

INSERVICE INSPECTION PUMP AND VALVE PROGRAM
FOR THE
DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1
SYNOPSIS OF CURRENT RELIEF REQUEST CHANGES

SECTION I. PUMP TEST PROGRAM

Relief Request Number 2: Alternate testing was revised entirely.

Relief Request Number 3: Deleted.

Relief Request Number 4: Deleted.

SECTION II. VALVE TEST PROGRAM

13. Test Frequency

Change: line 4 the word five to four.

Add: . Hot Shutdown

Relief Request Number G-2: Deleted.

Relief Request Number 1:

Changed in its entirety in Revision 3, submitted 3/12/82.

Rev. 4 Change: Hot shutdown to Hot stand-by (Mode 3),
Page II-59c, paragraph 4.a.

Relief Request Number 4:

Basis for Relief Request: Add:

... nozzles. The reason for not full stroking
the check valve is that the auxiliary boiler
will not provide enough steam for the pump to
spin fast enough.

Relief Request Number 14: Rewritten in its entirety.

Relief Request Number 15: Rewritten in its entirety.

Relief Request Number 19:

Alternate Testing: Line 2: Add:

...refueling when an adequate expansion volume is available.

8305060523 830429
PDR ADOCK 05000346
Q PDR

INSERVICE INSPECTION PUMP AND VALVE PROGRAM
FOR THE
DAVIS-BESSI' NUCLEAR POWER STATION UNIT NO. 1
LIST OF REVISIONS

Original May 15, 1980

Revision 1. December 15, 1980

Revision 2. March 31, 1981

Revision 3. February 16, 1982

Modified Relief Request 1 in December 14, 1982

Revised Pages

II-7

II-59 (a,b,c)

Revision 4. April 28, 1983

Revised Pages

I-4

I-5

I-8,9

II-4

II-7

II-11

II-26

II-27

II-30

II-31

II-58

II-59(c)

II-60

II-64

II-65

II-67

INSERVICE INSPECTION PUMP AND VALVE PROGRAM

FOR THE

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1

MODIFIED CODE RELIEF REQUESTS

REVISIONS 3 & 4

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1
PUMP TEST PROGRAM

Page 1 of 2

SYSTEM & DRAWING NUMBER	COORD- INATES	PUMP NO.	TEST PARAMETER MEASURED							CODE EXCEPTION
			SPEED n*	INLET PRESSURE P_i	DIFFERENTIAL PRESSURE Δp	FLOW RATE Q	VIBRATION AMPLITUDE V	BEARING TEMPERATURE T_b	LUBRICANT LEVEL OR PRESSURE	
AUXILIARY FEEDWATER 006B	J-8	P14-1	Q	Q	Q	Q	Q	NR	NR	1,2
	K-9	P14-2	Q	Q	Q	Q	Q	NR	NR	1,2
HIGH PRESSURE INJECTION 033	E-9	P58-1	NR	Q	Q	Q	Q	NR	NR	1,2
	C-9	P58-2	NR	Q	Q	Q	Q	NR	NR	1,2
LOW PRESSURE INJECTION 033	H-7	P42-1	NR	Q	Q	Q	Q	NR	NR	1,2
	G-10	P42-2	NR	Q	Q	Q	Q	NR	NR	1,2
CONTAINMENT SPRAY 034	D-9	P56-1	NR	Q	Q	Q	Q	NR	NR	1,2
	C-9	P56-2	NR	Q	Q	Q	Q	NR	NR	1,2
COMPONENT COOLING 036	H-2	P43-1	NR	Q	Q	Q	Q	NR	NR	1,2
	J-2	P43-2	NR	Q	Q	Q	Q	NR	NR	1,2
	K-2	P43-3	NR	Q	Q	Q	Q	NR	NR	1,2
*SYNCHRONOUS OR INDUCTION MOTORS DO NOT REQUIRE SPEED CHECK (IWP-4400).										

I-4

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PUMP TEST PROGRAM

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[illegible]

I-5

Rev. 4-4/83

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SECTION I. PUMP TEST PROGRAM (continued)

b. Code Exception Number 2 (continued)

- . Basis for Relief Request: The referenced edition of the Code requires bearing temperature to be recorded annually. It has been demonstrated by experience that bearing temperature rise occurs only minutes prior to bearing failure. Therefore, the detection of possible bearing failure by a yearly temperature measurement is extremely unlikely. It requires at least an hour of pump operation to achieve stable bearing temperatures. The small probability of detecting bearing failure by temperature measurement does not justify the additional pump operating time required to obtain the measurements.
- . Alternate Testing: Bearing temperature will be observed and recorded during the Quarterly Pump Test to insure limits are not exceeded. The pumps shall be run a minimum of 30 minutes.

c. Code Exception Number 3

Deleted.

d. Code Exception Number 4

Deleted.

2. Past Pump Performance

The following information is submitted for your review:

- a. Pump Past Performance Data
- b. Pump Past Performance Statistical Analysis

SECTION II. VALVE TEST PROGRAM

D. RELIEF REQUESTS

1. General Relief Requests

b. Relief Request Number G-2

Deleted -- Is met in principal by Code

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2. Specific Relief Requests

- a. Relief Request Number 1--Docket No. 50-346/License No. NPF-3/
Serial No. 882
- . Components: Main Steam Isolation Valves MS-100 (B-11),
MS-101 (B-9)
 - . Function: Valves are required to close within 5 seconds on a safety actuation signal thereby isolating the main steam lines from the Steam Generators.
 - . Class: 2
 - . Testing Requirements: Partial stroke valve every three months during normal operation and full stroke valves during cold shutdown.
 - . Basis for Relief Request:
 1. Code Test Requirements for exercising valves (Ref: ASME Code Section XI, 1977 Edition through Summer 1978 Addenda):

"IWV-3412 Exercising Procedure"

"(a) Valves shall be exercised to the position required to fulfill their function unless such operation is not practical during plant operation. If only limited operation is practical during plant operation, the valve shall be part-stroked exercised during plant operation and full-stroke exercised during cold shutdown."

2. Ramifications of Partial Stroke Code Test for Valves MS-100 and MS-101.

When performing the partial stroke test specified in the code, the following additional safety action items would have to be implemented if the valve would inadvertently close past 90% open during the test.

If the MSIV continues to shut past approximately 90% open, attempt will be made to seat the "Slow Close" valve by pushing and releasing "Slow Close" button. If this fails, the area must be evacuated. The reactor operator would be required to take the following action:

- a) Trip the reactor and carry out EP 1202.04 - Reactor Trip.
- b) Ensure that either a main feed pump is operating on the side where the MSIV is open or start the startup feed pump.

- c) If MS-101 has closed, shift auxiliary steam to the auxiliary boiler.
 - d) If MS-100 has closed, shift gland steam to auxiliary steam.
 - e) Shift turbine bypass valve on affected side to Hand and shut them.
 - f) Open bypass valve (MS-101A or MS-100A) on affected side.
 - g) Attempt to reopen MSIV when once thru steam generator (OTSG) and turbine header pressure are equalized within 100 psid.
 - h) The "Slow Close" valve would also have to be repaired in order to reopen the MSIV (MS-100/MS-101).
 - i) The cost involved if the above occurs would be approximately \$380,000 with two days lost operating time.
3. Background Information on the Inservice Testing Program for the Davis-Besse Unit 1 Nuclear Power Station
- a) On May 15, 1980 2 Serial No. 616 a revised Inservice Inspection Testing Program was submitted to the NRC, requesting exception from the partial stroke testing during normal operation on valves MS-100 and MS-101 Page II-59. The alternate testing stated in this submittal was to full stroke the valves during cold shutdown with a justification stated in the submittal.
 - b) On November 14, 1980 3 Docket No. 50-346 Toledo Edison Company received from the NRC questions and comments on the submitted Inservice Testing Program. The NRC requested a meeting at the Davis-Besse 1 site on November 19-21, 1980 to discuss their review on the submitted Inservice Testing Program. It should be noted that there were no comments from the NRC relating to the code exception for not partial stroking during normal operation valves MS-100 and MS-101.
 - c) On December 15, 1980 4 Serial No. 671 revisions were made to the Inservice Testing Program based upon the results of the combined meeting NRC/Toledo at the Davis-Besse site November 19-21, 1980. During the site meeting each relief request was discussed in detail, and we explained to the NRC personnel why we should not partial stroke valves MS-100 and MS-101. It was agreed during that meeting that a 10% stroke on the valves in question would not increase any safety margin and the possible safety consequences if the valve should go full close during the test could cause a

safety issue. It should be noted on page II-59, the exception to partial stroking of the valves was not one of the questions that evolved from of the NRC review of the Inservice Testing Program.

- d) On March 31, 1981 5 Serial No. 702 based upon the results of several telephone conversations with the NRC and EG&G, Inc., several editorial changes were made to the Inservice Testing Program. It also should be noted that on page II-59 the only change requested by the NRC on not partial stroking during normal operation valves MS-100 and MS-101. Toledo Edison requests permission to perform, in lieu of the partial stroking during normal operation valves MS-100 and MS-101 was to change code exception to Basis for Relief Request.

4. Alternative Valve Testing Proposed

- a) Based upon the above technical and safety-related considerations, and potential for additional downtime with no added safety benefits when partial stroking valves MS-100 and MS-101. Toledo Edison requests permission to perform, in lieu of the partial stroke test during normal operation, a full stroke test at hot stand-by as defined in Davis-Besse Technical Specification (Table 1-1, page 1-7). Since ASME Section XI 1977 Edition thru Summer 1978 Addenda, Article IWV. 3412 only defines two (2) plant conditions, the full stroke testing will be performed when the plant is in hot stand-by condition on a frequency not to exceed twelve (12) month periods or on a frequency not exceeding one (1) test every three (3) months.

5. Other Verification on Valves MS-100 and MS-101

- a) TED proposes to introduce valve trends analysis on valves MS-100 and MS-101, which will allow monitoring of the valves characteristic each time the valve is full stroked. By utilizing trends analysis during the full stroke testing any abnormal behavior of the valves could be identified and appropriate action taken to correct any abnormalities.

- 6. Attached for your information is Figure 1a Main Steam Isolation Valve Configuration, and Figure 1b MSIV Control Air Diagram, which is being submitted to support our technical discussions.

b. Relief Request Number 2 - Deleted

c. Relief Request Number 3 - Deleted

d. Relief Request Number 4

- . Components: P&ID 007 AF39(F-10), AF43(F-3), AF72(F-10),
AF73(E-8), AF74(E-5), AF75(F-4)
- . Function: Auxiliary feedwater check valves to the
steam generators
- . Class 3
- . Test Requirements: Quarterly forward flow stroking
- . Basis for Relief Request: Cycling valve would require injection
of auxiliary feedwater into the steam generator which would
thermal shock the auxiliary feedwater nozzles. The reason for not
full stroking the check valve is that the auxiliary boiler will
not provide enough steam for the pump to spin fast enough.
- . Alternate Testing: Valve will be partial stroke forward flow
cycled during refueling when the steam generator is cold.
Valve cannot be partial stroked during normal operation or
full stroked at any time without injecting auxiliary feed-
water into the steam generator and thermal shocking the
auxiliary feedwater nozzles.

n. Relief Request Number 14

- . Components: MU242, MU243, MU244, MU245
- . Function: Reactor Coolant pump seal water check valve
- . Class: 2
- . Test Requirements: Quarterly reverse flow stroking
- . Basis for Relief Request: Reverse flow cycling during normal operation would require interrupting reactor coolant pump seal cooling water flow. This could damage reactor coolant pump seals and is not permitted by plant procedure.
- . Alternate Testing: Reverse flow stroking will be cycled at refueling. Test will be performed per Technical Specification during Appendix J, Type C Test. System operation precludes partial stroke testing during normal operation.

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o. Relief Request Number 15

- . Components: P&ID 031 MU66A(K-3), MU66B(J-3), MU66C(H-3),
MU66D(H-3), MU59A(D-2), MU59B(E-2),
MU59C(F-2), MU59D(F-2), MU38(E-5)
- . Function: Reactor coolant pump seal water isolation valve
- . Class: 2
- . Test Requirements: Quarterly stroking
- . Basis for Relief Request: Cycling valve during normal operation would interrupt reactor coolant pump seals and is not permitted by plant operating procedure.
- . Alternating Testing: Valve will be stroked and timed at cold shutdown. Valve design precludes partial stroke testing during normal operation. Valves will be tested at refueling per Technical Specification during Appendix J, Type C Test.

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s. Relief Request Number 19

- . Components: P&ID 033 HP48(C-2), HP49(C-2), HP50(C-2), HP51(C-2), HP56(C-4), HP57(C-4), HP58(C-4), HP59(C-4)
- . Function: High pressure injection check valve
- . Class: 1
- . Test Requirements: Quarterly forward flow stroking
- . Basis for Relief Request: Valve can only be cycled by high pressure injection flow. High pressure injection during normal operation or cold shutdown could introduce cold water into the significantly hotter Reactor Coolant System. This would thermal shock the high pressure injection nozzle. Additionally high pressure injection during cold shutdown could subject the Reactor Coolant System to pressures higher than allowed in the cold shutdown mode.
- . Alternate Testing: Valve will be forward flow cycled at refueling when an adequate expansion volume is available. System operation precludes partial stroke testing during normal operation.

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13. Test Frequency. The codes used in this column indicate the plant operational status that must be achieved before a particular valve can be safely tested. For simplicity only the four codes are used.

. Q - Quarterly

Valves in this category can be tested quarterly during normal operation. (Technical Specification Modes 1 thru 4.)

. C - Cold Shutdown

Testing of valves in this category must be deferred until cold shutdown in order to avoid possible adverse operational or safety situations. (Technical Specification Mode 5.)

Inservice valve testing is defined as: Valve testing will commence as soon as possible but no later than 48 hours after reaching cold shutdown conditions. Valve testing will proceed in a normal manner until all testing is complete or the plant is ready to return to power. A completion of all valve testing is not a prerequisite to return to power and any testing not completed at the end of one cold shutdown will be performed during subsequent cold shutdowns, starting from the last test performed at the previous cold shutdown, to meet the code specified testing frequency. Cold shutdown conditions are defined per the Davis-Besse Technical Specifications.

. H - Hot Shutdown

. R - Refueling

Testing of valves in this category must be deferred until the plant is in a refueling interval in order to avoid possible adverse operational or safety situations. This designation is also used for passive valves to indicate that valve position is administratively controlled. (Technical Specification)

14. Maximum Stroke Time. This column provides the limiting value of full stroke time for power operated valves.

15. Remarks. This column is provided for pertinent information as appropriate.

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1
VALVE TEST PROGRAM

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System MAIN STEAM

Drawing No. 003

Rev. 29

Valve Number	Class	Drawing Coordinates	Valve Cat.				Passive	Size (Inches)	Valve Type	Actuator Type	Normal Position	Test Requirement	Code Exception	Alternate Testing	Test Frequency	Max. Stroke Time (Sec.)	Remarks
			A	B	C	D											
MS735	3	D-12			X			6	CK	SA	--	S			Q	60	FORWARD FLOW TEST
MS107A	2	D-12		X				6	GA	MO	CL	S T			Q Q	60	
MS727	3	D-12			X			6	CK	SA	--	S			Q		SEE REMARK FOR MS726
MS107	2	D-12		X				6	GA	MO	CL	S T			Q Q	60	
MS100	2	B-11			X			36	CK	AO	OP	S F T	1	S F T	H H H	5	
MS101	2	B-9			X			36	CK	AO	OP	S F T	1	S F T	H H H	5	
MS375	2	B-14		X			X	1.5	GL	AO	CL	P			R		
MS394	2	A-11		X			X	1.5	GA	AO	CL	P			R		
MS100A	2	B-11		X			X	0.75	GL	AO	CL	P			R		
MS101A	2	B-9		X			X	0.75	GL	AO	CL	P			R		
MS731	2	K-2			X			14	CK	SA	--	S			Q		FORWARD FLOW TEST WITH AUXILIARY FEED PUMP TURBINE TEST
MS732	2	F-13			X			14	CK	SA	--	S			Q		FORWARD FLOW TEST WITH AUXILIARY FEED PUMP TURBINE TEST

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1
VALVE TEST PROGRAM

Page 1 of 3

System STEAM GENERATOR SECONDARY SYSTEM

Drawing No. 007

Rev. 29

Valve Number	Class	Drawing Coordinates	Valve Cat.				Passive	Size (Inches)	Valve Type	Actuator Type	Normal Position	Test Requirement	Code Exception	Alternate Testing	Test Frequency	Max. Stroke Time (Sec.)	Remarks
			A	B	C	D											
AF599	2	F-2		X			X	6	GA	MO	OP	P			R		
AF32	3	F-3		X			X	2	GA	MA	CL	P			R		
AF43	3	F-3			X			6	CK	SA	--	S	4	S	R		FORWARD FLOW TEST
AF75	3	F-4			X			6	CK	SA	--	S	4	S	R		FORWARD FLOW TEST
AF3872	3	E-4		X				6	GA	MO	CL	S T			Q Q	60	
AF3871	3	E-5		X				6	GA	MO	CL	S T			Q Q	60	
AF74	3	E-5			X			6	CK	SA	--	S	4	S	R		FORWARD FLOW TEST
AF73	3	E-8			X			6	CK	SA	--	S	4	S	R		FORWARD FLOW TEST
AF3869	3	E-9		X				6	GA	MO	CL	S T			Q Q	60	
AF3870	3	E-10		X				6	GA	MO	CL	S T			Q Q	60	
AF72	3	F-10			X			6	CK	SA	--	S	4	S	R		FORWARD FLOW TEST
AF39	3	F-10			X			6	CK	SA	--	S	4	S	R		FORWARD FLOW TEST
AF34	3	F-11		X			X	6	GA	MA	CL	P			R		

VALVE TEST PROGRAM

System MAKEUP AND PURIFICATION

Drawing No. 031

Rev. 31

Valve Number	Class	Drawing Coordinates	Valve Cat.				Passive	Size (Inches)	Valve Type	Actuator Type	Normal Position	Test Requirement	Code Exception	Alternate Testing	Test Frequency	Max. Stroke Time (Sec.)	Remarks
			A	B	C	D											
MU33	2	F-5	X					2.5	GA	AO	OP	S F T	13	S F T	C C C	10	LEAK TEST PER APPENDIX J
MU242	2	K-2	X	X	X		X	1.5	SC	SA	LO	L	14	S	R		LEAK TEST PER APPENDIX J
MU66A	2	K-3	X					1.5	GL	AO	OP	S F T L L	15	S F T - S	C C C R R	12	LEAK TEST PER APPENDIX J
MU243	2	J-2	X		X		X	1.5	SC	SA	LO	L L	14	S F T - S	C C C R R	12	LEAK TEST PER APPENDIX J
MU66P	2	J-3	X					1.5	GL	AO	OP	S F T L L	15	S F T - S	C C C R R	12	LEAK TEST PER APPENDIX J
MU244	2	H-2	X	X	X		X	1.5	SC	SA	LO	L L	14	S F T - S	C C C R R	12	LEAK TEST PER APPENDIX J
MU66C	2	H-3	X					1.5	GL	AO	OP	S F T L L	15	S F T - S	C C C R R	12	LEAK TEST PER APPENDIX J
MU245	2	H-2	X		X		X	1.5	SC	SA	LO	L L	14	S F T - S	C C C R R	12	LEAK TEST PER APPENDIX J
MU66D	2	H-3	X					1.5	GL	AO	OP	S F T L L	15	S F T - S	C C C R R	12	LEAK TEST PER APPENDIX J

VALVE TEST PROGRAM

System MAKEUP AND PURIFICATION

Drawing No. 031

Rev. 31

Valve Number	Class	Drawing Coordinates	Valve Cat.				Passive	Size (Inches)	Valve Type	Actuator Type	Normal Position	Test Requirement	Code Exception	Alternate Testing	Test Frequency	Max. Stroke time (Sec.)	Remarks
			A	B	C	D											
MU59D	2	F-2	X					1	GL	MO	OP	S T L	15	S T -	C C R	30	LEAK TEST PER APPENDIX J
MU59C	2	F-2	X					1	GL	MO	OP	S T L	15	S T -	C C R	30	LEAK TEST PER APPENDIX J
MU59B	2	E-2	X					1	GL	MO	OP	S T L	15	S T -	C C R	30	LEAK TEST PER APPENDIX J
MU59A	2	D-2	X					1	GL	MO	OP	S T L	15	S T -	C C R	30	LEAK TEST PER APPENDIX J
MU38	2	E-5	X					1	GL	AO	OP	S F T L	15	S F T -	C C C R	12	LEAK TEST PER APPENDIX J
MU3	2	C-5	X					2.5	GA	AO	OP	S F T			Q Q Q	10	LEAK TEST PER APPENDIX J
MU2A	2	C-4	X					2.5	GA	MO	OP	S T	26	S T	C C	15	LEAK TEST PER APPENDIX J

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1
VALVE TEST PROGRAM

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System DECAY HEAT AND EMERGENCY CORE COOLING

Drawing No. 033

Rev. 34

Valve Number	Class	Drawing Coordinates	Valve Cat.				Passive	Size (Inches)	Valve Type	Actuator Type	Normal Position	Test Requirement	Code Exception	Alternate Testing	Test Frequency	Max. Stroke Time (Sec.)	Remarks
			A	B	C	D											
DH44	2	H-11		X			X	10	GA	MA	LO	L			R		FORWARD FLOW TEST WITH PUMP TEST
DH42	2	H-11			X			10	CK	SA	--	S			Q		
DH2734	2	K-9		X			X	18	GA	MO	OP	P			R		
DH87	2	F-5	X				X	8	GA	MA	LC	L			R		LEAK TEST PER APPENDIX J
DH88	2	F-4	X				X	8	GA	MA	LC	L			R		LEAK TEST PER APPENDIX J
CF29	1	B-2			X			14	CK	SA	--	S	17	S	R		VALVE INTEGRITY TESTED PER ST 5050.03
CF31	1	B-2			X			14	CK	SA	--	S	18	S	C		
DH77	1	C-2			X		X	10	SC	SA	LO	S	18	S	C		VALVE INTEGRITY TESTED PER ST 5050.03
HP51	1	C-2			X			2.5	CK	SA	--	S	19	S	C		FORWARD FLOW TEST
HP49	1	C-2			X		X	2.5	SC	SA	LO	S	19	S	C		FORWARD FLOW TEST
HP50	1	C-2			X			2.5	CK	SA	--	S	19	S	C		FORWARD FLOW TEST
HP48	1	C-2			X		X	2.5	SC	SA	LO	S	19	S	C		FORWARD FLOW TEST
CF28	1	B-3			X			14	CK	SA	--	S	17	S	C		VALVE INTEGRITY TESTED PER ST5050.03
CF30	1	B-3			X			14	CK	SA	--	S	18	S	C		
DH76	1	B-4			X		X	10	SC	SA	LO	S	18	S	C		VALVE INTEGRITY TESTED PER ST5050.03

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REV. 4-4/83

System DECAY HEAT AND EMERGENCY CORE COOLING

Drawing No. 033

Rev. 34

Valve Number	Class	Drawing Coordinates	Valve Cat.				Passive	Size (Inches)	Valve Type	Actuator Type	Normal Position	Test Requirement	Code Exception	Alternate Testing	Test Frequency	Max. Stroke Time (Sec.)	Remarks
			A	B	C	D											
HP59	1	C-4			X		X	2.5	CK	SA	--	S	19	S	C		FORWARD FLOW TEST WITH NORMAL MAKEUP
HP57	1	C-4			X		X	2.5	SC	SA	LO	S L	19	S	C C		FORWARD FLOW TEST WITH NORMAL MAKEUP
HP58	1	C-4			X			2.5	CK	SA	--	S	19	S	C		FORWARD FLOW TEST
HP56	1	C-4			X		X	2.5	SC	SA	LO	S L	19	S	C C		FORWARD FLOW TEST
HP2A	2	C-5		X				2.5	GL	MO	CL	S T	27	S T	C C	15	
HP2B	2	C-5		X				2.5	GL	MO	CL	S T	27	S T	C C	15	
HP27	2	C-7		X			X	4	GA	MA	LC	L			R		
DH1A	2	B-6		X			X	10	GA	MO	OP	P			R		
DH2736	2	B-5	X				X	1.5	GL	MO	CL	P			R		LEAK TEST PER APPENDIX J
DH2735	1	B-4	X				X	1.5	GA	MO	CL	P			R		LEAK TEST PER APPENDIX J
HP25	2	C-8		X			X	4	GA	MA	LO	L			R		
HP23	2	C-8			X			4	CK	SA	--	S			Q		FORWARD FLOW TEST WITH PUMP TEST
HP31	2	B-8		X			X	2	SC	SA MO	-- OP	S P			Q R		FORWARD FLOW TEST WITH PUMP TEST