	RR RR	 16			ROJ-7	
1/2SI8900B	M-61-2 M-136-2	1	AC	1.5	CK	S.A.	C	O/C	Ct/Bt Lt	RR RR	 16			ROJ-7	
1/2SI8900C	M-61-2 M-136-2	1	AC	1.5	CK	S.A.	C	O/C	Ct/Bt Lt	RR RR	 16			ROJ-7	
1/2SI8900D	M-61-2 M-136-2	1	AC	1.5	CK	S.A.	C	O/C	Ct/Bt Lt	RR RR	 16			ROJ-7	
1/2SI8905A	M-61-3 M-136-3	1	AC	2.0	CK	S.A.	C	O/C	Ct/Bt Lt	RR RR	 16			ROJ-6	
1/2SI8905B	M-61-3 M-136-3	1	AC	2.0	CK	S.A.	C	O/C	Ct/Bt Lt	RR RR	 16			ROJ-6	

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1/2SI8905C	M-61-3	1	AC	2.0	CK	S.A.	C	O/C	Ct/Bt	RR				ROJ-6	
	M-136-3								Lt	RR	16				
1/2SI8905D.	M-61-3	1	AC	2.0	CK	S.A.	C	O/C	Ct/Bt	RR				ROJ-6	
	M-136-3								Lt	RR	16				
1/2SI8919A	M-61-1A	2	C	1.5	CK	S.A.	C	O	Ct	Q	9				
	M-136-1							C	Bt	Q					
1/2SI8919B	M-61-1A	2	C	1.5	CK	S.A.	O	O	Ct	Q	9				
	M-136-1							C	Bt	Q					
1/2SI8920	M-61-1A	2	B	1.5	GL	M.O.	O	C	St	Q		1,3			
	M-136-1								It	2Y		4			
1/2SI8922A	M-61-1A	2	C	4.0	CK	S.A.	C	O	Ct	RR				ROJ-1	
	M-136-1							C	Bt	RR				ROJ-1	
1/2SI8922B	M-61-1A	2	C	4.0	CK	S.A.	C	O	Ct	RR				ROJ-1	
	M-136-1							C	Bt	RR				ROJ-1	
1/2SI8924	M-61-1A	2	B	6.0	GA	M.O.	O	C/O	St	Q		1,3			
	M-136-1								It	2Y		4			
1/2SI8926	M-61-1A	2	C	8.0	CK	S.A.	C	O	Xt	Q				ROJ-1	
	M-136-1							C	Ct/Bt	RR				ROJ-1	
1/2SI8948A	M-61-5	1	AC	10.0	CK	S.A.	C	C/O	Lt/Ct	RR	16			ROJ-2	
	M-136-5								Xt/Bt	CS/RR				ROJ-2	
1/2SI8948B	M-61-5	1	AC	10.0	CK	S.A.	C	C/O	Lt/Ct	RR	16			ROJ-2	
	M-136-5								Xt/Bt	CS/RR				ROJ-2	
1/2SI8948C	M-61-6	1	AC	10.0	CK	S.A.	C	C/O	Lt/Ct	RR	16			ROJ-2	
	M-136-6								Xt/Bt	CS/RR				ROJ-2	
1/2SI8948D	M-61-6	1	AC	10.0	CK	S.A.	C	C/O	Lt/Ct	RR	16			ROJ-2	
	M-136-6								Xt/Bt	CS/RR				ROJ-2	
1/2SI8949A	M-61-3	1	AC	6.0	CK	S.A.	C		Lt	RR	16				
	M-136-3							O/C	Ct/Bt	RR				ROJ-8	
1/2SI8949B	M-61-3	1	AC	6.0	CK	S.A.	C		Lt	RR	16				
	M-136-3							O/C	Ct/Bt	RR				ROJ-6	
1/2SI8949C	M-61-3	1	AC	6.0	CK	S.A.	C		Lt	RR	16				
	M-136-3							O/C	Ct/Bt	RR				ROJ-8	
1/2SI8949D	M-61-3	1	AC	6.0	CK	S.A.	C		Lt	RR	16				
	M-136-3							O/C	Ct/Bt	RR				ROJ-6	
1/2SI8956A	M-61-5	1	AC	10.0	CK	S.A.	C		Lt	RR	16				
	M-136-5							O/C	Ct/Bt	RR				ROJ-2	
1/2SI8956B	M-61-5	1	AC	10.0	CK	S.A.	C		Lt	RR	16				
	M-136-5							O/C	Ct/Bt	RR				ROJ-2	
1/2SI8956C	M-61-6	1	AC	10.0	CK	S.A.	C		Lt	RR	16				
	M-136-6							O/C	Ct/Bt	RR				ROJ-2	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2SI8956D	M-61-6	1	AC	10.0	CK	S.A.	C		Lt	RR	16				
	M-136-6							O/C	Ct/Bt	RR				ROJ-2	
1/2SI8958A	M-61-4	2	C	12.0	CK	S.A.	C	O	Ct	CS			VC-8		
	M-136-4							C	Bt	Q					
1/2SI8958B	M-61-4	2	C	12.0	CK	S.A.	C	O	Ct	CS			VC-8		
	M-136-4							C	Bt	Q					
1/2SI8964	M-61-6	2	A	.75	GL	A.O.	C	C	St	Q		1,3			
	M-136-5								Lt	AJ	1				
									It	2Y		4			
									Fc	Q		2			
1/2SI8968	M-61-6	2	AC	1.0	CK	S.A.	C	C	Lt/Bt	RR	1			ROJ-24	
	M-136-6														

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2SX002A	M-42-1B	3	C	36.0	CK	S.A.	C	O C	Ct Bt	Q Q					
1/2SX002B	M-42-1A	3	C	36.0	CK	S.A.	C	O C	Ct Bt	Q Q					
1/2SX005	M-42-1A	3	B	30.0	BTF	M.O.	C	O	St It	Q 2Y		1,3 4			
0SX007	M-42-2A	3	B	24.0	BTF	M.O.	C	O	St It	Q 2Y		1,3 4			
1/2SX016A	M-42-5B M-126-3	2	B	16.0	BTF	M.O.	O	O/C	St It	Q 2Y		1,3 4			
1/2SX016B	M-42-5A M-126-3	2	B	16.0	BTF	M.O.	O	O/C	St It	Q 2Y		1,3 4			
1/2SX027A	M-42-5B M-126-3	2	B	16.0	BTF	M.O.	O	O/C	St It	Q 2Y		1,3 4			
1/2SX027B	M-42-5A M-126-3	2	B	16.0	BTF	M.O.	O	O/C	St It	Q 2Y		1,3 4			
1/2SX101A	M-42-3 M-126-1	3	B	1.5	GL	S.O.	C	O	St Fo	Q Q		6 2,6			
1/2SX112A	M-42-3 M-126-1	3	B	12.0	BTF	A.O.	O	C	St It Fc	Q 2Y Q		1,3 4 2			
1/2SX112B	M-42-3 M-126-1	3	B	12.0	BTF	A.O.	O	C	St It Fc	Q 2Y Q		1,3 4 2			
1/2SX114A	M-42-3 M-126-1	3	B	12.0	BTF	A.O.	O	C	St It Fc	Q 2Y Q		1,3 4 2			
1/2SX114B	M-42-3 M-126-1	3	B	12.0	BTF	A.O.	O	C	St It Fc	Q 2Y Q		1,3 4 2			
0SX146	M-42-2A	3	B	30.0	BTF	M.O.	C	O	St It	Q 2Y		1,3 4			
0SX147	M-42-2A	3	B	30.0	BTF	M.O.	C	O	St It	Q 2Y		1,3 4			
1/2SX147A	M-42-3 M-126-1	3	B	16.0	BTF	S.O.	O	O	St/Fo It	Q 2Y		1,2,3 4			
1/2SX147B	M-42-3 M-126-1	3	B	16.0	BTF	S.O.	O	O	St/Fo It	Q 2Y		1,2,3 4			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2SX169A	M-42-3 M-126-1	3	B	10.0	BTF	A.O.	C	O	St It Fo	Q 2Y Q		1,3 4 2			
1/2SX169B	M-42-3 M-126-1	3	B	10.0	BTF	A.O.	C	O	St It Fo	Q 2Y Q		1,3 4 2			
1/2SX173	M-42-3 M-126-1	3	B	6.0	GA	A.O.	C	O	St Fo	Q Q	4	1,3 2			
1/2SX174	M-42-3 M-126-1	3	C	6.0	CK	S.A.	C	O	Ct	Q					
1/2SX178	M-42-3 M-126-1	3	B	6.0	GA	A.O.	C	O	St Fo	Q Q	4	1,3 2			

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2VF01M	M-61-18 M-136-1	None	C	6.0	RV	S.A.	C	O	Rt	10Y	3				

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2VQ001A	M-105-1 M-106-1	2	A	48.0	BTF	H.O.	C	C	Lt St It	AJ CS 2Y	1	4	VC-24		
1/2VQ001B	M-105-1 M-106-1	2	A	48.0	BTF	H.O.	C	C	Lt St It	AJ CS 2Y	1	4	VC-24		
1/2VQ002A	M-105-1 M-106-1	2	A	48.0	BTF	H.O.	C	C	Lt St It	AJ CS 2Y	1	4	VC-24		
1/2VQ002B	M-105-1 M-106-1	2	A	48.0	BTF	H.O.	C	C	Lt St It	AJ CS 2Y	1	4	VC-24		
1/2VQ003	M-105-1 M-106-1	2	A	8.0	BTF	A.O.	C	C	Lt St/Fc It	AJ Q 2Y	1	1,2,3 4			
1/2VQ004A	M-105-1 M-106-1	2	A	8.0	BTF	A.O.	C	C	Lt St/Fc It	AJ Q 2Y	1	1,2,3 4			
1/2VQ004B	M-105-1 M-106-1	2	A	8.0	BTF	A.O.	C	C	Lt St/Fc It	AJ Q 2Y	1	1,2,3 4			
1/2VQ005A	M-105-1 M-106-1	2	A	8.0	BTF	A.O.	C	C	Lt St/Fc It	AJ Q 2Y	1	1,2,3 4			
1/2VQ005B	M-105-1 M-106-1	2	A	8.0	BTF	A.O.	C	C	Lt St/Fc It	AJ Q 2Y	1	1,2,3 4			
1/2VQ005C	M-105-1 M-106-1	2	A	8.0	BTF	A.O.	C	C	Lt St/Fc It	AJ Q 2Y	1	1,2,3 4			
1/2VQ016	M-105-3	2	A	0.5	GL	M	C	C	Lt	AJ	1				
1/2VQ017	M-105-3	2	A	0.5	GL	M	C	C	Lt	AJ	1				
1/2VQ018	M-105-3	2	A	0.5	GL	M	C	C	Lt	AJ	1				
1/2VQ019	M-105-3	2	A	0.5	GL	M	C	C	Lt	AJ	1				

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
1/2WM190	M-49-1A M-49-1B	2	A	2.0	GL	M	C	C	Lt	AJ	1				
1/2WM191	M-49-1A M-49-1B	2	AC	2.0	CK	S.A.	C	C	Lt/Bt	RR	1			ROJ-25	

VALVE NUMBER	P&ID	CLASS	VALVE CATEGORY	VALVE SIZE (IN.)	VALVE TYPE	ACT. TYPE	NORMAL POSITION	STROKE DIRECT.	TEST METHOD	TEST FREQ	NOTES	TECH. POS. (VA)	COLD SHUTDOWN JUST.	REFUELING OUTAGE JUST.	RELIEF REQUEST
0WO002A	M-118-1	3	C	3.0	CK	S.A.	O	O	Ct	Q					
0WO002B	M-118-1	3	C	3.0	CK	S.A.	O	O	Ct	Q					
1/2WO006A	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	Q AJ 2Y	1	1,3 4			
1/2WO006B	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	Q AJ 2Y	1	1,3 4			
1/2WO007A	M-118-5 M-118-7	2	AC	10.0	CK	S.A.	C	C	Lt/Bt	RR	1			ROJ-19	
1/2WO007B	M-118-5 M-118-7	2	AC	10.0	CK	S.A.	C	C	Lt/Bt	RR	1			ROJ-19	
1/2WO020A	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	Q AJ 2Y	1	1,3 4			
1/2WO020B	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	Q AJ 2Y	1	1,3 4			
0WO028A	M-118-1	3	C	1.5x2.5	RV	S.A.	C	O/C	Rt	10Y					
0WO028B	M-118-1	3	C	1.5x2.5	RV	S.A.	C	O/C	Rt	10Y					
1/2WO056A	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	Q AJ 2Y	1	1,3 4			
1/2WO056B	M-118-5 M-118-7	2	A	10.0	GA	M.O.	O	C	St Lt It	Q AJ 2Y	1	1,3 4			

SECTION 3.1.3

VALVE NOTES

NOTE 1

The following category A valves, which are containment isolation valves, will be seat leakage tested (Lt) in accordance with Federal Regulation 10CFR50, Appendix J, per OMa-1988, part 10, paragraph 4.2.2.2 (unless otherwise directed by more conservative Technical Specifications). Additionally, 10CFR 50.55 a(b)(Vii) provides rules for category A containment isolation valves.

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

NOTE 2

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 3

The 1/2VF01M are vacuum relief devices located on the Refueling Water Storage Tanks (RWST). Their function in the open direction is to prevent a collapse of the RWST and/or prevent drawing vacuum in the tank. The successful operation of these devices would ensure that the net positive suction head for the ECCS pumps is maintained. Although these devices are non-safety and are considered to fall outside the scope of the IST Program, they will be listed in the IST tables and tested in accordance with OM-1 due to their safety significance.

NOTE 4

The following valves are stroke timed locally and do not require a position indication test (see Technical Position VA-4 for more details).

1/2CV128	1/2SX173
1SD054A-H	1/2SX178
2SD054B,D,F,H	

NOTE 5

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 OM-10, paragraph 4.1. 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 6

The following valves are manually stroked locally and do not require a position indication test (see Technical Position VA-4 for more details).

1/2CC9458	1/2CC9467A-C
1/2CC9459A, B	1/2MS019A-D

NOTE 7

1/2SI8818A-D, 1/2SI8819A-D, and 1/2SI8841A/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 8

1/2CC9518, 1/2CC9534, 1/2CV8113, and 1/2RH8705A/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 9

The 1/2SI8919A/B check valves are the Safety Injection Pump mini-flow recirculation line valves which open to allow recirculation flow during IST Surveillances. Since full stroking these valves will depend on the reference point of testing, acceptable full stroke will be verified whenever the recorded mini-recirculation flowrate is greater than the minimum allowed flowrate given in the surveillance.

NOTE 10

Not used at Braidwood

NOTE 11

Per Braidwood Technical Specifications Amendment Number 26, valves 1/2SD002A-H,and 1/2SD005A-D have been removed from the list of valves to be tested under 10CFR50 Appendix J . However, they will be tested as OM-10 Category A valves.

NOTE 12

In response to Generic Letter 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 13

The starting air receiver overpressurization relief valves, 1/2SA148A-D, classified as safety category I, quality group "G" (Non-ASME) valves, as noted in P&ID M-54-4A, Note 3. Due to their safety significance, they will be included in the IST Program and treated as an ASME Class 3 valve.

NOTE 14

The 1/2SI121A/B Relief Valves have been installed to prevent pressure locking of the 1/2SI8811A/B containment sump valves due to pressure buildup in the 1/2SI8811A/B valve bonnets.

NOTE 15

Per OM-1987 Part 1, paragraph 1.3.4.1, PWR main steam safety valves 1/2MS013A-D, 1/2MS014A-D, 1/2MS015A-D, 1/2MS016A-D, and 1/2MS017A-D shall be tested in accordance with paragraph 1.3.3.1. Consequentially, even though they are class 2 valves, they must be tested to the class 1 interval of 5 years.

NOTE 16

The following valves have been identified as intersystem LOCA and pressure isolation valves. They form a pressure boundary between the RCS and other essential components in order to protect these components from damage.

Intersystem LOCA Pressure Isolations Valves (PIVs)

1RH8701A/B	1RH8702A/B	2RH8701A/B	2RH8702AB
1RH8705A/B*	1SI8815	2RH8705AB*	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 Technical specifications for PIVs.

SECTION 3.2

VALVE TECHNICAL POSITIONS

3.2.1 Valve Technical Position Summary

Number	Component(s)	Description
VA-1	All Power-Operated Valves	Method of Stroke Timing Valves
VA-2	Valves with Fail-Safe Actuators	Method of Fail-Safe Testing Valves
VA-3	All Power-Operated Valves	Method of Establishing Acceptance Criteria for Power-Operated Valves
VA-4	Valves with Remote Position Indicators	Method of Position Indication Testing
VA-5	0AB8473,1/2AB8487	Gives basis for the exclusions of the Boric Acid Transfer pump discharge check valves
VA-6	SX101 Valves	Alternate testing to meet OM-10 requirements for the SX101 SOVs.

VALVE TECHNICAL POSITION
VA-1

TITLE:

Method of Stroke Timing Valves

VALVES AFFECTED:

Power Operated Valves Requiring Stroke Time Testing

CODE REQUIREMENT(S)/DISCUSSION:

The use of the control board open and closed lights to determine the stroke time of power-operated valves is the issue discussed in this Technical Position. Paragraph 1.3 of OMa-1988, Part 10, defines "full-stroke time" as "the time interval from initiation of the actuating signal to the indication of the end of the operating stroke." 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 closed or open on the control board (switch to light).

POSITION:

The way in which the limit switches that operate the remote position indicator lights are 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 may be rounded to the nearest tenth (0.1) of a second. 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). Reference values may be established to the nearest tenth of a second although stroke times may be recorded to the hundredths place (0.01). This technique satisfies OM-10, paragraph 4.2.1.4(b), in that all power operated valves will be measured to at least the nearest second.

For those specific cases in which a valve must be stroke timed locally, the stroke timing will begin with the initiation of the actuating signal and end with the completion of valve movement as observed in the field.

VALVE TECHNICAL POSITION
VA-2

TITLE:

Method of Fail Safe Testing Valves.

VALVES AFFECTED:

See IST Valve Tables (Fc = Fail Safe Test closed; Fo = Fail Safe Test open)

CODE REQUIREMENT(S) DISCUSSION:

Paragraph 4.2.1.6 of OM-10 states that "Valves with fail-safe actuators shall be tested by observing the operation of the actuator upon loss of valve actuator power in accordance with the exercising frequency of paragraph 4.2.1.1 of OM-10".

POSITION:

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.

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.

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 OM-10, paragraph 4.1.

The fail-safe test is generally performed at the same frequency as the stroke time exercise test. Where the exercise test is performed less frequently than every 3 months, a cold shutdown justification, refueling outage justification, or relief request has been written. The same justifications for the stroke timing would also apply to the fail-safe tests.

VALVE TECHNICAL POSITION
VA-3

TITLE:

Method of Establishing Acceptance Criteria for Power-Operated Valves.

VALVES AFFECTED:

Power Operated Valves Requiring Stroke Time Testing

CODE REQUIREMENT(S) DISCUSSION:

The IST Program requires that reference values be established in accordance with paragraphs 3.3, 3.4, or 3.5 of OM-10. Per paragraph 1.3 of OM-10, a reference value is "one or more values of test parameters measured or determined when the equipment is known to be operating acceptably." Acceptable bands are determined based on these reference values in accordance with paragraph 4.2.1.8 of OM-10.

Per paragraph 4.2.1.4(a) of OM-10, "The limiting value(s) of full-stroke time of each power-operated valve shall be specified by the Owner." OM-10 does not provide specific guidance on how to determine the limiting value(s). According to NRC Generic Letter 89-04, 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 Technical Specification (TS) or safety analysis limit, the TS or safety analysis limit should be used as the limiting value of full-stroke time.

POSITION:

Table VA-3.1 will be used to establish the Acceptable Ranges (per paragraph 4.2.1.8) and used as general guidance to establish Limiting Values (determined by Braidwood Station) for power-operated valves subject to the Notes listed as follows:

1. T_{REF} is the reference value in seconds of a valve when it is known to be operating acceptably.

VALVE TECHNICAL POSITION
VA-3

POSITION: (continued)

2. Reference values may be rounded off to the nearest tenth of a second. Acceptable Ranges may be rounded off to the nearest tenth of a second. Calculated IST limiting values may be rounded off to the nearest whole number. Standard rounding techniques are to be used when rounding (e.g., 10.45 rounds to 10.5, and 10.44 rounds to 10.4 seconds).

3. The most conservative limiting value between the IST Calculated limit (as determined from Table VA-3.1, below), UFSAR limit, or Tech Spec Limit should be used as the Maximum/Limiting stroke time. Any deviations from this criteria will be evaluated.

4. When a valve or its control system has been replaced, repaired, or has undergone maintenance that could affect the valve's performance, a new reference value shall be determined or the previous value reconfirmed by an inservice test run prior to the time it is returned to service.

TABLE VA-3.1

Valve Operator	Reference Stroke Time (sec.)	Acceptable Range (sec.)	[5] Maximum/Limiting Stroke Time (sec.)
Motor	$T_{REF} > 10$	$0.85T_{REF}$ - $1.15T_{REF}$	[1] $1.25T_{REF}$
	$T_{REF} \leq 10$	[2] $0.75T_{REF}$ - $1.25T_{REF}$	$1.50T_{REF}$
Other (AOVs/HOVs/SOVs)	$T_{REF} > 10$	$0.75T_{REF}$ - $1.25T_{REF}$	[3] $1.75T_{REF}$
	$T_{REF} \leq 10$	$0.50T_{REF}$ - $1.5T_{REF}$	$2.0T_{REF}$
All(Optional)	[4] $T_{REF} < 2$	≤ 2.0	2.0

[1] or $T_{REF} + 20$, whichever is more conservative (lower)
[2] or $T_{REF} \pm 1$, whichever is greater, when compared to reference value
[3] or $T_{REF} + 20$, whichever is more conservative (lower)
[4] In general, a valve with a reference value of 1.2 seconds or below will use this option
[5] Also refered to as Operability (Oper Limits)

VALVE TECHNICAL POSITION
VA-4

TITLE:

Method of Position Indication Testing

VALVES AFFECTED:

All valves with Remote Position Indicators

CODE REQUIREMENT(S) / DISCUSSION:

OMa-1988, Part 10, paragraph 4.1, states that "valves with remote position indicators shall be observed at least once every 2 years to verify that valve operation is accurately indicated."

POSITION:

In reference to Steven Weinman (Boiler and Pressure Vessel Committee) reply letter to Russell J. Tamminga (ComEd), dated November 14, 1988, concerning Inquiry number IN88-015, the following question was answered:

> Question: Is it the intent of Section XI, IWV-3300 that for valves having remote position indicators at multiple locations (such as in the control room and also on a remote shutdown panel and/or sampling panel) that only the remote position indicator at the location utilized in exercising the valve (IWV-3412) and timing the stroke of the valve (IWV-3413) be verified that the valve operation is accurately indicated?
>
> Reply: Yes

This Inquiry also applies to the applicable sections in OMa-1988, Part 10:
1. Paragraph 4.1, Valve Position Verification
2. Paragraph 4.2.1, Valve Exercising Test
3. Paragraph 4.2.1.4, Power-Operated Valve Stroke Testing

In summary, the remote position indicator utilized during valve exercising (OM-10, paragraph 4.2.1) and stroke timing (OM-10, paragraph 4.2.1.4) is the indicator which is used to verify that valve operation is accurately indicated (OM-10, paragraph 4.1). However, if a valve is stroke time tested locally or manually exercised locally, a remote position indication test is not required.

VALVE TECHNICAL POSITION
VA-4

POSITION: (continued)

The remote position indication test is to be performed as follows:

An individual is dispatched to the valve to locally observe the valve movement and he/she establishes communication with an individual at the remote position indicator. As the valve is exercised in both directions, the individual at the remote position indicator verifies that the indicator shows the proper position by communicating with the local observer, who is observing the valve stem movement. When the valve stem movement cannot be directly observed, indirect means may be employed to verify the change in valve position. These may include observations such as changes in system pressure or establishment/cessation of flow done locally or remotely.

NOTE

Byron/Braidwood Station's conversion from the 1983 Edition of Section XI of the ASME Code to the 1989 Edition of Section XI of the ASME Code, which references OMa-1988, Part 10, for valves, has not been understood to require an expansion of scope for the sole purpose of performing an indication test on a valve (reference Table 1 of OM-10). It is Byron/Braidwood's position that the intent of OM-10 was not to expand the scope of the IST Program due to position indication testing alone. A joint, "living" bases document between Byron/Braidwood has been created to maintain the bases for inclusion/exclusion of valves in the IST Program.

VALVE TECHNICAL POSITION
VA-5

TITLE:

Testing of the Boric Acid Transfer Pumps Discharge Check Valves.

VALVES AFFECTED:

0AB8473, 1/2AB8487

References: (a) Engineering Correspondence (CHRON #161733) dated January 17, 1997

Code Class: 3

CODE REQUIREMENT(S) / DISCUSSION:

These check valves are tested per the Technical Specification requirement that requires an 18 month flow verification of 30 gpm to the RCS.

POSITION:

The Boric Acid Transfer Pumps fall outside the scope of the IST Program as described in Pump Technical Position PA-01. For the same reasons that the pumps are outside the scope of the IST Program, the valves are outside the scope of the IST Program. PA-01 does mention that Braidwood has developed a testing program for the Boric Acid Transfer Pumps, which is outside the IST Program. This test of the pumps will also test the opening capability of the check valves.

VALVE TECHNICAL POSITION
VA-6

TITLE:

Stroke Timing Solenoid Valves without Position Indication using Non-Intrusive Magnetic and Acoustical Techniques

VALVES AFFECTED:

1SX101A, 2SX101A

CODE REQUIREMENT(S) / DISCUSSION:

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 closed 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).

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 time on valve closing.

VALVE TECHNICAL POSITION
VA-6

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 housing. The use of an 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 timing method is on the order of two magnitudes more accurate than the conventional Code stroke time method and is clearly and 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 stroke 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 conjunction with acceptable lube oil temperatures, to monitor valve opening.

SECTION 3.3

VALVE COLD SHUTDOWN

JUSTIFICATIONS

3.3.1 Valve Cold Shutdown Justification Summary

Number	Component(s)	Description
VC-1	1/2MS001A-D	Stroke Time Test (St) During Cold Shutdown and Partial Stroke (Xt) Quarterly
VC-2	1/2CV8104; 1/2CV8442 1/2CV8804A; 1/2CV112D; 1/2CV112E	Full Stroke Test (Ct) of 1/2CV8442 and Stroke Time Test (St) of Remaining Valves During Cold Shutdown
VC-3	1/2FW009A-D	Stroke Time Test (St) During Cold Shutdown and Partial Stroke Test (Xt) Quarterly
VC-4	1/2CV112B; 1/2CV112C 1/2CV8105; 1/2CV8106 1/2CV8152; 1/2CV8160	Stroke Time Test (St) During Cold Shutdown and Fail Safe Test Closed (Fc) of 1/2CV8152 and 1/2CV8160 During Cold Shutdown
VC-5	1/2RH8701A/B; 1/2RH8702A/B	Stroke Time Test (St) During Cold Shutdown
VC-6	1/2RC014A-D	Stroke Time Test (St) / Fail Safe Test Closed (Fc) During Cold Shutdown
VC-7	1/2RH8730A/B	Full Stroke Test (Ct) / Backflow Test (Bt) During Cold Shutdown and Partial Stroke Test (Xt) Quarterly
VC-8	1/2SI8818A-D 1/2SI8958A/B	Full Stroke Test (Ct) During Cold Shutdown
VC-9	1/2FW039A-D	Stroke Time Test (St) and Fail Safe Test Closed (Fc) During Cold Shutdown
VC-10	1/2CV459; 1/2CV460 1/2CV8149A-C	Stroke Time Test (St) and Fail Safe Test Closed (Fc) During Cold Shutdown
VC-11	1/2AF003A/B; 1/2/AF029A/B 1/2AF014A-H	Full Stroke Test (Ct) of all valves During Cold Shutdown, Partial Stroke Test (Xt) Quarterly for 1/2AF003A/B and Backflow Test (Bt) During Cold Shutdown for 1/2AF014A-H
VC-12	1/2SI8801A/B	Stroke Time Test (St) During Cold Shutdown
VC-13	1/2SI8802A/B; 1/2SI8806 1/2SI8809A/B; 1/2SI8813 1/2SI8835; 1/2SI8840	Stroke Time Test (St) During Cold Shutdown

3.3.1 Valve Cold Shutdown Justification Summary (continued)

Number	Component(s)	Description
VC-14	1/2RY455A; 1/2RY456	Stroke Time Test (St) and Fail Safe Test Closed (Fc) During Cold Shutdown
VC-15		Not used at Braidwood
VC-16		Not used at Braidwood
VC-17		Not used at Braidwood
VC-18	1/2RH8716A/B	Stroke Time Test (St) During Cold Shutdown
VC-19	1/2CC9415	Stroke Time Test (St) During Cold Shutdown with no RCPs running
VC-20	1/2FW036A-D	Backflow Test (Bt) During Cold Shutdown using non-intrusive techniques
VC-21	1/2SI8808A-D	Stroke Time Test (St) During Cold Shutdown
VC-22	1/2CV8355A-D	Stroke Time Test (St) During Cold Shutdown with no RCPs running
VC-23	1SD054A-H; 2SD054B,D,F,H	Stroke Time Test (St) and Fail Safe Test Closed (Fc) During Cold Shutdown
VC-24	1/2VQ001A,B 1/2VQ002A,B	Stroke Time Test (St) During Cold Shutdown or as Required to Declare Operability

COLD SHUTDOWN JUSTIFICATION
VC-1

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2MS001A	B	2	M-35-2 (120-2A)	C4(D5)
1/2MS001B	B	2	M-35-1 (120-1)	E5(E5)
1/2MS001C	B	2	M-35-2 (120-2B)	E4(D5)
1/2MS001D	B	2	M-35-1 (120-1	B5(B5)

FUNCTION(S):

These are the Main Steam Isolation Valves (MSIVs). In the normally open position, steam is supplied to the turbine. The valves are required to close to isolate the main steam line to prevent: reverse flow into containment during a main steam line break, Steam Generator Blowdown during a major steamline break outside of containment, and secondary system contamination from a Steam Generator tube rupture.

JUSTIFICATION:

Closure of the main steam isolation valves 1MS001A-D or 2MS001A-D during unit operation would result in reactor trip and safety injection actuation. Failure of these valves during partial stroke testing can result in valve closure and subsequent reactor trip. NUREG-1482 section 4.2.4 states, "MSIVs should not be tested at power, since even a part-stroke exercise increases the risk of a valve closure when the unit is generating power."

Because stroke testing of these valves at power would result in a reactor trip, and because partial stroke testing at power presents the unwarranted risk of a potential reactor trip, testing of these valves during operation is not practical. Stroke time testing of the Main Steam Isolation Valves will be completed during cold shutdown, as conditions allow, in accordance with OM-10, paragraph 4.2.1.2. The actual test mode will be Mode 3 before or after cold shutdowns in which the valve is tested.

COLD SHUTDOWN JUSTIFICATION
VC-2

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CV8104	B	2	M-64-4B(138-4A)	C3 (C2)
1/2CV8442	C	2	M-64-4B(138-4A)	B3 (B2)
1/2CV8804A	B	2	M-64-4B(138-4A)	C7 (C7)
1/2CV112D	B	2	M-64-4B(138-4A)	B5 (B5)
1/2CV112E	B	2	M-64-4B(138-4A)	A5 (A5)

FUNCTION(S):

These are the emergency boration flowpath valves. The 1/2CV8104 is the emergency boration valve and the 1/2CV8442 is the emergency boration header check valve. The 1/2CV8804A is the RH heat exchanger 1A to charging pumps suction isolation valve required to be open for Post LOCA recovery. The 1/2CV112D and 1/2CV112E are the RWST to charging pumps suction isolation valves which are in the emergency boration flowpath when the RWST is the Boration Source.

JUSTIFICATION:

The testing of any emergency boration flowpath valves during unit operation is not practical. Stroke testing the Boric Acid injection isolation valve 1/2CV8104 and check valve 1/2CV8442, the RH to CV pump suction isolation valve 1/2CV8804A, or the RWST to CV pump suction isolation valves 1/2CV112D/E could result in boration of the RCS, resulting in a cooldown or reactivity 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 OM-10, paragraph 4.2.1.2 and 4.3.2.2.

COLD SHUTDOWN JUSTIFICATION
VC-3

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2FW009A	B	2	M-36-1C (121-1B)	C5 (C5)
1/2FW009B	B	2	M-36-1A (121-1D)	C5 (C5)
1/2FW009C	B	2	M-36-1D (121-1A)	C5 (C5)
1/2FW009D	B	2	M-36-1B (121-1C)	C5 (C5)

FUNCTION(S):

These are the main feedwater isolation valves (FWIVs). They are open during normal operation to allow flow to the Steam Generator (non-IST function). They are required to close for Feedwater Isolation and Containment Isolation.

JUSTIFICATION:

The main feedwater isolation valves cannot be fully stroked during operation as feedwater would be terminated causing a reactor trip. Failure of these valves during partial stroke testing can result in valve closure and subsequent reactor trip.

Because stroke testing of these valves at power would result in a reactor trip, and because partial stroke testing at power presents the unwarranted risk of a potential reactor trip, testing of these valves during operation is not practical. Stroke time testing of the Main Feedwater Isolation Valves will be completed during cold shutdown, as conditions allow, in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-4

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CV112B	B	2	M-64-4A (138-4B)	B4 (C3)
1/2CV112C	B	2	M-64-4A (138-4B)	B3 (C3)
1/2CV8105	B	2	M-64-3B (138-3B)	E6 (E6)
1/2CV8106	B	2	M-64-3B (138-3B)	E5 (E5)
1/2CV8152	A	2	M-64-5 (138-5A)	E4 (E7)
1/2CV8160	A	2	M-64-5 (138-5A)	F5 (E8)

FUNCTION(S):

The 1/2CV112B & C are the volume control tank outlet isolation/charging pump suction valves. The 1/2CV8105 and 1/2CV8106 are the normal charging path containment isolation valves. The 1/2CV8152 and the 1/2CV8160 are the letdown line containment isolation valves. These valves are part of the chemical and volume control system (CVCS).

JUSTIFICATION:

Closure of these letdown and charging makeup valves 1/2CV112B/C, 1/2CV8105, 1/2CV8106, 1/2CV8152, and 1/2CV8160 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. Additionally, isolating letdown during normal unit operation would result in a thermal transient on the charging nozzle. Valves 1/2CV8152 and 1/2CV8160 will be stroke time tested during cold shutdown in accordance with OM-10, paragraph 4.2.1.2 (also covers fail-safe tests for 1/2CV8152 and 1/2CV8160). As valves 1/2CV112B/C are the volume control tank outlet isolation/charging pump suction valves, they should not be closed while the charging pumps are running. As valves 1/2CV8105 and 1/2CV8106 are in the normal charging flow path, they should not be closed while the charging pumps are running. Valves 1/2CV112B/C, 1/2CV8105, and 1/2CV8106 will be exercised during Cold Shutdown when the charging pumps are not running, as a result they may not be tested during cold shutdowns in which the charging pumps are not secured for sufficient duration to perform the tests. It is not the intent of this justification to require charging pump shutdown only to perform the exercise test for these valves. Valves 1/2CV112B/C, 1/2CV8105, and 1/2CV8106 will be tested during Cold Shutdown in which the charging pumps are secured for sufficient duration to perform the tests, which is in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-5

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2RH8701A	A	1	M-62 (137)	E2 (E7)
1/2RH8701B	A	1	M-62 (137)	E1 (E8)
1/2RH8702A	A	1	M-62 (137)	D2 (D6)
1/2RH8702B	A	1	M-62 (137)	D1 (D8)

FUNCTION(S):

The 1RH8701A/B, 2RH8701A/B, 1RH8702A/B and 2RH8702A/B valves are the isolation boundary between the Residual Heat Removal Pumps and the Reactor Coolant System. The RH8701 valves isolate the "A" loop of the RCS from the "A" RHR pump suction. The RH8702 valves isolate the "C" loop of the RCS from the "B" RHR pump suction.

JUSTIFICATION:

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 and potentially unsafe condition. Therefore, these valves will be full stroke tested during cold shutdown, in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-6

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2RC014A	B	1	M-60-1B (135-1B)	F3 (F2)
1/2RC014B	B	1	M-60-1B (135-1B)	E3 (E2)
1/2RC014C	B	1	M-60-1B (135-1B)	E3 (E2)
1/2RC014D	B	1	M-60-1B (135-1B)	E3 (E2)

FUNCTION(S):

These are the reactor head vent valves and are used to vent the reactor of hydrogen or other post-accident gases.

JUSTIFICATION:

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, in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-7

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2RH8730A	C	2	M-62 (137	E4 (E5)
1/2RH8730B	C	2	M-62 (137)	C4 (C5)

FUNCTION(S):

These are the RHR pump discharge check valves. The open function of these valves is to provide an RHR pump flowpath. The closure function is to prevent back leakage while the opposite train is in operation during post-accident situations.

JUSTIFICATION:

The Residual Heat Removal Pump discharge check valves 1RH8730A/B and 2RH8730A/B cannot be full stroke exercised during unit operation due to the RCS pressure being greater than the RH pumps are capable of putting out. These check valves will be partial stroke tested, however, on a quarterly basis during the mini-flow recirculation RHR pump tests and full stroke exercised during cold shutdown. This is in accordance with OM-10, paragraph 4.3.2.2.

Additionally, it would be impractical to backflow test these valves during unit operation. The methodology for testing these valves involves closing the mini-flow valve on the train being tested and having the opposite train provide pressure against the check valve being tested. The test is satisfied by verifying that the pump on the same train as the check valve is not rotating backwards. However, this testing would put the plant in an undesirable condition as both trains of RH would be considered inoperable. During cold shutdowns, the train running on shutdown cooling may be used to pressurize against the opposite train's check valve. For this reason, these valves will be backflow tested during cold shutdown in accordance with OM-10, paragraph 4.3.2.2.

COLD SHUTDOWN JUSTIFICATION
VC-8

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2SI8818A	AC	1	M-61-4 (136-4)	F7 (F2)
1/2SI8818B	AC	1	M-61-4 (136-4	D7 (D2)
1/2SI8818C	AC	1	M-61-4 (136-4)	D7 (D2)
1/2SI8818D	AC	1	M-61-4 (136-4)	E7 (E2)
1/2SI8958A	C	2	M-61-4 (136-4)	C4 (C7)
1/2SI8958B	C	2	M-61-4 (136-4)	B4 (B7)

FUNCTION(S):

The SI8818 valves are the safety injection RCS Loop 1 cold leg upstream check valves located in the flowpath from the Residual Heat Removal (RHR) pumps. The SI8958 valves are the safety injection RWST outlet check valves to the RHR pumps.

JUSTIFICATION:

Due to the high RCS pressure during unit operation (2235 psi), these valves cannot be full or partial stroke exercised during quarterly testing. The 1/2SI8958A/B check valves, although located at the suction of the RHR pumps, are not in the recirculation flow path to allow partial stroking each quarter. These valves will be full stroke exercised during cold shutdown, in accordance with OM-10, paragraph 4.3.2.2.

COLD SHUTDOWN JUSTIFICATION
VC-9

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2FW039A	B	2	M-36-1C (121-1B)	C4 (C4)
1/2FW039B	B	2	M-36-1A (121-1D	C4 (D4)
1/2FW039C	B	2	M-36-1D (121-1A)	C4 (D4)
1/2FW039D	B	2	M-36-1B (121-1C)	C4 (C4)

FUNCTION(S):

These are the steam generator feedwater preheater bypass downstream isolation valves. They provide for Feedwater/Containment isolation in the closed position. They are normally open air operated valves located on the cross-tie lines connecting the main FW line to the tempering line.

JUSTIFICATION:

It is not practical for the 1FW039A-D and 2FW039A-D valves to be stroke tested during normal operation as closure of these valves would require a power reduction from full power to less than 80%. Stroking these valves closed above 80% would result in undesirable preheater tube vibrations within the Steam Generators. These valves will be stroke time/fail safe tested during cold shutdown, in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-10

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1(2)CV459	B	1	M 64-5(138-5B)	E7 (F5)
1(2)CV460	B	1	M 64-5(138-5B)	F8 (F7)
1(2)CV8149A	B	2	M 64-5(138-5B)	F6 (E2)
1(2)CV8149B	B	2	M 64-5(138-5B)	F6 (E3)
1(2)CV8149C	B	2	M 64-5(138-5B)	F5 (F2)

FUNCTION(S):

CV459 & 460 valves are normally OPEN with the Unit at power, allowing letdown flow to occur. The valves auto close on low Pressurizer level and on letdown isolation due to an interlock with the orifice isolation valves.

CV8149 Orifice Isolation Valves are interlocked with CV459/460 to Close on Phase A Containment Isolation signal. One or more of these valves are normally OPEN to maintain letdown flow.

JUSTIFICATION:

It is impractical to exercise and stroke time the above listed valves on a quarterly basis. Due to the interlocks between the 459, 460, & the 8149 valves, exercising these valves during normal operation results in (multiple) total letdown flow isolation events. The affect of a letdown isolation with the Unit at power is a thermal transient to the RPV charging nozzle. A letdown isolation also results in some amount of pressurizer level fluctuation until equilibrium letdown and makeup is re-established. While the piping and components are designed for thermal transients, each cycle presents some additional stress to all of the affected equipment. It is prudent to minimize the number of transients the equipment is required to undergo to prevent premature failures.

Due to the above, these valves will be tested in Cold Shutdowns of sufficient duration in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-11

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2AF003A	C	3	M-37 (122)	D5 (E5)
1/2AF003B	C	3	M-37 (122)	B5 (C5)
1/2AF029A	C	3	M-37 (122)	C5 (E5)
1/2AF029B	C	3	M-37 (122)	B5 (C4)
1/2AF014A	C	2	M-37 (122)	D8 (D2)
1/2AF014B	C	2	M-37 (122)	A8 (B2)
1/2AF014C	C	2	M-37 (122)	E8 (E2)
1/2AF014D	C	2	M-37 (122)	B8 (C2)
1/2AF014E	C	2	M-37 (122)	D8 (E2)
1/2AF014F	C	2	M-37 (122)	B8 (B2)
1/2AF014G	C	2	M-37 (122)	E8 (F2)
1/2AF014H	C	2	M-37 (122)	C8 (D2)

FUNCTION(S):

The AF003 valves are the AFW pump discharge check valves. The AF029 valves are the AFW pump header check valves downstream to the mini-flow recirculation line. The AF014 valves are the individual header check valves to the steam generators. All these valves are required to open to provide a flowpath to the Steam Generators.

Also covered in this cold shutdown justification is the closure function for the 1/2AF014A-H valves. These valves are required to close in order to prevent Steam Generator inventory loss, prevent steam binding of the AFW pumps, and provide containment isolation during a steam generator tube rupture.

JUSTIFICATION:

The Auxiliary Feedwater check valves 1/2AF003A/B, 1/2AF014A-H, and 1/2AF029A/B cannot be full stroke tested during unit operation, as this would induce potentially damaging thermal stresses in the upper feedwater nozzle piping. The 1/2AF003A/B valves will be partially stroke tested during operation, and all valves full stroke tested during cold shutdown, in accordance with OM-10, paragraph 4.3.2.2.

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 ≤ 130°F. If the temperature is > 130°F at any 1/2AF005 valve, then 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. However, at the NRC's request, the official IST backflow test will be performed following the full flow test during cold shutdowns (NRC Inspection Report number 50-456/93011 (DRS) and 50-457/93011 (DRS) dated June 10, 1993, paragraph 2.C.(2)) in accordance with OM-10, paragraph 4.3.2.2.

COLD SHUTDOWN JUSTIFICATION
VC-12

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2SI8801A	B	2	M-61-2 (136-2)	D3 (D6)
1/2SI8801B	B	2	M-61-2 (136-2)	C3 (C6)

FUNCTION(S):

These are the charging pumps to RCS cold leg isolation valves. They are required to open to provide a flow path for the high head safety injection portion of ECCS. They are required to close for containment isolation.

JUSTIFICATION:

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 stroke time tested during cold shutdowns provided the charging pumps are shutdown. As a result, they may not be tested during cold shutdowns for which the charging pumps are required to be running. It is not the intent of this justificaiton to require charging pump shutdown to perform the exercise test for these valves. These valves will be tested during cold shutdowns in which the charging pumps are secured for sufficient duration to perform the tests, which is in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-13

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2SI8802A	B	2	M-61-3 (136-3)	E3 (E6)
1/2SI8802B	B	2	M-61-3 (136-3)	D3 (D6)
1/2SI8806	B	2	M-61-1A (136-1)	D2 (C6)
1/2SI8809A	B	2	M-61-4 (136-4)	E4 (E5)
1/2SI8809B	B	2	M-61-4 (136-4)	D4 (D5)
1/2SI8813	B	2	M-61-1B (136-1)	D7 (E4)
1/2SI8835	B	2	M-61-3 (136-3)	C4 (C5)
1/2SI8840	B	2	M-61-3 (136-3)	B4 (B5)

FUNCTION(S):

The SI8802 valves are the Safety Injection to the Reactor Coolant System (RCS) hot leg (1A/1D, 1B/1C) isolation valves. The SI8806 valves are the A and B train SI pump suction isolation valves from the RWST. The SI8809 valves are the Residual Heat Removal (RHR) pumps to RCS cold leg isolation valves. The SI8813 valves are the SI pumps common mini-flow recirculation isolation valves. The SI8835 valves are the SI pumps cold leg isolation valves. The SI8840 valves are the RHR to RCS hot legs 1A/1D isolation valves.

JUSTIFICATION:

The safety injection system SVAG (Spurious Valve Actuation Group) valves 1/2SI8802A/B, 1/2SI8806, 1/2SI8809A/B, 1/2SI8813, 1/2SI8835, and 1/2SI8840 cannot be stroke tested during unit operation. These valves are required by Technical Specification 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 OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-14

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2RY455A	B	1	M-60-5(135-5)	C8(C8)
1/2RY456	B	1	M-60-5(135-5)	D8(D8)

FUNCTION(S):

Pressurizer Power Operated Relief Valves are required to open for low temperature overpressure protection. The closed function is for pressure isolation.

JUSTIFICATION:

PORV's 1/2RY455A and 1/2RY456 will be stroke/fail safe tested on a cold shutdown frequency per Generic Letter 90-06. This recommendation comes from Enclosure A to Generic Letter 90-06, which addresses the NRC staff positions concerning PORV and Block Valve Reliability. Item number 3.1.2 states that the "Stroke testing of PORVs should only be performed during mode 3 (HOT STANDBY) or mode 4 (HOT SHUTDOWN) and in all cases prior to establishing conditions where the PORVs are used for low-temperature overpressure protection. Stroke testing of the PORV's should not be performed during power operation." For this reason, these valves will be stroke time tested/fail-safe tested during cold shutdowns in accordance with OM-10, paragraph 4.2.1.2 and Generic Letter 90-06. The actual test mode will be MODE 3 or 4, as the Technical Specifications require full cycle operation in MODE 3 or 4 once per 18 months. This is accomplished before entering MODE 5 during plant shutdowns per station administrative procedures.

COLD SHUTDOWN JUSTIFICATION NUMBER: VC-15

NOT USED AT BRAIDWOOD

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COLD SHUTDOWN JUSTIFICATION:
VC-16

NOT USED AT BRAIDWOOD

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COLD SHUTDOWN JUSTIFICATION
VC-17

NOT USED AT BRAIDWOOD

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COLD SHUTDOWN JUSTIFICATION
VC-18

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2RH8716A	B	2	M-62(M-137)	D8(E1)
1/2RH8716B	B	2	M-62(M-137)	C8(D1)

FUNCTION(S):

These valves are the Residual Heat Removal system cross connect valves that are required to be open to allow injection into all four RCS loops. Both A and B valves are required to be open for train operability of either train of RHR. The valves are required to be closed during cold leg recirculation and open during hot leg recirculation.

JUSTIFICATION:

Technical Specifications require these valves to be open. Stroking either valve closed would make both trains of RH inoperable, which is a violation of the Technical Specification. They can only be exercised during cold shutdown or refuel. These valves will be stroke timed closed and open during cold shutdowns in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-19

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CC9415	B	3	M-66-4D	C6(C3)

FUNCTION(S):

Motor Operated Valves 1/2CC9415 are in the supply line to the RCPs and other non-essential Component Cooling Water loads. They close to isolate non-essential loads from essential loads during accident conditions. Additionally, these valves may need to be reopened to cool the Excess Letdown HX to maintain control of pressurizer level during a post accident scenario.

JUSTIFICATION:

This valve cannot be stroked during normal operations because it would isolate flow to the Reactor Coolant Pumps. Failure of one of the CC valves in a closed position during an exercise test would result in a loss of cooling flow to the pumps and eventual pump damage and/or trip. Therefore, these valves will be stroke tested during cold shutdowns, in accordance with OM-10, paragraph 4.2.1.2 provided all of the RCPs are shutdown. This test frequency will adequately maintain these valves in a state of operational readiness by testing them as often as safely possible.

COLD SHUTDOWN JUSTIFICATION
VC-20

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2FW036A	C	2	M-36-1C(M-121-1B)	E3(E3)
1/2FW036B	C	2	M-36-1A(M-121-1A)	E3(E3)
1/2FW036C	C	2	M-36-1D(M-121-1C)	E3(E3)
1/2FW036D	C	2	M-36-1B(M-121-1C)	E3(E3)

FUNCTION(S):

The feedwater tempering flow check valves (1/2FW036A-D) 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 IST function is to close to provide an immediate isolation during a feedwater line break accident to mitigate a loss of secondary make-up and/or inventory.

JUSTIFICATION:

The 1/2FW036A-D are 3" 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 as its needed to maintain subcooling on the nozzle used for Auxillary Feedwater. Also, flow/pressure is always toward the Steam Generators 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 in accordance with OM-10, paragraph 4.3.2.2.

COLD SHUTDOWN JUSTIFICATION
VC-21

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1(2)SI8808A	B	1	M 61(136)-5	C6 (C3)
1(2)SI8808B	B	1	M 61(136)-5	C4 (C6)
1(2)SI8808C	B	1	M 61(136)-6	C7 (D2)
1(2)SI8808D	B	1	M 61(136)-6	C5 (D4)

FUNCTION(S):

The 1/2SI8808A-D valves are Motor Operated Safety Injection Accumulator Discharge Isolation Valves. These valves are OPEN with Power Removed for Modes 1, 2, and 3 with Pressurizer Pressure above 1000 psig in accordance with the Braidwood Technical Specifications. These valves were included in the IST Program for their need to be closed after all of the water in the Accumulator has been injected into the RCS. Closure of these valves would prevent injection of a Nitrogen bubble into the RCS. These valves are included in the IST Program for testing in both OPEN and CLOSED directions.

JUSTIFICATION:

Technical Specifications requires "The (Accumulator) isolation valve open and power removed." while in Modes 1, 2 or 3 (with pressurizer pressure above 1000 psig).

Since the Technical Specifications require these valves to be OPEN with power to their motor operators removed during periods when pressurizer pressure is above 1000 psig, the valves cannot be exercised every three months. In lieu of stroke time testing the valves every three months, these valves will be tested during heatup or cooldown (the pressure transition between 800 and 1000 psig pressurizer pressure) or, they will be tested with the RCS depressurized and the associated accumulator vented and drained. This cold shutdown testing frequency is in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-22

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1(2)CV8355A	B	2	M 64(138)-1	B8 (B8)
1(2)CV8355B	B	2	M 64(138)-1	B4 (B4)
1(2)CV8355C	B	2	M 64(138)-2	B8 (B8)
1(2)CV8355D	B	2	M 64(138)-2	B5 (B5)

FUNCTION(S):

The CV8355 valves are Motor Operated Isolation valves in the seal injection line to the Reactor Coolant Pumps. Additionally, the CV8355s are designated Containment Isolation valves but are exempt from Local Leak Rate Testing of 10 CFR 50, Appendix J. The CV8355s have no automatic closure function as part of Containment Isolation.

JUSTIFICATION:

Reactor Coolant Pumps (RCPs) are required to be in operation in Mode 1, Power Operation. Seal injection flow must be maintained when the RCPs are running. Interruption of seal injection flow with the RCPs in operation, even for a short duration, is detrimental to the RCP seals. The above listed valves are Seal Injection Inlet valves and are designated Containment Isolation valves (CIVs).

The 1/2CV8355A-D valves are exempt from Local Leakage Rate testing of 10 CFR 50, Appendix J, but due to their designation as CIVs, they will be tested per ASME Code in the Closed direction. Due to the above, these valves will not be exercised during plant operation, but they will be exercised during Cold Shutdown when the RCPs are not running. Short duration forced outages to Cold Shutdown seldom require shutdown of RCPs as they are part of the normal heat removal loop. It is not the intent of this justification to require RCP shutdown only to perform the exercise tests for these valves. It is anticipated that these valves may not normally be tested more often than once per refueling outage. However, these valves will be tested during cold shutdowns in which the RCPs are secured for sufficient time to perform the tests, which is in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION NUMBER VC-23

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1SD054A	B	2	M 48-5A	D8
1(2)SD054B	B	2	M 48-5A(5B)	D7 (D8)
1SD054C	B	2	M 48-5A	D6
1(2)SD054D	B	2	M 48-5A(5B)	D6 (D6)
1SD054E	B	2	M 48-5A	D5
1(2)SD054F	B	2	M 48-5A(5B)	D4 (D4)
1SD054G	B	2	M 48-5A	D3
1(2)SD054H	B	2	M 48-5A(5B)	D2 (D2)

FUNCTION(S):

The SD054 valves are normal Steam Generator Blowdown throttle control valves. An additional function of the Unit 1, (A through H valves) and the Unit 2, (B train valves [B, D, F, & H]) is to isolate Blowdown in the event of a High Energy Line Break (HELB) in the SD system.

JUSTIFICATION:

It is impractical to exercise and stroke time the above listed valves on a quarterly basis. The valves have no Open / Closed handswitch. They are normally operated by means of a potentiometer which ultimately controls an air signal to a positioner. Attainment of repeatable stroke time results requires the valves to be stroked by causing (or simulating) HELB relay actuation. This method of closure causes multiple valve actuations resulting in complete steam generator blowdown isolation. Furthermore, the remote position indicator, (a 0-100% indicator - not based on limit switch operation) may lag actual valve position. Therefore the only repeatable method of stroke timing these valves involves stationing personnel locally at the valve(s) to witness actual valve movement.

Full stroke exercising the valves is a Unit operation concern in that closure of these valves during normal operation presents a thermal transient to the downstream piping and components including the blowdown condenser. While the valves, piping, and components are designed to withstand this thermal transient, each transient produces stress which may lead to premature failure of the affected components. It is prudent to minimize the number of thermal transients that these high energy lines are required to undergo.

COLD SHUTDOWN JUSTIFICATION
VC-23

JUSTIFICATION: (continued)

Personnel safety concerns exist with this stroking exercise during normal operation in that the valves are physically located in the Main Steam Isolation (MSIV) Valve Room, off the Steam Tunnel. This room contains the MSIVs, Feedwater Isolation Valves (FWIVs), Main Steam Safety Valves, Main Steam PORVs, and other miscellaneous piping and valves. The normal ambient temperature in this room with the Unit at power is greater than 110 °F. Almost all of the piping (most of which is insulated) and instrument tubing in the room are normally at temperatures of approximately 500 °F or more. The SD054 valves are located above the floor some 16 to 20 feet and are not visible from the floor being obscured by Main Steam and Feedwater Piping. Since personnel must be stationed locally at the valve to witness actual valve movement, it is necessary to climb around very hot piping in a hot and very noisy ambient atmosphere. In some cases it may be necessary to erect scaffolding to conduct this test with the Unit in normal operation.

Due to the above, these valves will be stroke time/fail safe tested during Cold Shutdowns of sufficient duration to allow safe access to the valves, including the erection of scaffolding, if required. This testing frequency is in accordance with OM-10, paragraph 4.2.1.2.

COLD SHUTDOWN JUSTIFICATION
VC-24

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2VQ001A	A	2	M-105-1 (M-106-1)	E5(E5)
1/2VQ001B	A	2	M-105-1 (M-106-1)	E6(E6)
1/2VQ002A	A	2	M-105-1 (M-106-1)	E4(E4)
1/2VQ002B	A	2	M-105-1 (M-106-1)	E3(E3)

FUNCTION(S):

The 1/2VQ001A/B valves are the containment purge supply isolation valves. The 1/2VQ002A/B valves are the containment purge exhaust isolation valves. They were designed to purge containment under normal shutdown conditions. The IST function of closure is for containment isolation.

JUSTIFICATION:

The Primary Containment Purge Supply and Exhaust Valves, 1/2VQ001A/B and 1/2VQ002A/B, cannot be stroke time tested 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 modes 5 or 6 would be a violation of Braidwood Technical Specifications, in which it states that in modes 1-4, the valves "..shall be closed and power removed." Administratively, these valves are maintained Out of Service Closed in a blocked closed condition.

As a containment isolation valve, the closure function is considered to be operable. The valves are leak tested in accordance with Technical Specifications every 6 months on a staggered basis and a monthly verification is performed to verify that these valves are closed and power is removed. The monthly verification is completed by verifying the closed indication of the Group 6 monitor lights in the control room and that each power supply is off. However, if re-positioning this valve is necessary and the valve needs to be considered operable in association with exercising capabilities of it, then the IST stroke time testing and remote position indication testing will be completed prior to declaring the valve operable per OM-10, paragraph 4.3.2.5. It is anticipated that the necessary stroke time testing of these valves will be very infrequent, if at all, in the future.

TEST FREQUENCY:

The 1/2VQ001A/B and 1/2VQ002A/B valves will be stroke time tested during cold shutdowns, as necessary, to declare the valve exercising capabilities operable, in accordance with OM-10, paras. 4.2.1.2 and 4.3.2.5.

SECTION 3.4

VALVE REFUELING OUTAGE JUSTIFICATIONS

3.4.1 Valve Refueling Outage Justification Summary

Number	Component	Description
ROJ-1	1/2SI8922A/B; 1/2SI8926	Full Stroke Test (CT) and Backflow Test (Bt) during Refueling Outages and Partial Stroke (Xt) 1/2SI8926 Quarterly
ROJ-2	1/2SI8948A-D; 1/2SI8956A-D	Full Stroke Test (Ct) and Backflow Test (Bt) during Refueling, and Partial Stroke Test (Xt) of 1/2SI8948A-D during Cold Shutdown
ROJ-3	1/2CC9458; 1/2CC9459A/B; 1/2CC9467A-C	All Valves Manually Stroke Tested (St) in preparation/ during each U-2 Refueling
ROJ-4	1/2SI8811A/B	Stroke Time Tested (St) during Refueling
ROJ-5	1/2IA065; 1/2IA066; 1/2IA091	Stroke Time Test (St) and Fail Safe Test Closed (Fc) of 1/2IA065 and 1/2IA066 during Refueling, and Full Stroke (Ct) and Backflow Test (Bt) of 1/2IA091 during Refueling
ROJ-6	1/2SI8819A-D; 1/2SI8905A-D; 1/2SI8949B,D	All Valves Full Stroke (Ct) and Backflow Tested (Bt) during Refueling
ROJ-7	1/2CV8481A/B; 1/2CV8546; 1/2SI8815; 1/2SI8900A-D	All Valves Full Stroke (Ct) and Backflow Tested (Bt) during Refueling, and the 1/2CV8481A/B Valves are Partial Stroke Tested (Xt) Quarterly.
ROJ-8	1/2SI8841A/B; 1/2SI8949A,C	Full Stroke (Ct) and Backflow Test (Bt) during Refueling
ROJ-9	1/2RH8705A/B	Full Stroke (Ct) and Backflow Test during Refueling
ROJ-10	1/2FP345	Backflow Test (Bt) during Refueling
ROJ-11	1/2CV8348	Backflow Test (Bt) during Refueling
ROJ-12	1/2CV8368A-D	Backflow Test (Bt) during Refueling

3.4.1 Valve Refueling Outage Justification Summary (continued)

Number	Component	Description
ROJ-13		Not used at Braidwood
ROJ-14	1/2FW510A; 1/2FW520A; 1/2FW530A; 1/2FW540A; 1/2FW510; 1/2FW520; 1/2FW530; 1/2FW540; 1/2FW034A-D	Augmented Fail-Safe Test Closed (Fc) during Refueling
ROJ-15	1/2AF001A/B	Backflow Test (Bt) at each Refueling Outage. Partial Stroke (Xt) Quarterly and Full Stroke (Ct) during Cold Shutdown
ROJ-16	1/2PR032	Backflow Test (Bt) during Refueling
ROJ-17	1/2PS231A/B	Backflow Test (Bt) during Refueling
ROJ-18	1/2RY8046 1/2RY8047	Backflow Test (Bt) during Refueling
ROJ-19	1/2WO007A/B	Backflow Test (Bt) during Refueling
ROJ-20	1/2CV8100 1/2CV8112 1/2CV8113	Full Stroke (Ct) and Backflow (Bt) Test 1/2CV8113 during Refueling. Stroke Time Test (St) 1/2CV8100 and 1/2CV8112 during Refueling or Cold Shutdown when all four RCPs are not running
ROJ-21	1/2CC685 1/2CC9413A 1/2CC9414 1/2CC9416 1/2CC9438 1/2CC9518	BackflowTest (Bt) Check Valves 1/2CC9486 during Refueling. Full Stroke (Ct) and Backflow Test (Bt) 1/2CC9518 and 1/2CC9534 during Refueling. Stroke Time Test (St) all solation 1/2CC9486 Valves at planned Cold 1/2CC9534 Shutdowns with no RCPs running or during each Refueling
ROJ-22	1/2CV8440	Backflow Test (Bt) during Refueling using non-intrusives

3.4.1 Valve Refueling Outage Justification Summary (continued)

Number	Component	Description
ROJ-23	1/2PR002G 1/2PR002H	Backflow Test (Bt) during Refueling with Leakage Test (Lt)
ROJ-24	1/2SI8968	Backflow Test (Bt) during Refueling with Leakage Test (Lt)
ROJ-25	1/2WM191	Backflow Test (Bt) during Refueling with Leakage Test (Lt)

REFUELING OUTAGE JUSTIFICATION
ROJ-1

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2SI8922A	C	2	M-61-1A(M-136-1)	E4(E5)
1/2SI8922B	C	2	M-61-1A(M-136-1)	E7(D4)
1/2SI8926	C	2	M-61-1A(M-136-1)	C7(B4)

FUNCTION(S):

Check Valves 1/2SI8922A, B are located on the Safety Injection pumps discharge line. They are required to open for ECCS injection and recirculation phases.

Check valves 1/2SI8926 are located on the SI pumps' suction line from the RWST. They are required to open for the ECCS injection phase. They are required to close to prevent backflow from the Safety Injection (SI) pump suction line to the Refueling Water Storage Tank (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. The SI8806 MOV is in series with this check valve, and would be closed to prevent the reverse flow. The closure function for 1/2SI8926 was conservatively added to the IST Program.

JUSTIFICATION:

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. Backflow testing during operation requires configurations of the system which is impractical except for during refueling outages.

TEST FREQUENCY:

These valves will be full-stroke tested and tested for closure during refueling outages, in accordance with OM-10 Paragraph 4.3.2.2. Additionally, 1/2SI8926 check valves will be partial stroke tested quarterly during the mini-flow recirculation pump runs.

REFUELING OUTAGE JUSTIFICATION
ROJ-2

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2SI8948A	AC	1	M-61-5(M-136-5)	B7(B2)
1/2SI8948B	AC	1	M-61-5(M-136-5)	B4(B5)
1/2SI8948C	AC	1	M-61-6(M-136-6)	A8(B1)
1/2SI8948D	AC	1	M-61-6(M-136-6)	A5(B4)
1/2SI8956A	AC	1	M-61-5(M-136-5)	B7(B3)
1/2SI8956B	AC	1	M-61-5(M-136-5)	B4(B6)
1/2SI8956C	AC	1	M-61-6(M-136-6)	A8(B2)
1/2SI8956D	AC	1	M-61-6(M-136-6)	A5(B4)

FUNCTION(S):

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 10" check valves have safety functions in both the open and closed directions. The open direction safety function of these check valves is to permit the injection of borated water into the reactor vessel cold legs during the passive injection phase of a safety injection. The closed safety function of the 1/2SI8956A-D check valves is to maintain the Reactor Coolant Pressure Boundary (RCPB). The closed safety function of the 1/2SI8948A-D check valves is to provide a redundant (back-up to the 1/2SI8956A-D, 1SI8918A-D, and 1/2SI8819A-D) Reactor Coolant Pressure Boundary (RCPB).

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.

Check valves 1/2SI8956A-D cannot be full or partial tested during unit operation due to the pressure differential between the accumulators (650 psig) and the reactor coolant system (2235 psig). Full or partial stroke exercising of these valves could occur only with a rapid depressurization of the reactor coolant system.

Check valves 1/2SI8948A-D cannot be full or partial stroke tested during unit operation without depressurizing the RCS to 1600 psig (to stroke using Safety Injection pumps) or to 200 psig (to use the Residual Heat Removal pumps).

REFUELING OUTAGE JUSTIFICATION
ROJ-2

JUSTIFICATION: (continued)

Full stroking these valves during cold shutdowns, routine or forced, would impose 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 approximately 100 psi over RCS pressure.

An additional concern with testing is that at or near end-of-core life, the boron concentration of the RCS is low compared to the approximate 2300 ppm concentration of the accumulators. This injection test requires that approximately 8 thousand gallons of this borated 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 restoration time and in amounts of radioactive water rejected from the site. The cost of nitrogen required to test these valves is at least $2,500, and although not quantified, the cost of processing the Reactor Coolant to restore the optimum boron concentration are not inconsequential.

Braidwood will use one of two methods to full stroke these valves during refueling outages. The method to be used depends on whether the testing is done with the reactor head on or off the reactor vessel. The methods are as follows:

> Method one (usually to be used with reactor head off): Flow is passed through the valves by discharging the accumulators. With the reactor head off, it is difficult to verify that the flow rate is greater than the determined flow rate needed to full open the check valves. As the flow value is not determined when using this method, acoustic testing is performed on all four SI8948 check valves and SI8956 check valves of the unit being tested. The primary acoustic method which is used is 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.
>
> This method was previously evaluated and approved in relief request VR-5 of Revision 7 of the first ten year interval IST Program.

REFUELING OUTAGE JUSTIFICATION
ROJ-2

JUSTIFICATION: (continued)

Method two (usually to be used with the reactor head on): With the reactor vessel head on, flow can be injected into the pressurizer. When injecting into the pressurizer, a flow rate can be calculated. The full stroke test is accomplished by opening the flowpath to the RCS by stroking the respective SI8808 valve open, and then closed. During this discharging of the accumulator, strip chart recorders are used to obtain data that will be used to calculate the pressurizer level increase with time and verify that the flow that is passed through the respective SI8956 and SI8948 check valves is greater than a calculated full flow value for the check valves, or determined by other flow measuring devices.

As all four trains are verified to have passed a flow greater than the minimum flow required to physically open the check valves, the acoustic testing is performed on the check valves on one loop only. The test is successful if the flow is calculated to be greater than the minimum required to open the valves for all four loops, and this is confirmed by a successful acoustic test to verify that both the SI8956 and SI8956 check valves on one loop full stroke. The technique involves a sampling plan. The 1SI8948A-D, 1SI8956A-D, 2SI8948A-D, and 2SI8956A-D each represent their own sampling group since each set of valves are of the same size, model number and system function. One valve from each group for the unit being tested would be tested on a rotating basis. If a problem is found with the non-intrusively tested valve, then the remaining valves in that particular group will be acoustically tested during the same outage.

This method of utilizing a sampling plan on a rotating basis is consistent with NUREG 1482, Section 4.1.2. This Section of the NUREG states that relief is not required because this test (referring to non-intrusive techniques) is considered an acceptable "other positive means," even if used on a rotating schedule. The NUREG further goes on to state that the sampling is acceptable if all the valves in the group are flow tested. The NUREG also states that if implemented, this is to be documented in the IST Program. When using the sampling technique, Braidwood would be flow testing all four trains, hence the other valves would be flow tested. This refueling outage justification documents the use of this method as an option.

Successful completion of the seat leakage test will provide positive verification of closure (Bt). Therefore, backflow testing these valves will be on the same schedule as their required Technical Specification leak rate testing.

The partial stroke exercising of the 1/2SI8948 valves will be completed during cold shutdowns using the RH or SI pumps since there are alternate flowpaths available and it can be done with little or no effect on the RCS system. Partial stroking of the 1/2SI8956 valves will not be completed during cold shutdowns because the same test methodology used for the full stroke test would be required to perform the partial test.

REFUELING OUTAGE JUSTIFICATION
ROJ-2

TEST FREQUENCY:

Braidwood Station will full stroke exercise (CT) the 1/2SI8948A-D and 1/2SI8956A-D check valves during each respective U-1 or U-2 refueling outage in accordance with either method 1 or method 2. The backflow test will be performed in accordance with Braidwood Technical Specifications, at least once per refueling outage. The 1/2SI8948 valves will be partially stroke tested during cold shutdowns in accordance with OM-10, paragraph 4.3.2.2

When using method 2 for the full storke, the 1SI8948A-D, 1SI8956A-D, 2SI8948A-D, and 2SI8956A-D valves each represent their own sampling group since each set of valves are of the same size, model number and system function. Under the sampling program, one valve will be nonintrusively tested per group (one SI8948 valve and one SI8956 valve per outage), on a rotating schedule, while the balance of the plant groups will be flow tested with less than accident flow. If a problem is found with the nonintrusively tested valve, then the remaining three valves in that particular group will be checked using nonintrusives during the same outage.

REFUELING OUTAGE JUSTIFICATION
ROJ-3

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CC9458	B	3	M-66-3B	C6(C3)
1/2CC9459A	B	3	M-66-3A	D6(D3)
1/2CC9459B	B	3	M-66-3A	D5(D4)
1/2CC9467A	B	3	M-66-4D	C6(C3)
1/2CC9467B	B	3	M-66-4D	C5(C3)
1/2CC9467C	B	3	M-66-3B	D6(D2)

FUNCTION(S):

1/2CC9458: CC pump Discharge Header Manual Isolation Valves which may provide for train separation in a post accident situation.

1/2CC9459A: CC Pump Suction Header Crosstie Manual Isolation valves which may provide for separation/isolation of the CC system into two redundant trains during recirculation phase of RHR operation during a LOCA and other applicable accident modes.

1/2CC9459B: CC Pump Suction Header Crosstie Manual Isolation valves which may provide for separation/isolation of Unit 1 and Unit 2 CC systems during normal cooldown and recirculation phase of RHR operation.

1/2CC9467A: CC heat exchanger Outlet Header Crosstie Manual Isolation Valves which provide for possible manual isolation of flow to the unit normal plant loads if the respective CC9415 valve fails open.

1/2CC9467B: CC Heat Exchanger Header Crosstie Manual Isolation Valves which may provide for train separation while the subject unit undergoes Post LOCA cooldown. Provides separation/isolation of Unit 1 and Unit 2 CC systems during normal cooldown and recirculation phase of RHR operation.

1/2CC9467C: CC Supply Header Crosstie Manual Isolation Valve which may need to be called upon due to a single failure within the CC system configuration.

REFUELING OUTAGE JUSTIFICATION
ROJ-3 (continued)

JUSTIFICATION:

General Information:

This refueling outage justification will address the 1(2)CC9459B and 1(2)CC9467B in more detail than the other valves in this justification (CC9458, CC9459A, CC9467A, and CC9467C); as these other valves are less safety significant within the CC system. None of these remaining valves would function as a primary means of mitigating an accident, and none of them are considered "active" valves per UFSAR Table 3.9.16. The reason for their inclusion is the possibility that they may be called upon following a single failure within the CC system. In addition, there are several other "maintenance" type valves that would also be available for isolation purposes. In a post accident situation, there are no specific directions taken within the CC system. If a malfunction were to occur, operators would be dispatched and the problem isolated as required. Braidwood conservatively added these valves to the program due to the uniqueness of the CC system and to address possible concerns about the valves' ability to isolate. In addition, Braidwood will be exercising these valves on the same frequency as the CC9459B and CC9467B valves. There would be no value added and it would be impractical to exercise them on a more frequent basis. The following is specific information concerning the valves in this refueling outage justification.

Specific Information

a. 1/2CC9459B and 1/2CC9467B

Manual valves 1/2CC9459B and 1/2CC9467B are used to provide train separation and/or isolation of the Component Cooling Water (CCW) System. More specifically, they are aligned to place the Unit 0 Heat Exchanger and Pump on the Unit 1 or Unit 2 side of CCW to ensure adequate cooling during shutdowns and/or Post-Accident.

REFUELING OUTAGE JUSTIFICATION
ROJ-3

JUSTIFICATION: (continued)

Exercising these valves presents a concern for the equipment cooled by the CCW System. The CCW system is a 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 oscillation 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 (RCP) thermal barrier Component Cooling Water return valve, autocloses on high flow, which would result in a loss of flow to the RCP thermal barriers. The CC685 valve could potentially close during the exercising of the CC manual valves, due to the upset flow conditions. Exercising the CC manual valves quarterly is impractical for the reasons presented above.

These valves require very careful plant monitoring and a considerable amount of time to physically exercise. The normal practice at Braidwood for the CCW System is to align the Unit 0 heat exchanger and Unit 0 Pump to the Unit going into a refueling outage. This is normally not done when going into a Cold Shutdown. As a result, the most practical method of exercising these valves is to exercise them during or shortly before a refueling outage, at which time the Unit 0 heat exchanger and Unit 0 pump are aligned to the Unit in the refueling outage.

REFUELING OUTAGE JUSTIFICATION
ROJ-3

JUSTIFICATION: (continued)

b. 1/2CC9467A

Exercising these valves quarterly is impractical. One function of these valves is to serve as another means of isolating flow to the normal plant loads in a post-accident situation in the event that the respective CC9415 valve were to fail open. Due to its function, it is an undesirable practice to exercise these manual valves during normal operations. Closing this valve for a particular Unit, with the Unit 0 heat exchanger and pump aligned to that Unit, would divert CC flow through the Unit 0 heat exchanger which may cause disruptions within the CC system. If the valve is closed at a time when the Unit 0 heat exchanger and pump are not aligned to the Unit, it would interrupt flow to the normal plant loads.

It is impractical to induce the disruptions described above during normal operations. Additionally, finding an appropriate window to stroke these valves during a cold shutdown could possibly result in an extension of the cold shutdown and there would be no compensated increase in plant safety. The most practical alternative method is to exercise these valves at the same frequency (within the same procedure) as valves 1/2CC9459B and 1/2CC9467B.

c. 1/2CC9458, 1/2CC9459A, and 1/2CC9467C

Exercising these valves introduces possibilities of disrupting the CC system. There would be instances in which pumps may need to be swapped, or further re-routing of flow may be necessary due to other misc. work being performed throughout the system.

For reasons justified in the general section and throughout this refueling outage justification, it is more practical to exercise these manual valves at the same frequency as described for the manual valves in Part a and Part b of this refueling outage justification.

Conclusions:

To conclude, the most practical method of exercising all the CC manual valves included in this justification is to test all of them under the same procedure, under carefully controlled conditions, to ensure that all necessary precautions/actions are taken. To test them in a different manner would be impractical.

REFUELING OUTAGE JUSTIFICATION
ROJ-3 (continued)

TEST FREQUENCY:

The 1(2)CC9459B and 1(2)CC9467B valves will normally be exercised in one direction in preparation for the Unit going into the refueling outage, to align the Unit going into the outage to the Unit 0 heat exchanger and Unit 0 pump. Subsequently, when the opposite Unit then goes into a refueling outage the valves will again be exercised in one direction (the opposite direction). An exception to stroking it during a refueling outage would be if for other reasons it was required or desirable to align the Unit 0 heat exchanger and pump to a Unit prior to its refueling outage. The valves would then be exercised at that time, and not necessarily during the refueling outage. The remaining valves in this refueling outage justification will normally be exercised within the same procedure. This test frequency meets the intent of OM-10, paragraph 4.2.1.2(e).

REFUELING OUTAGE JUSTIFICATION
ROJ-4

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2SI8811A	B	2	M-61-4(M-136-4)	B5(B6)
1/2SI8811B	B	2	M-61-4(M-136-4)	A5(A6)

FUNCTION(S):

These normally closed motor operated gate valves are located on the Containment Recirculation Sump discharge line. The valves are required to be closed during the injection phase of ECCS along with functioning as a containment isolation valve. These valves are required to open during the recirculation phase of ECCS.

JUSTIFICATION:

The stroke time testing of the 1/2SI8811A/B valves require the suctions of the Residual Heat Removal Pumps to be drained, thus rendering the train that is being tested inoperable. The stroke time testing of these valves during unit operation would be clearly impractical due to the extensive activities required to perform this testing, along with rendering a subsystem of ECCS (RHR) inoperable for an extended period of time (placing the plant in an undesirable condition).

The routine testing of these valves during cold shutdowns is also impractical for the following reasons:

1. For a cold shutdown in which the Reactor Coolant Loops remain filled and there is one train of Residual Heat Removal declared inoperable, Braidwood Station's Technical Specifications require the secondary side narrow range water level to be sufficient to provide a viable heat sink. 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 Specifications would preclude the testing of the containment sump outlet isolation valves until such time as the affected steam generators had been refilled.

2. 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 Specifications 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."

REFUELING OUTAGE JUSTIFICATION
ROJ-4

JUSTIFICATION: (continued)

3. The full stroke testing of the 1/2SI8811A, B valves; in conjunction with system draining, filling and venting 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 Technical Specifications. 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.

4. 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 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.

TEST FREQUENCY:

The 1/2SI8811A/B valves will be stroke timed during refueling outages in accordance with OM-10, paragraph 4.2.1.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-5

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2IA065	A	2	M-55-4(M-55-5)	D3(E6)
1/2IA066	A	2	M-55-4(M-55-5)	D6(E4)
1/2IA091	AC	2	M-55-4(M-55-5)	E5(E5)

FUNCTION(S):

Air Operated Valves 1/2IA065 and 1/2IA066 are the outboard and inboard (respectively) air operated containment isolation valves for Instrument Air supply lines to containment. The closed safety function of these valves is to provide a leak-tight barrier between the containment atmosphere and the environment during accident conditions.

Check Valves 1/2IA091 are located on the air supply lines to the 1/2IA066 valves (inboard containment isolation valves). The safety function of the 1/2IA091 valves in the closed direction is to provide a leak-tight barrier between the containment atmosphere and the environment during accident conditions (see Note 1). The function in the open direction is to supply control air to the 1/2IA066 valves. The open full stroke test of the 1/2IA091 valves is satisfied by the open stroke test of the 1/2IA066 valves.

JUSTIFICATION:

Stroke/fail-safe testing of the 1/2IA065 and 1/2IA066 valves (and full stroke testing of the 1/2IA091 valves upon re-opening of the 1/2IA066 valves) during plant operation or cold shutdowns would, by design, isolate the air to air operated instruments inside the containment building. This would introduce the possibility of major operating perturbations and/or personnel safety concerns should these valves fail to re-open during testing activities. This would result in scenarios such as:

1. 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. There will also be a loss of air supply to the PORV accumulators.

REFUELING OUTAGE JUSTIFICATION
ROJ-5

JUSTIFICATION: (continued)

2. 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 1/2CV8149A, B & C, the excess letdown heat exchanger inlet isolation valves 1/2CV8153A & B, and the regenerative 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.

3. 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.

4. 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 close 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 environment.

TEST FREQUENCY:

Air Operated Valves 1/2IA065 and 1/2IA066 will be stroke tested and fail safe tested (and subsequently 1/2IA091 full stroke tested with the open stroke time test of the 1/2IA066 valves) during refueling outages on the respective unit in accordance with OM-10, paragraphs 4.2.1.2 and 4.3.2.2. The backflow test of 1/2IA091 will be done during refueling outages in conjunction with the Appendix J leakage test.

REFUELING OUTAGE JUSTIFICATION
ROJ-6

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2SI8819A	AC	1	M-61-3(M-136-3)	A5(B4)
1/2SI8819B	AC	1	M-61-3(M-136-3)	A7(B2)
1/2SI8819C	AC	1	M-61-3(M-136-3)	A6(B2)
1/2SI8819D	AC	1	M-61-3(M-136-3)	A6(B3)
1/2SI8905A	AC	1	M-61-3(M-136-3)	E4(E4)
1/2SI8905B	AC	1	M-61-3(M-136-3)	D7(D2)
1/2SI8905C	AC	1	M-61-3(M-136-3)	C7(C2)
1/2SI8905D	AC	1	M-61-3(M-136-3)	E4(E5)
1/2SI8949B	AC	1	M-61-3(M-136-3)	D8(D1)
1/2SI8949D	AC	1	M-61-3(M-136-3)	E8(E1)

FUNCTION(S):

The above valves which are designated as category "AC" are pressure isolation valves (PIVs) and will be leak tested (and backflow tested) per Braidwood Station Tech Specs.

Check valves 1/2SI8819A-D 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 vessel cold legs during a safety injection.

Check valves 1/2SI8905A-D and 1/2SI8949B/D are located in the lines going from the Safety Injection pumps to the reactor vessel hot legs. Their safety function in the open direction is to permit flow of coolant to the reactor vessel hot legs during the Hot Leg Recirculation portion of a safety injection.

All of these check valves have a closed safety function to maintain the reactor coolant pressure boundary (PIV).

REFUELING OUTAGE JUSTIFICATION
ROJ-6 (continued)

JUSTIFICATION:

These valves cannot be full stroke exercised open during operation as the shut-off head of the Safety Injection pumps is lower than the reactor coolant system pressure. These valves cannot be full stroke exercised during routine MODE 5 cold shutdowns due to the Braidwood Station Technical Specification requirement that all Safety Injection pumps and all but one Charging pump be inoperable during MODES 4, 5, and 6 (temperature less than 350 F), except when the reactor vessel head is removed (mode 6 refueling outages only). This requirement minimizes the possibility of low temperature overpressurization (LTOP) of the Reactor Coolant System (RCS). 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. Full stroke exercising of these valves may only be safely performed in Mode 6 with the Reactor vessel head removed.

TEST FREQUENCY:

These valves will be full stroke (Ct) exercised and backflow (Bt) tested during refueling outages in accordance with OM-10, paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-7

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CV8481A	C	2	M-64-3A(M-138-3A)	D6(D6)
1/2CV8481B	C	2	M-64-3A(M-138-3A)	C6(C7)
1/2CV8546	C	2	M-64-4B(M-138-4)	B5(A5)
1/2SI8815	AC	1	M-61-2(M-136-2)	D5(D4)
1/2SI8900A	AC	1	M-61-2(M-136-2)	E7(E2)
1/2SI8900B	AC	1	M-61-2(M-136-2)	D7(D2)
1/2SI8900C	AC	1	M-61-2(M-136-2)	C7(C2)
1/2SI8900D	AC	1	M-61-2(M-136-2)	B7(B2)

FUNCTION(S):

All of the "AC" category valves in this refueling outage justification are pressure isolation valves (PIVs) and will be leak tested (and backflow tested) per Braidwood Station Technical Specifications.

Check valves 1/2SI8815 are located in the lines from the Chemical and Volume Control (CV) Centrifugal Charging pump. Their safety function in the open direction is to permit flow of coolant from the centrifugal charging pumps to the four lines which branch off and provide flow to the reactor vessel cold legs during the high pressure injection phase of a safety injection. 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).

Check Valves 1/2SI8900A-D are in the four lines which branch off from the lines containing the 1/2SI8815 valves. 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 vessel cold legs during the high pressure injection phase of a safety injection. The safety function of these valves in the closed direction is to provide a reactor coolant pressure boundary.

Check valves 1/2CV8481A/B are located at the discharge of the Chemical and Volume Control charging pumps. They are required to open to permit flow of coolant during a safety injection. Their closed function is to prevent reverse flow from the charging header when the pump is not in operation.

Check valves 1/2CV8546 are located on the CV pumps' suction line from the RWST. They are required to open to permit flow of coolant when the charging pumps take suction from the RWST during a safety injection. They are required to close to prevent reverse flow from the Chemical and Volume Control (CV) pump suction line to the refueling water storage tank (RWST). This check valve would stop reverse flow when the CV pumps are transferred to hot/cold leg injection mode to prevent contamination of the RWST. The 1/2CV112D and 1/2CV112E MOVs are in series with this check valve and would also be closed to prevent reverse flow. The closure function of 1/2CV8456 was conservatively added to the IST Program.

REFUELING OUTAGE JUSTIFICATION
ROJ-7 (continued)

JUSTIFICATION:

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 thermal cycles imposed would exceed the allowable number for the Reactor Vessel nozzles. 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 check valves.

These valves cannot be full stroke exercised during routine mode 5 cold shutdowns due to Braidwood Station Technical Specifications requirements 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 (mode 6 of refueling outages only). This requirement minimizes the possibility of low temperature overpressurization (LTOP) of the Reactor coolant System (RCS). 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. 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 is consequential. Full stroke exercising of these valves may only be safely performed in Mode 6 with the Reactor vessel head removed.

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.

TEST FREQUENCY:

1/2SI8815 and 1/2SI8900A-D will be full stroke exercised (open-Ct; close-Bt) during refueling outages in accordance with OM-10, paragraph 4.3.2.2. They are verified closed in conjunction with the Technical Specification pressure isolation valve leakage test. Check valves 1/2CV8481A, B and 1/2CV8546 can not be full stroke exercised without causing stroking of 1/2SI8815 and 1/2SI8900A-D. Therefore, they will be fullflow (Ct) and backflow (Bt) tested in conjunction with the 1/2SI8815 and 1/2SI8900A-D full flow test. Additionally, the 1/2CV8481A/B check valves will be partial stroke tested quarterly.

REFUELING OUTAGE JUSTIFICATION
ROJ-8

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2SI8841A	AC	1	M-61-3(M-136-3)	E4(E4)
1/2SI8841B	AC	1	M-61-3(M-136-3)	C7(C2)
1/2SI8949A	AC	1	M-61-3(M-136-3)	E8(E1)
1/2SI8949C	AC	1	M-61-3(M-136-3)	C8(C1)

FUNCTION(S):

All of the "AC" category valves in this refueling outage justification are pressure isolation valves (PIVs) and will be leak tested (and backflow tested) per Braidwood Station Technical Specifications. This refueling outage justification will only include the open functions of all the check valves listed above.

Check valves 1/2SI8841A/B are located in the lines from the Residual Heat Removal (RHR) pumps to the "A" and "C" Reactor Coolant System hot legs. Their safety function 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.

Check Valves 1/2SI8949A/C are located in an ECCS line to the RCS "A" and "C" hot legs. They are required to open 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. The closed safety function of these valves is to maintain the reactor coolant pressure boundary.

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

JUSTIFICATION:

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 the low head developed by the RHR pumps (less than 250 psi) is not great enough to inject into the RCS (2235 psi). Similarly, the 1/2SI8949A/C check valves cannot be partial stroke tested during normal reactor operation with the Safety Injection (SI) pumps since the RCS pressure cannot be overcome by the SI pump developed head (1500 psi).

Full or partial stroke testing of these valves during cold shutdowns would induce thermal stresses on their respective reactor vessel nozzles as the Reactor Coolant System (maintained at approximately 180 F) is injected with water from the Refueling Water Storage Tank (maintained at approximately 65 F). Additionally, the margin of safety is reduced for brittle fracture prevention and an unacceptable reactivity excursion could be created (high boron concentration and low temperature water).

REFUELING OUTAGE JUSTIFICATION
ROJ-8

JUSTIFICATION: (continued)

Exercising these check valves 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. 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.

TEST FREQUENCY:

These valves will be full stroke exercised (Ct-open; Bt-closed) during refueling outages in accordance with OM-10, paragraph 4.3.2.2. The closure test is done in conjunction with the leak test.

REFUELING OUTAGE JUSTIFICATION
ROJ-9

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2RH8705A	AC	2	M-62(M-137)	D1(D8)
1/2RH8705B	AC	2	M-62(M-137)	C1(C8)

FUNCTION(S):

These valves are located on the 3/4" branch line between the 1/2RH8701A/B and 1/2RH8702A/B 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 between the two valves. Their safety function in the closed direction is to maintain the integrity of the reactor coolant pressure boundary, and it is a pressure isolation valve (PIV).

These check valves are leak tested in conjunction with pressure isolation valves (PIVs) 1/2RH8701B and 1/2RH8702B and will be leak tested (and backflow tested) at the same frequency as the 1/2RH8702B valves (see VC-5).

JUSTIFICATION:

These valves are simple spring loaded lift check valves and are not equipped with an external operator or disk position indicator. The only way to verify operability in the open direction is by verifying that the piping between the suction isolation valves is able to be depressurized through the applicable valve via a field test. It would be impractical to perform this testing during unit operation due to the necessity to enter containment, hook up a pressurized water source to the piping via a test/vent valve, and slowly increase the pressure until the check valve opens to relieve the pressure. Additionally, the RCS must be depressurized in order to perform this test.

It would be impractical to perform this test during cold shutdowns as it requires placing the standby train of Residual Heat Removal (RHR) in an inoperable condition and the RCS must be depressurized (requires all reactor coolant pumps to be stopped). Then, due to the extensive field work involved, there is a potential for delaying reactor start up and return to power. Additionally, taking away the backup/redundant train of RHR reduces both the plant decay removal capability and the available safety margin regarding shutdown risk assessment.

The 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.

REFUELING OUTAGE JUSTIFICATION
ROJ-9 (continued)

TEST FREQUENCY:

The 1/2RH8705A, B check valves will be full stroke exercised 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 in accordance with OM-10 paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-10

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	COORDINATE
1/2FP345	C	2	M-52-1(M-52-1)	E7(E2)

FUNCTION(S):

These check valves are in the line from the Fire Protection System to Containment. The open function allows Fire Protection Water to reach the Containment building (non-IST). The closed function (the subject of this justification), is for containment isolation.

JUSTIFICATION:

These valves are exempt from Local Leakage Rate testing of 10 CFR 50, Appendix J, but due to their designation as CIVs, they shall be tested in the Closed direction. The valves are physically located inside containment making a quarterly test impractical. There is no flow through these valves during periods when the associated reactor is at power, and there is very seldom any flow through these valves during any mode of operation. This valve would only open in the event of a fire or during the flushing surveillance of the fire hose stations. Testing these valves more frequently than each associated refueling outage adds no additional confidence in the valve's closure capability but it does add to the occupational radiation exposure of those personnel required to perform the test.

Verifying the closed position of these valves during cold shutdowns is a significant burden for the following reasons:

1) The valves are inconveniently located for testing purposes. At a minimum, a ladder is required for one person to climb, but ladders are not routinely taken into containment during cold shutdowns. Also, climbing is a personnel safety concern.

2) Scaffolding is the safest way to access these valves, but for elevations of 14 to 20 feet above the floor construction of scaffolds takes approximately 32 person-hrs at a cost of $900 to $1,000. Scaffolding removal has the same costs. The time associated with this job could delay plant startup.

3) Cold shutdown testing would violate ALARA radiation exposure goals since it is estimated that total dose to scaffold installers, insulation removers, and testing personnel would be at least 50-70 mrem on either unit.

4) Ultrasonic testing requires special expertise. Since a non-intrusive technique has been selected for verifying valve position, certified UT inspectors must be involved. Since inspectors are not necessarily on site during cold shutdown activities but are routinely hired to support refuel outage activities, cold shutdown frequency testing would required additional cost.

REFUELING OUTAGE JUSTIFICATION
ROJ-10 (continued)

TEST FREQUENCY:

These valves will be tested on a refueling outage frequency to verify closure in accordance with OM-10, paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-11

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CV8348	C	2	M-64-3B(M-138-3B)	E2(E2)

FUNCTIONS:

The above listed valves are Reactor Coolant Loop Fill Check valves in the Chemical and Volume Control System (CV) and are designated Containment Isolation valves (CIVs). These valves are normally closed and are required to remain closed for containment isolation.

JUSTIFICATION:

These valves are exempt from Local Leakage Rate testing of 10 CFR 50, Appendix J, but due to their designation as Containment Isolation Valves, they shall be tested in the Closed direction. These particular check valves are difficult to test in the closed direction. Traditional methods of measuring leakage and/or closure are not sufficient for these valves. Non-intrusive techniques are required to test these valves adequately. For this type of check valve (2" Kerotest) radiography has been the most effective method of verifying valve closure.

Performing radiography requires the use of outside contractor personnel, which may not be available unless planned well in advance. The valves are physically located inside containment approximately 14 feet above the floor, requiring scaffolding for access. Scaffolding for elevations 14 to 20 feet above the floor takes approximately 32 person-hours. There is no flow through these valves during periods when the associated reactor is at power, and there is very seldom any flow through these valves during any mode of operation. This valve opens during initial loop fill following a refueling outage. Testing these valves more frequently than every associated refueling outage adds no additional confidence on the valves closure capability but it does add to the occupational radiation exposure of those personnel required to perform the test. In addition to two radiographers, an Engineer and four Radiation Technicians are needed. The testing requires approximately one eight hour shift.

Testing these valves on a frequency of every three months during normal operation adds to the occupational radiation exposure of the personnel required to perform the test. Erection of scaffolding inside containment while at power presents unique hazards and requires extensive analysis and evaluation. There is normally no flow through this valve to result in the valve disc leaving the seat, therefore the valve remains passively closed during periods of normal operation. No additional confidence in the ability of the valve to close is gained by subjecting this valve to quarterly or cold shutdown testing versus testing on a refueling outage frequency.

TEST FREQUENCY:

The above listed valves will be tested on a refueling outage frequency to verify closure in accordance with OM-10, paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-12

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CV8368A	C	2	M-64(138)-1	B7(B7)
1/2CV8368B	C	2	M-64(138)-1	C4(C4)
1/2CV8368C	C	2	M-64(138)-2	B8(B8)
1/2CV8368D	C	2	M-64(138)-2	B5(B5)

FUNCTION(S):

The 1/2CV8368A-D check valves are in the seal injection line to the Reactor Coolant Pumps. Additionally, they are designated as containment isolation valves, but are exempt from local leak rate testing in accordance with 10CFR50, Appendix J.

JUSTIFICATION:

These valves are exempt from local leak rate testing, but due to their designation as Containment Isolation Valves, they will be conservatively tested per the ASME code in the closed direction. Reactor Coolant Pumps (RCPs) are required to be in operation in Mode 1, power operation. Seal injection flow must be maintained when the RCPs are running. Seal injection flow stoppage with the RCPs in operation, even for a short duration, is detrimental to the RCP seals. Therefore, these valves cannot be tested at power or shutdown when RCPs are running. Seal flow perturbations in cold shutdown or refuel have lead to seal leakage problems and need to be minimized. Seal injection flow is also used for flushing, and is maintained even when RCPs are off.

These particular check valves are difficult to test in the closed direction. Traditional methods of measuring leakage and/or closure are not sufficient for these valves. Non-intrusive techniques are required to test these valves adequately. For this type of check valve (2" Kerotest) radiography has been the most effective method of verifying valve closure.

Performing radiography requires the use of two outside contractor personnel, which are not onsite during cold shutdowns (or refueling outages). Scheduling a radiographer for on-site work usually requires a 30 day notice. Also, to safely perform radiography or any other non-intrusive technique on these valves, scaffolding will be required. Additionally, cold shutdown testing would add to the occupational radiation exposure of the personnel required to complete the test, with the test duration possibly holding up a cold shutdown. For these reasons, it would be costly and impractical to perform this testing on a cold shutdown frequency. Testing these valves for closure at a refueling outage frequency is sufficient for maintaining these valves in a state of operational readiness.

TEST FREQUENCY:

These check valves will be tested for closure during refueling outages in accordance with OM-10, paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-13

NOT USED AT BRAIDWOOD

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REFUELING OUTAGE JUSTIFICATION
ROJ-14

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2FW510A	B	None	M-36-1C(M-121-1B)	C2(C2)
1/2FW520A	B	None	M-36-1A(M-121-1D)	C2(C2)
1/2FW530A	B	None	M-36-1D(M-121-1A)	C2(C2)
1/2FW540A	B	None	M-36-1B(M-121-1C)	C2(C2)
1/2FW510	B	None	M-36-1C(M-121-1B)	D2(D2)
1/2FW520	B	None	M-36-1A(M-121-1D)	D2(D2)
1/2FW530	B	None	M-36-1D(M-121-1A)	D2(D2)
1/2FW540	B	None	M-36-1B(M-121-1C)	D2(D2)
1/2FW034A	B	None	M-36-1C(M-121-1B)	E2(E2)
1/2FW034B	B	None	M-36-1A(M-121-1D)	E2(E2)
1/2FW034C	B	None	M-36-1D(M-121-1A)	E2(E2)
1/2FW034D	B	None	M-36-1B(M-121-1C)	E2(E2)

FUNCTION(S):

The Feedwater Regulating Bypass Valves (1FW510A. 1FW520A, 1FW530A, and 1FW540A), the Feedwater Regulating Valves (1FW510, 1FW520, 1FW530, and 1FW540) and the Feedwater Tempering Flow Control Valves (1FW034A-D) are non-safety related valves which perform a backup function to isolate Feedwater. These valves are not considered to be Containment Isolation Valves per the Braidwood Station Technical Specifications, and are considered only Feedwater Control Valves that, additionally, serve as backup Feedwater Isolation Valves. They are not considered to be in the scope of the IST Program (per OM-10, paragraph 1.1). This has always been Braidwood's position on these valves. However, since they do receive a Feedwater Isolation signal, an augmented test to verify the fail-safe test will be tracked within the IST Program.

JUSTIFICATION:

The augmented Fail-Safe test will be performed. These valves are all part of the surveillance executed to satisfy Technical Specifications, which manually simulates an SI signal, causing these valves to fail closed. These valves will be fail-safe tested to satisfy the requirements of this Technical Specification (Refueling Outage Frequency).

Additionally, the closure of the Main Feedwater Regulating Bypass Valves (1/2FW510A, 1/2FW520A, 1/2FW530A, and 1/2FW540A) 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. The closure of the Main Feedwater Regulating Valves (1/2FW510, 1/2FW520,

REFUELING OUTAGE JUSTIFICATION
ROJ-14

JUSTIFICATION: (continued)

1/2FW530, 1/2FW540) during unit operation would cause a loss of feedwater to the steam generators, resulting in a plant transient with a reactor trip as a result. Finally, it would be impractical to fail-safe test any of these augmented valves on a more frequent basis than required by the Technical Specifications.

TEST FREQUENCY:

These valves will be fail-safe tested closed (Fc) as an augmented IST test during refueling outages in accordance with Braidwood Station Technical Specifications.

REFUELING OUTAGE JUSTIFICATION
ROJ-15

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2AF001A	C	3	M-37(M-122)	D2(E7)
1/2AF001B	C	3	M-37(M-122)	B2(B7)

FUNCTION(S):

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. They are required to open to provide a flow path to the steam generators.

JUSTIFICATION:

It is undesirable to full stroke open these valves quarterly due to the transients placed on the feedwater system and the potentially damaging stresses on the steam generator (S/G) nozzles.

For the closure testing, performing a pressure test (by attaching a pump or other pressure source to a test connection and pressurizing the line) to verify closure is impractical due to the system configuration. Adequate closure capabilities of these check valves cannot be verified due to the multiple potential leakage paths (valves, pump seal, and instrument lines). This configuration makes it impossible to assign any observed leakage to any individual component using standard mass make-up or pressure delay techniques.

Since there are no conventional ways to verify closure of these check valves, acoustic monitoring has been investigated as allowed by OM-10 Paragraph 4.3.2.4(a) (other positive means). First, it was attempted to verify closure during the Cold Shutdown full stroke test of the 1/2AF001A/B valves, in which only a single train of AFW is run at a time. With an AFW pump running on mini-flow recirculation, flow is initiated to each S/G and increased 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. This is done to minimize Feedwater perturbations to the S/Gs. Due to this gradual change in flow, the open and closed acoustical impacts cannot be distinguished 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 disc closure. This test is only performed on refueling outage frequencies due to the large transient placed on Feedwater flow and the thermal stresses imposed on the Steam Generators.

It is expected that acoustic testing will continue to provide adequate test results. If acoustic data does not provide an adequate determination of valve closure, another non-intrusive method such as ultrasonic testing or radiography, may be utilized or the valve will be disassembled and inspected.

REFUELING OUTAGE JUSTIFICATION
ROJ-15 (continued)

TEST FREQUENCY:

The 1/2AF001A and 1/2AF001B suction check valves will be acoustically tested for closure (Bt) at each refuel outage. Alternate test or inspection means may be used as explained in the Justification. These valves will be partially stroke tested open during operation, and full stroke tested during cold shutdown, in accordance with OM-10, Paragraph 4.3.2.2.

This ROJ was previously evaluated and approved per VR-19 of revision 7 of the first Interval Program.

REFUELING OUTAGE JUSTIFICATION
ROJ-16

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2PR032	AC	2	M-78-10(M-[illegible])	E1(E1)

FUNCTION(S):

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.

JUSTIFICATION:

These check valves are located inside containment. They do not have remote or local position indication devices to indicate the position of the check valve. The most practical method for verifying closure for these check valves, is through the execution of the Appendix J local leak rate testing methods. The closure test for these check valves is identical to the Appendix J local leak rate test.

Testing these valves closed would not be practical to perform routinely at power or during cold shutdowns. To perform the closure test, the test equipment and testing methodology would be the same as that used to satisfy the Appendix J leak test. This involves a considerable amount of planning and set up, in addition to taking containment penetrations out of service. The test equipment, the test rig, and air supply lines would need to be run throughout the containment building and the penetration area. Personnel entry into the containment would be required, resulting in exposure to radiation.

Performing the test 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 the leak rate equipment. This would make the process radiation monitor (PRM) inoperable while this testing was being performed.

TEST FREQUENCY:

These check valves will be backflow tested during refueling outages in accordance with OM-10, paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-17

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2PS231A	AC	2	M-68-7(M-140-6)	D8(D8)
1/2PS231B	AC	2	M-68-7(M-140-6)	A8(A8)

FUNCTION(S):

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 isolation valves. They function in the open direction to allow the sampled air to be returned to containment.

JUSTIFICATION:

These check valves are located inside containment. They do not have remote or local position indication devices to indicate the position of the check valve. The most practical method for verifying closure for these check valves, is through the execution of the Appendix J local leak rate testing methods. The closure test for these check valves is identical to the Appendix J local leak rate test.

Testing these valves closed would not be practical to perform routinely at power or during cold shutdowns. To perform the closure test, the test equipment and testing methodology would be the same as that used to satisfy the Appendix J leak test. This involves a considerable amount of planning and set up, in addition to taking containment penetrations out of service. The test equipment, the test rig, and air supply lines would need to be run throughout the containment building and the penetration area. Personnel entry into the containment and climbing in the penetration areas would be required, resulting in exposure to radiation. Also, quarterly testing would confilict with the Technical Specifications, which requires the hydrogen monitors to be in the standby mode in order to meet the requirements set forth in NUREG 0737, Item F.1.6 in Modes 1 and 2.

Performing the test 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 to connect the leak rate equipment. This would make the hydrogen monitor inoperable while the system is isolated.

TEST FREQUENCY:

These check valves will be backflow tested during refueling outages in accordance with OM-10, paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-18

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2RY8046	AC	2	M-60-6(M-135-6)	E3(E3)
1/2RY8047	AC	2	M-60-6(M-135-6)	E3(E3)

FUNCTION(S):

The 1/2RY8046 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/stand pipes. 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 O2 and H2 gas from combining into an explosive mixture. PRT pressure is maintained at 3 psig and is monitored by installed insturmentation.

JUSTIFICATION:

These check valves are located inside containment. They do not have remote or local position indication devices to indicate the position of the check valve. The most practical method for verifying closure for these check valves, is through the execution of the Appendix J local leak rate testing methods. The closure test for these check valves is identical to the Appendix J local leak rate test.

Testing these valves closed would not be practical to perform routinely at power or during cold shutdowns. To perform the closure test, the test equipment and testing methodology would be the same as that used to satisfy the Appendix J leak test. This involves a considerable amount of planning and set up, in addition to taking containment penetrations out of service. The test equipment, the test rig, and air supply lines would need to be run throughout the containment building and the penetration area. Personnel entry into the containment would be required, resulting in exposure to radiation.

Performing the test 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 the leak rate equipment. 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).

REFUELING OUTAGE JUSTIFICATION
ROJ-18 (continued)

TEST FREQUENCY:

These check valves will be backflow tested during refueling outages in accordance with OM-10, paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-19

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2WO007A	AC	2	M-118-5(M-118-7)	E5(E5)
1/2WO007B	AC	2	M-118-5(M-118-7)	B4(B4)

FUNCTION(S):

The 1/2WO007A, B check valve is located inside containment in the supply lines to the Reactor Containment Fan Coolers (RCFC) chilled water coils. These valves are normally open valves. 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).

JUSTIFICATION:

These check valves are located inside containment. They do not have remote or local position indication devices to indicate the position of the check valve. The most practical method for verifying closure for these check valves, is through the execution of the Appendix J local leak rate testing methods. The closure test for these check valves is identical to the Appendix J local leak rate test.

Testing these valves closed would not be practical to perform routinely at power or during cold shutdowns. To perform the closure test, the test equipment and testing methodology would be the same as that used to satisfy the Appendix J leak test. This involves a considerable amount of planning and set up, in addition to taking containment penetrations out of service. The test equipment, the test rig, and air supply lines would need to be run throughout the containment building and the penetration area. Filing and venting would also be required. Personnel entry into the containment would be required, resulting in exposure to radiation.

Performing the test 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 the leak rate equipment. Additionally it is impractical to perform this test during power operation because the WO system is needed to keep containment temperatures below 120 degrees F. This is based on the environmental qualification of components inside containment and accident analysis assumptions.

TEST FREQUENCY:

These check valves will be backflow tested during refueling outages in accordance with OM-10, paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-20

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CV8100	A	2	M-64-2(M-138-2)	F1(F1)
1/2CV8112	A	2	M-64-2(M-138-2)	F2(F2)
1/2CV8113	AC	2	M-64-2(M-138-2)	F2(F2)

FUNCTIONS:

All of the above valves function to provide for a limited leakage barrier between the containment atmosphere and the Auxilliary Building 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 (CIV) 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.

JUSTIFICATION:

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.

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.

REFUELING OUTAGE JUSTIFICATION
ROJ-20

JUSTIFICATION: (continued)

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.

Backflow 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.

TEST FREQUENCY:

The 1/2CV8100 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, in accordance with OM-10, paragraph 4.3.2.2. 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. The frequencies are in accordance with OM-10 4.2.1.2 and 4.3.2.2.

This ROJ is similar to previously approved per VR-9 of Revision 7 of the first Interval Program.

REFUELING OUTAGE JUSTIFICATION
ROJ-21

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CC685	A	2	M-66-1A(M-139-1)	B4(B4)
1/2CC9413A	A	2	M-66-1A(M-139-1)	E3(37)
1/2CC9414	A	2	M-66-1A(M-139-1)	A4(B6)
1/2CC9416	A	2	M-66-1A(M-139-1)	A6(B6)
1/2CC9438	A	2	M-66-1A(M-139-1)	B6(B6)
1/2CC9518	AC	2	M-66-1A(M-139-1)	B6(B6)
1/2CC9486	AC	2	M-66-1A(M-139-1)	E6(E6)
1/2CC9534	AC	2	M-66-1A(M-139-1)	B6(A6)

FUNCTION(S):

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 condition (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.

JUSTIFICATION:

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.

REFUELING OUTAGE JUSTIFICATION
ROJ-21

JUSTIFICATION: (continued)

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.

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.

TEST FREQUENCY:

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 from service. The RCPs will not be shutdown for the sole purpose of stroke timing the isolation valves.

Check valves 1/2CC9486 (total) CC supply flow to the RCPs will be backflow 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. The frequencies are in accordance with OM-10 Paragraphs 4.2.1.2 and 4.2.2.3.

This ROJ is similar to previously evaluated and approved per VR-8 of Revision 7 of the first Interval Program.

REFUELING OUTAGE JUSTIFICATION
ROJ-22

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CV8440	C	2	M-64-4B(M-138-4B)	F6(D5)

FUNCTION(S):

These check valves allow flow from the Volume Control Tank (VCT) to the suction of the CV pumps. During the injection phase of an accident, these valves prevent pump deadheading by allowing a pump mini-flow flow path. During the hot leg recirculation phase of a safety injection, these valves close to prevent flow diversion through the seal return line back to the VCT. Such flow could result in the lifting of the VCT relief valve, which is undesirable, and could potentially lead to an unfiltered release of radioactivity outside containment.

JUSTIFICATION:

These valves may only be tested closed when all 4 RCPs and charging pumps are off. Isolation at power would isolate flow to the suction of the CV pumps, which, in turn would isolate charging flow and flow to the RCP seals. Isolating charging flow, which provides flushing to the RCP seals, is not performed routinely during cold shutdowns.

These valves were reclassified by Site Engineering as active in a letter dated November 23, 1992 (CHRON # 0117821). Based on this reclassification, the valves were added to the IST Program for testing in the close direction.

Testing methods for this valve were considered. The most practical method of testing this valve is by the use of non-intrusive techniques. Currently, ultrasonic testing has provided the most meaningful results. Utilizing non-intrusive techniques requires set up of equipment and planning, and for ultrasonic testing requires qualified ultrasonic testing personnel which may require off-site contractor support. For these reasons, these valves will be tested during refueling outages.

TEST FREQUENCY:

These valves will be backflow (Bt) tested closed during refueling outages in accordance with OM-10 Paragraph 4.3.2.2, using non-intrusive techniques.

REFUELING OUTAGE JUSTIFICATION
ROJ-23

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2PR002G	AC	2	M-78-6	C4(C4)
1/2PR002H	AC	2	M-78-6	C4(C4)

FUNCTION(S):

These valves are discharge check valves on the rad monitor pump for sampling containment atmosphere. The only safety function they provide is in the closed direction as they are containment isolation valves. These valves are normally closed, and the lines are capped. They are tested closed in the IST Program because they are containment isolation valves.

JUSTIFICATION:

These check valves are located inside containment. They do not have remote or local position indication devices to indicate the position of the check valve. The most practical method for verifying closure for these check valves, is through the execution of the Appendix J local leak rate testing methods. The closure test for these check valves is the Appendix J local leak rate test.

Testing these valves closed would not be practical to perform routinely at power or during cold shutdowns. To perform the closure test, the test equipment and testing methodology would be the same as that used to satisfy the Appendix J leak test. This involves a considerable amount of planning and set up, in addition to taking containment penetrations out of service. The test equipment, the test rig, and air supply lines would need to be run throughout the containment building and the penetration area. Personnel entry into the containment would be required, resulting in exposure to radiation.

These valves will be tested closed using the Appendix J test, at refueling outages. This approach is acceptable as described in NUREG 1482 paragraph 4.1.4.

TEST FREQUENCY:

These check valves will be backflow tested (Bt) during refueling outages by using its Appendix J leak rate test. This frequency is in accordance with OM-10 Paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-24

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2SI8968	AC	2	M-61-6(M-136-6)	F4(F5)

FUNCTION(S):

These valves are isolation check valves on the nitrogen supply to the SI accumulators. The only safety function they provide is in the closed direction as they are containment isolation valves. These valves are normally closed. They are tested closed in the IST Program because they are containment isolation valves.

JUSTIFICATION:

These check valves are located inside containment. They do not have remote or local position indication devices to indicate the position of the check valve. The most practical method for verifying closure for these check valves, is through the execution of the Appendix J local leak rate testing methods. The closure test for these check valves is the Appendix J local leak rate test.

Testing these valves closed would not be practical to perform routinely at power or during cold shutdowns. To perform the closure test, the test equipment and testing methodology would be the same as that used to satisfy the Appendix J leak test. This involves a considerable amount of planning and set up, in addition to taking containment penetrations out of service. The test equipment, the test rig, and air supply lines would need to be run throughout the containment building and the penetration area. Personnel entry into the containment would be required, resulting in exposure to radiation.

These valves will be tested closed using the Appendix J test, at refueling outages. This approach is acceptable as described in NUREG 1482 paragraph 4.1.4.

TEST FREQUENCY:

These check valves will be backflow tested (Bt) during refueling outages by using its Appendix J leak rate test. This frequency is in accordance with OM-10 Paragraph 4.3.2.2.

REFUELING OUTAGE JUSTIFICATION
ROJ-25

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2WM191	AC	2	M-49-1A(M-49-1B)	E6(E3)

FUNCTION(S):

These valves are used to supply make up demineralized water to the containment during maintenance. The only safety function they provide is in the closed direction as they are containment isolation valves. These valves are normally closed. They are tested closed in the IST Program because they are containment isolation valves.

JUSTIFICATION:

These check valves are located inside containment. They do not have remote or local position indication devices to indicate the position of the check valve. The most practical method for verifying closure for these check valves, is through the execution of the Appendix J local leak rate testing methods. The closure test for these check valves is the Appendix J local leak rate test.

Testing these valves closed would not be practical to perform routinely at power or during cold shutdowns. To perform the closure test, the test equipment and testing methodology would be the same as that used to satisfy the Appendix J leak test. This involves a considerable amount of planning and set up, in addition to taking containment penetrations out of service. The test equipment, the test rig, and air supply lines would need to be run throughout the containment building and the penetration area. Personnel entry into the containment would be required, resulting in exposure to radiation.

These valves will be tested closed using the Appendix J test, at refueling outages. This approach is acceptable as described in NUREG 1482 paragraph 4.1.4.

TEST FREQUENCY:

These check valves will be backflow tested (Bt) during refueling outages by using its Appendix J leak rate test. This frequency is in accordance with OM-10 Paragraph 4.3.2.2.

SECTION 3.5

VALVE RELIEF

REQUESTS

3.5.1 Valve Relief Request Summary

Status: A = Approved
P = Pending NRC Approval
W = Withdrawn

Rev: Revision Submitted

Number	Status	Rev	Component(s)	Description
VR-1	A	0	1/2FW079A-D	Disassembly per GL 89-04, Position 2, to satisfy the Backflow Test (Bt); Approved per GL 89-04
VR-2	P	0	1/2CS003A/B 1/2CS008A/B 1/2CS011A/B 1/2CS020A/B	Sample Disassmebly of the 3s, 11s, and 20s on an 18 month frequency and the 8s per GL 89-04, position 2, to satisfy Full Stroke Testing (Ct); proposes using Tech Spec Flow Test in lieu of Disassembly for 11s, and 20s when performed (approx. every 5 years)
VR-3	A	0	1/2CC9495A-D	Sample Disassembly of one valve per refueling outage to satisfy the Backflow Test (Bt); approved per GL 89-04, position 2
VR-4	A	0	1/2DG5182A/B 1/2DG5183A/B 1/2DG5184A/B 1/2DG5185A/B	Non-IST Alternative Testing for Diesel Air Start Valves; NRC Prior Approval Not Required

RELIEF REQUEST VR-1

TITLE: Disassembly of the Main Feedwater Header Check Valves

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2FW079A	C	2	M-36-1C(M-121-1B)	C4(C4)
1/2FW079B	C	2	M-36-1A(M-121-1D)	C4(C4)
1/2FW079C	C	2	M-36-1D(M-121-1A)	C4(C4)
1/2FW079D	C	2	M-36-1B(M-121-1C)	C4(C4)

FUNCTION(S):

1/2FW079A-D: Closed: Isolate Steam Generators from an upstream pipe break

CODE REQUIREMENT(S):

Per OMa-1988, Part 10, paragraph 4.3.2.1, check valves shall be exercised nominally every 3 months, except as provided by paras. 4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.5.

BASIS FOR RELIEF:

The main feedwater header flow check valves are 16-inch tilting disk check valves built with a vertical piston and rod assembly that serves as a controlled closure mechanism; the valves do not have external position indicators. The valves are designed to have a delayed closure time of 2 to 3 seconds to isolate flow during a feedwater line break accident without inducing significant water hammer transients. Their closed safety functions are to 1) mitigate a loss of secondary inventory and/or make-up, and 2) provide pressure integrity between the safety and non-safety related portions of piping.

These valves cannot be exercised to their closed position during power operations because feed flow to a steam generator would be isolated, causing loss of Steam Generator water inventory and a subsequent low S/G Level Reactor Trip.

Non-intrusive testing during cold shutdowns has been attempted at Braidwood Station with unreliable results. Specifically, ultrasonic examination of the piston rod position has not conclusively demonstrated valve closure: The anti-slam mechanism prevents the disk from travelling completely to its seat after cessation of forward flow. In fact, during normal feedwater system shutdown evolutions, the valves routinely come to rest at a partial open position -- substantial reverse flow or reverse differential pressure (.5 psid) would be required to bring the disk into contact with the seat. This is in accordance with the valve's design.

RELIEF REQUEST VR-1

BASIS FOR RELIEF: (continued)

Traditional backflow testing methods were considered, but it has been determined that reverse flow and/or differential pressure sufficient to close the valve cannot be obtained without major modification to the existing plant configuration. Clearly, acoustic testing techniques which require contact noise between disk and seat cannot be used for this application, either.

Full-stroke exercising these valves by performing complete disassembly and inspection of each valve during cold shutdown conditions is undesirable and impractical because:

1) The main feedwater system would have to be drained. This would both delay reactor start-up and eliminate a method of reactor decay heat removal. The latter, in particular, could adversely affect shutdown safety.

2) Complete disassembly often requires machining activities that remove metal from the valve walls which may jeopardize minimum wall thickness. If minimum wall thickness is approached, then costly and difficult weld overlay techniques and associated machining would be required.

3) Scaffolding must be built and removed to allow examination of these valves.

4) Disassembly and inspection activities are extremely complicated for these valves, based on the piston assembly. Significant wear and tear is imposed on these valves in order to disassemble and reassemble them for inspection and test, to the point of being detrimental to the valve's material condition.

Full-stroke exercising these valves by performing partial disassembly (i.e. removing only the bonnet) of all four valves on a refueling or cold shutdown frequency is burdensome because of the system draining necessary and the potential wall material loss associated with disassembly and inspection work.

Because major plant modifications would be required to establish enough reverse flow/pressure to fully close the valves, in-service testing in accordance with NRC Generic Letter 89-04 is justified. The Generic Letter allows valves of the same design (manufacturer, size, model number, and materials of construction) and the same service conditions including valve orientation to be classified in sample disassembly and inspection groups. There may be up to four members in the group with testing of one valve in the group during each refueling outage.

In-service testing of the valves that close on a feedwater isolation signal, including the safety-related feedwater containment isolation valves (FW009A-D), the non-safety-related feedwater regulating valves (FW510, 520, 530, 540), and the feedwater regulating bypass valves (FW510A, 520A,...) helps ensure that the power operated valves and the system are capable of safely responding to an initiating feedwater line break accident regardless of FW079 check valve position.

RELIEF REQUEST VR-1

BASIS FOR RELIEF: (continued)

The alternate test method is sufficient to ensure operability of these valves and is consistent with Generic Letter 89-04 sample disassembly and inspection program. The alternate test method in conjunction with other existing in-service testing of feedwater valves is more than sufficient to ensure the system's ability to safely respond to a feedwater line break accident.

PROPOSED ALTERNATIVE TESTING:

The four valves on each unit 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 fully disassembled and examined each refueling outage. If the initial "fully" disassembled valve is not capable of being full stroke exercised or if there is binding or failure of internals, subsequent disassembly and inspection of the remaining three group members will be commensurate with the initial valve's failure mode.

Commensurate means that the remaining three valves may be "partially" disassembled, which refers to the removal of the bonnet for inspection of the accessible components (e.g. seal ring, mating surfaces), and also for manual full stroke closing. A "fully" disassembled valve (minimum of one per outage) would additionally include removal of the valve cylinder, giving access to the disk and seating surfaces. The subsequent disassembly requirements would be satisfied through either "partial" or "full" disassemblies depending on what is found with the initial disassembled valve. This will both satisfy the testing requirements to demonstrate all four valves' ability to perform their safety function and minimize the potential concerns regarding minimum wall thickness discussed earlier. This approach is consistent with Generic Letter 89-04, position 2.

A partial stroke test following disassembly (full or partial) is not required for these check valves since an "as left" stroke is performed prior to the installation of the bonnet. The installation of the bonnet does not affect the stroke of the valve. In addition, the plant operates with these valves in the open position and open stroke problems would be readily identified during plant startup.

APPROVAL STATUS:

1. Submitted with Revision 0 of Braidwood's 2nd Interval Program (Jan., 1998).
2. Relief granted per Generic Letter 89-04.

RELIEF REQUEST VR-2

TITLE: Disassembly of Containment Spray Check Valves

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CS003A	C	2	M-46-1A(M-129-1A)	E6(E3)
1/2CS003B	C	2	M-46-1A(M-129-1A)	C6(C3)
1/2CS008A	AC	2	M-46-1C(M-129-1C)	D6(D3)
1/2CS008B	AC	2	M-46-1C(M-129-1C)	B6(B3)
1/2CS011A	C	2	M-46-1A(M-129-1A)	D2(D8)
1/2CS011B	C	2	M-46-1A(M-129-1A)	B2(B8)
1/2CS020A	C	2	M-46-1B(M-129-1A)	B2(D5)
1/2CS020B	C	2	M-46-1B(M-129-1B)	B5(A5)

FUNCTION(S):

1/2CS003A/B:	Open:	Supply water to the Spray Nozzles
1/2CS008A/B:	Open:	Provides flowpath to Spray Nozzles
	Closed:	Containment Isolation
1/2CS011A/B:	Open:	Supplies NaOH to suction of the CS pump (Eductor Outlet)
1/2CS020A/B:	Open:	Supplies NaOH to suction of the CS pump (Eductor Inlet/Discharge of Spray Add Tank)
	Closed:	Prevents backflow to the spray additive tank (quarterly test)

CODE REQUIREMENT(S):

Per OMa-1988, Part 10, paragraph 4.3.2.1, check valves shall be exercised nominally every 3 months, except as provided by paras. 4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.5.

BASIS FOR RELIEF:

General: Currently full flow recirculation flow paths do not exist for the Containment Spray pumps. Extensive modifications to the existing plant design would be required to accommodate full flow testing of the 1/2CS003A,B and 1/2CS008A/B check valves, including the penetration of containment integrity. Additionally, NaOH in the spray additive tank limits the stroking of the 1/2CS011A,B and 1/2CS020A/B valves. Finally, the use of nonintrusive techniques, such as acoustic monitoring and magnetics, have not been successful in proving full stroking on this type of valve (dual disk).

RELIEF REQUEST VR-2

BASIS FOR RELIEF: (continued)

Generic Letter 89-04, position 2, "Alternative to Full Flow Testing of Check Valves" allows for disassembly and inspection of check valves on a sampling basis during refueling outages. The purpose of this relief request is twofold. One is to establish a basis for performing disassemblies on these valves during refueling outages as established in Generic Letter 89-04, position 2. The second purpose is to establish a basis for performing disassembly and inspection using a sampling plan at the same approximate frequency as refueling outages, every 18 months, but not necessarily during the refueling outage mode (such as performing the disassembly and inspection during an operating mode). This second purpose would apply to the 1/2CS003A/B, 1/2CS011A/B, and 1/2CS020A/B. The 1/2CS008A/B valves disassemblies will remain during outages, due to their physical location in containment.

Per NUREG 1482, Appendix A, "Positions, Questions, Responses, and Current Considerations Regarding Generic Letter 89-04," Question Group 14 considers the question of disassembling valves during a non-refueling outage schedule. Under "Current Considerations" for this question group, it states that "If it is practical to disassemble and inspect the selected valves at a frequency not determined by refueling outages, the licensee may establish a schedule for these valves that does not conform to a refueling outage schedule. However, ...entry into an LCO to perform the activity may not be acceptable (See Section 3.1.2)." Braidwood Station feels that the entry into the Containment Spray LCO to perform these check valve inspections would not create a significant safety or equipment problem which would discourage this activity. Per Braidwood Technical Specifications, there is a 7 day LCO to restore an inoperable Containment Spray System. If this could not be met, then the shutdown process would begin. However, the work involved with these check valves is easily completed within the 7 day LCO. Additionally, having a Containment Spray Train inoperable is low in risk significance when considering Braidwood's PRA analysis. Braidwood Station feels that it would be practical to disassemble and inspect these valves during nonoutage time periods. The NUREG 1482 Appendix A discussion discussed above, provides that a schedule may be established that does not conform to a refueling outage schedule.

Previous inspections at Byron and Braidwood Stations have shown no evidence of degradation or physical impairment which would inhibit the valves from performing the functions described in this relief request. These valves are not expected to experience degradation or impairment since the valves are infrequently actuated. 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. An 18 month frequency is being requested for the 1/2CS003A/B, 1/2CS011A/B, and 1/2CS020A/B valves to be consistent with Braidwood's current refueling outage frequency of 18 months.

RELIEF REQUEST VR-2

BASIS FOR RELIEF: (continued)

Because of the significant work involved with the isolation, draining, maintenance, inspections, and partial stroke testing of the valves, along with the superior results of past inspections, it is clearly impractical and burdensome to perform disassemblies as frequently as quarterly or during cold shutdowns.

Additional technical support in justification for this relief request is provided for each set of valves in parts A-D of this section.

A. 1/2CS008A,B: With the existing plant configuration, these valves cannot be full flow or partial flow tested during unit operation, cold shutdown or refueling, as water from the CS pumps would be discharged through the CS ring headers, causing undesirable effects on system components inside containment. Additionally, it is impractical to erect temporary large bore piping from the CS line to the reactor cavity, during cold shutdowns or refueling outages, in order to perform a full stroke test on these valves. The filling of the cavity would require the removal of the reactor vessel head to preclude equipment damage from borated water and the construction of the temporary piping would take an estimated nine to twelve shifts (or longer) to complete. There would be even more time involved with the draining and removal of the piping from containment following the completion of the test.

   Partial stroking of these valves using air during unit operation, cold shutdown, or refueling does not provide adequate assurance of valve operability and may be detrimental for the following reasons:

   a. There is no correlation between air flow and angle of disc movement.

   b. Venting and draining the required portion of piping to perform this test may cause deposition of boric acid residue which could in turn promote binding of the check valve internals.

B. 1/2CS003A,B: These valves cannot be full stroke tested due to the existing plant configurations, as previously discussed for the 1/2CS008A,B valves. However, these valves are partially stroked quarterly since they are in the flowpath of their respective Containment Spray pump runs.

RELIEF REQUEST VR-2

BASIS FOR RELIEF: (continued)

C. 1/2CS011A,B: These valves cannot be full stroke tested 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 makeup supply (RWST) and associated systems. Additionally, personnel safety would also be a factor, since NaOH is a hazardous caustic chemical. However, these valves are partially stroked quarterly during respective Containment Spray Pump runs in which the eductor flow passes through the valve, while the spray additive tank is isolated, thereby eliminating the NaOH flow required for the full stroke.

Full flow testing of these valves is accomplished a minimum of once every 5 years through the use of a temporary test hook-up in which flushing of the system is necessitated. Performing this testing on a more frequent basis is undesirable due to the accumulation of nearly two 55 gallon drums of potentially radioactive/toxic mixed waste that requires either recycling or disposal. Additionally, the handling of this material poses a significant safety hazard to personnel, potentially resulting in eye damage and/or chemical burns if splashed or spilled. This testing, currently performed every five years per Technical Specifications, would be impractical and burdensome to perform on a more frequent basis.

Non-intrusive techniques (acoustics and magnetics) have been attempted with unsuccessful results since the amount of flow required to full stroke the disks (critical velocity of 10 ft/sec) cannot be obtained based on current system design.

D. 1/2CS020A,B: These valves cannot be full stroked or partial stroked during unit operation, or cold shutdowns, for the same reasons as stated for the full flow testing of the 1/2CS011A,B valves. The Spray Additive tank is isolated during pump runs, so no flow is passed through the 1/2CS020A/B valves during this testing.

Additionally, the Technical Specifications full flow test, performed a minimum of once every five years, would apply to these check valves in addition to the 1/2CS011A/B valves. 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 (in regards to performing the test more than once every five years). The five year frequency on this Technical Specifications test in conjunction with the disassemblies performed, will more than adequately ensure operability of these valves.

RELIEF REQUEST VR-2 (continued)

PROPOSED ALTERNATIVE TESTING:

Per Generic Letter 89-04, position 2, "...valve disassembly and inspection can be used as a positive means of determining that a valve's disk will full stroke exercise open..." Once stroked in the full open position, the valve's discs are then returned to their full closed position. The provisions of this position may be used in the case of the CS check valves for the open direction as follows:

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

Group 1 (U-1)	Group 2 (U-1)	Group 3 (U-1)	Group 4 (U-1)
1CS003A	1CS008A	1CS011A	1CS020A
1CS003B	1CS008B	1CS011B	1CS020B

Group 5 (U-2)	Group 6 (U-2)	Group 7 (U-2)	Group 8 (U-2)
2CS003A	2CS008A	2CS011A	2CS020A
2CS003B	2CS008B	2CS011B	2CS020B

Group numbers 1, 3, 4, 5, 7, and 8: One valve from each group, on a per unit basis, will be disassembled on an eighteen month frequency without restrictions on plant mode. Additionally, following re-installation, the 1/2CS003A,B and 1/2CS011A,B valves will be partial stroke tested using the CS pumps and the 1/2CS020A,B valves will be partial stroke tested using an alternate water source (Note: the 1/2CS020A,B test for the closed position is currently performed quarterly). When the Technical Specification full stroke testing of the respective CS020 and CS011 valves is completed, it may be used to satisfy the full stroke testing in lieu of the disassembly plan (if within the 18 month frequency guidelines established).

If a valve disassembled during power operation is found failed, Braidwood will evaluate the operability status of the remaining valve in the group. Expanding the sample expansion to the other valve in the group will be determined from the guidance provided by Generic Letter 89-04.

RELIEF REQUEST VR-2

PROPOSED ALTERNATIVE TESTING: (continued)

Group number 2 and 6: One valve from each group, on a per unit basis, will be disassembled on a refueling outage frequency. If the disassembled valve is not capable of being full-stroke exercised or if there is binding or failure of valve internals, the remaining valve on the affected unit will be inspected prior to startup. This methodology is consistent with Generic Letter 89-04, position 2; prior NRC approval is not required. Since partial stroke testing is impractical, the as-left Appendix J leak rate test ensures the correct installation of the valve.

APPROVAL STATUS:

1. Submitted with Revision 0 of Braidwood's 2nd Interval Program (Jan., 1998).

2. Performing disassembly and inspection using a sample plan during refueling outages is approved per Generic Letter 89-04. NUREG 1482 Appendix A provides further guidance on performing the disassembly and inspection on a schedule other than refueling outages. Concurrence/approval is requested on the application of the NUREG 1482 Appendix A Guidance as applied by this relief request.

RELIEF REQUEST VR-3

TITLE: Disassembly of the Component Cooling Water Supply to the Reactor Coolant Pump Thermal Barrier Check Valves

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2CC9495A	BC	3	M-66-1B(M-139-1)	E4(C4)
1/2CC9495B	BC	3	M-66-1B(M-139-1)	D4(C4)
1/2CC9495C	BC	3	M-66-1B(M-139-1)	C4(C4)
1/2CC9495D	BC	3	M-66-1B(M-139-1)	B4(C4)

FUNCTION(S):

The 1/2CC9495A-D check valves are the component cooling water supply check valves to the Reactor Coolant Pump (RCP) Thermal Barriers. These valves are required to close to isolate the component cooling system in the event of a thermal barrier tube failure.

CODE REQUIREMENT(S):

Per OMa-1988, Part 10, Paragraph 4.3.2.1, check valves shall be exercised nominally every 3 months, except as provided by Paragraphs 4.3.2.2, 4.3.2.3, 4.3.2.4, and 4.3.2.5.

BASIS FOR RELIEF:

These valves cannot be verified for closure during unit operation. In order to verify these valves are closed, the corresponding RCP must be off and cooling flow isolated. Isolating Component Cooling Water flow to the RCP during unit operation is undesirable and may result in eventual pump damage and/or trip. Additionally, these valves are located in the containment building, inside the missile barrier, where entry requires a significant power reduction (to ~30% reactor total power) to reduce radiation levels (estimated to be 100 to 200 mr/hr generally when shut down).

Various methods of testing these valves to the closed direction were considered. The most practical and effective means of testing these valves is by means of disassembly and inspection. This will be performed at refueling outages, as permitted in OM Part 10 4.3.2.4(c). A sample disassembly and inspection plan will be used as provided by Generic Letter 89-04. Generic Letter 89-04 allows valves of similar design, service conditions, size, materials of construction, to be classified in sample disassembly and inspection groups of up to four members with testing of one valve in the group during each refueling outage. Additionally, these valves are designed with seal welded bonnet/cap and requires grinding and re-welding during inspection activity. This takes more than one shift to accomplish.

RELIEF REQUEST VR-3 (continued)

PROPOSED ALTERNATE TESTING:

The four Unit 1 valves will compose one group, the four Unit 2 valves will compose another group. One valve from each group, on a per unit basis, will be disassembled and inspected on a refueling outage frequency. If the initial disassembled valve is not capable of being full stroke exercised, or if there is binding or failure of valve internals, subsequent disassembly and inspection of the remaining three group members will be performed. This method is consistent with Generic Letter 89-04, Position 2.

APPROVAL STATUS:

1. Relief granted per Generic Letter 89-04.

RELIEF REQUEST VR-4

TITLE: Non-IST Monthly Test of Diesel Generator Air Start System Valves

VALVE NUMBER	CATEGORY	CODE CLASS	DRAWING NUMBER	DRAWING COORDINATE
1/2DG5182A	B	N/A	M-152-20	B5(B5)
1/2DG5182B	B	N/A	M-152-20	B5(B5)
1/2DG5183A	B	N/A	M-152-20	E5(E5)
1/2DG5183B	B	N/A	M-152-20	E5(E5)
1/2DG5184A	C	N/A	M-152-20	B6(B6)
1/2DG5184B	C	N/A	M-152-20	B6(B6)
1/2DG5185A	C	N/A	M-152-20	F6(F6)
1/2DG5185B	C	N/A	M-152-20	F6(F6)

FUNCTION(S):

This relief request covers the open function of these valves only. They are required to open in order to supply starting air to the Diesel Generators.

CODE REQUIREMENT(S):

These valves are not within the scope of the IST Program per 10CFR50.55 (a). 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 (6)(ii).

Therefore, valves associated with the Diesel Air Start System shall be exercised to the position required to fulfill their function per OM-10, Paragraphs 4.2.1.1 and 4.3.2.2. Additionally, the stroke testing of power operated valves shall be measured to the nearest second and such stroke times compared to the initial reference valves to document continued valve operational readiness per OM-10, paras. 4.2.1.4(b), 4.2.1.8, and 4.2.1.9.

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 OM-10, Paragraph 4.2.1.2. 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.

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.

RELIEF REQUEST VR-4 (continued)

PROPOSED ALTERNATIVE 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 comparison of these values 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.

APPROVAL STATUS:

1. Submitted with Revision 0 of Braidwood's 2nd Interval Program (Jan., 1998)
2. This relief request was evaluated and approved for the First Interval IST Program.

SECTION 3.6

VALVE REFERENCES

VALVE REFERENCE LIST

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, 1989 Edition.

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. ASME/ANSI OM-1987, Operation and Maintenance of Nuclear Power Plants, Part 1, Requirements for Inservice Performance Testing of Nuclear Power Plant Pressure Relief Devices.

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

6. Byron/Braidwood Station UFSAR, Section 3.9.6.2, Inservice Testing of Valves.

7. Braidwood Station Technical Specification, 3/4.0.5, ASME XI Program Requirement.

> **NOTE**
>
> When the improved Technical Specifications are implemented, 3/4.0.5 will be 5.5.8.

8. NRC Safety Evaluation Reports (SER's)

   a. SER dated October 15, 1991 for revision 4/4a of first 10 year Interval Inservice Testing Program Plan

   b. SER dated September 10, 1992 for June 25, 1992 submittal for first 10 year Interval Inservice Testing Program Plan

   c. SER dated September 14, 1993 for revision 5/5a of first 10 year Interval Inservice Testing Program Plan

   d. SER dated August 18, 1995, for Revision 7 of the first 10 year Interval Inservice Testing Program Plan

9. IST Valve Scope Basis Document - This document provides additional/amplifying information as to bases of component inclusion or exclusion.

(Final)