



HIGH HEAD SAFETY INJECTION PUMPS & VALVES
(MONTHLY)
UNIT 2

Date _____
DSS _____

1.0 PURPOSE

- 1.1 The purpose of this test is to perform the following periodic inservice tests as required by Technical Specifications and/or the ASME Boiler & Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components."
 - 1.1.1 Monthly functional test of the SI pumps as per Technical Specification 15.4.5.II.A.1.
 - 1.1.2 Monthly functional test of 2SI-825A&B, SI pump RWST suction valves, as required by Technical Specification 15.4.5.II.B.4.
 - 1.1.3 Monthly functional test of 2SI-826A, B & C, SI pump BAT suction valves, as required by Technical Specification 15.4.5.II.B.4.
 - 1.1.4 Quarterly full stroke test of 2SI-826B&C as required by ASME Section XI. This test will be performed monthly with 1.1.3 above.
 - 1.1.5 Quarterly partial stroke of 2SI-889A&B, SI pump discharge check valves, as required by ASME Section XI. This test will be done monthly along with the pump test.
 - 1.1.6 Quarterly full stroke of 2SI-891A&B, SI pump mini-recirc check valves, as required by ASME Section XI. This test will be done monthly along with the pump test.
 - 1.1.7 Quarterly leak test of 2SI-842A&B, accumulator discharge check valves, as required by ASME Section XI. This will be done monthly during the pump test.
- 1.2 The functional test of the SI pumps also satisfies environmental qualification requirements.

2.0 PRECAUTIONS AND LIMITATIONS

- 2.1 If there is any problem in performing this test, immediately notify the duty shift superintendent. Operation of this equipment is a Technical Specification requirement.
- 2.2 Monitor accumulator levels while the SI pumps are running. A level increase will indicate leakage past the accumulator check valve.
- 2.3 The suction pressure gauge shall be isolated except for the time required to take readings.
- 2.4 There is no installed instrumentation to measure the flow through 2SI-891A or B, SI pump recirc line check valves. Satisfactory operation of a SI pump for 15 minutes without overheating is positive indication that its respective recirc line check valve is operable.
- 2.5 Technical Specification prohibits the testing of a safeguards component if the opposite trains diesel generator is out of service.
- 2.6 If at any time the pump suction pressure is less than the NPSH required, this test must be discontinued until the problem is corrected.



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3.0 INITIAL CONDITIONS

INITIALS

3.1 This test is being done by _____

_____ The normally scheduled test is: Sheet No. _____

_____ Post maintenance (equip. ID)

MWR No.(s) _____

Task Sheet No.(s) _____

_____ Special test - no numbers

Explain: _____

3.2 SIS is aligned for critical operation as per CL-7A or the valve lineup for mini-recirculation operation is checked.

3.3 G01 & G02, emergency diesel generators, are in service or the component(s) to be tested is/are in the same safeguards train as the diesel generator that is out of service.

3.4 Permission to Perform Test

The conditions required by this test are consistent with required plant conditions including equipment operability. Permission is granted to perform this test.

DSS _____ TIME _____ DATE _____

4.0 PROCEDURE

4.1 Pre-test Valve Position Verification/Alignment

Position

2SI-876A

2P15A Mini-recirc

Open

2SI-876B

2P15B Mini-recirc

Open

2SI-897A

SI test line AOV

Gag Open

2SI-897B

SI test line AOV

Gag Open

2SI-828

Blender to RWST

Shut

2WL-1729

RCDT pump to RWST

Shut

2SF-811

P33 to RWST

Shut

2RH-742A

RHR to RWST low flow

Shut

2SI-884

Containment SI test line

Open

2SI-825A

2P15A&B RWST suction MOV

Open

2SI-825B

2P15A&B RWST suction MOV

Open



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NOTE: When post-maintenance or operability testing of 2P15A or Train "A" components is not required, then NA all of Section 4.2 sub-steps.

4.2 2P15A and Train "A" Test

CAUTION: 2PI-974, SUCTION PRESSURE GAUGE FOR 2P15A&B, SHALL BE ISOLATED EXCEPT FOR THE TIME REQUIRED TO TAKE DATA.

NOTE: Accumulator level data is required to determine the position of 2SI-842A&B, accumulator discharge check valves, when an SI pump is operating.

4.2.1 Record accumulator level.

2T34A level per 2LI-938 _____ %
2T34B level per 2LI-934 _____ %

4.2.2 Check oil level of 2P15A at or above one-half sightglass. Contact the DSS for the type of replacement oil.

4.2.3 Verify open 2SI-896A, 2P15A pump suction MOV.

4.2.4 Record 2P15A static suction pressure on Attachment A.

4.2.5 Start 2P15A. Time start _____

4.2.6 Verify 2P15A suction pressure is ≥ 5 psig.

4.2.7 Check the mechanical seals and pump for excessive leakage, unusual noise, and overheating.

4.2.8 Check all flanges, packing, and joints, up to the containment penetrations, for leaks.

4.2.9 After a 15-minute run time, record data on Attachment A. Reference Note 2 for pump run time requirements when taking bearing temperature readings.

4.2.10 Record accumulator level and compare with Step 4.2.1 level.

2T34A level per 2LI-938 _____ % _____ % Δ L
2T34B level per 2LI-934 _____ % _____ % Δ L



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- 4.2.11 Remove the locking device and open 2SI-879B, containment SI test line isolation valve.

NOTE: A flow reading greater than 0 gpm verifies the partial stroke of 2SI-889A.

- 4.2.12 Record 2FI-929 test line flow on Attachment A, then shut 2SI-879B.

- 4.2.13 Stop 2P15A and observe its coastdown behavior for unusual noises, vibrations, or other abnormal conditions. Note results on Attachment A.

Time Stop _____

- 4.2.14 Check pump operability by comparing the pump data with the limits in the Operations Standing Order.

NOTE: When post-maintenance or operability testing of 2P15B or Train "B" components is not required, then NA all of Section 4.3 sub-steps.

4.3 2P15B and Train "B" Test

CAUTION: 2PI-974, SUCTION PRESSURE GAUGE FOR 2P15A&B, SHALL BE ISOLATED EXCEPT FOR THE TIME REQUIRED TO TAKE DATA.

NOTE: Accumulator level data is required to determine the position of 2SI-842A&B, accumulator discharge check valves, when an SI pump is operating.

- 4.3.1 Record accumulator level.

2T34A level per 2LI-938 _____ %

2T34B level per 2LI-934 _____ %

- 4.3.2 Check oil level of 2P15B at or above one-half sightglass. Contact the DSS for the type of replacement oil.

- 4.3.3 Verify open 2SI-896B, 2P15B pump suction MOV.

- 4.3.4 Record 2P15B static suction pressure on Attachment B.

- 4.3.5 Start 2P15B. Time start _____

- 4.3.6 Verify 2P15B suction pressure is ≥ 5 psig.



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4.3.7 Check the mechanical seals and pump for excessive leakage, unusual noise and overheating.

4.3.8 Check all packing, flanges, and joints, up to the containment penetrations, for leaks.

4.3.9 After a 15-minute run time, record data on Attachment B. Reference Note 2 for pump run time requirements when taking bearing temperature readings.

4.3.10 Record accumulator level and compare with Step 4.3.1 level.

2T34A level per 2LI-938 _____ % _____ %ΔL
2T34B level per 2LI-934 _____ % _____ %ΔL

4.3.11 Open 2SI-879B, containment SI test line isolation valve

NOTE: A flow reading greater than 0 gpm verifies the partial stroke of 2SI-889B.

4.3.12 Record 2FI-929 test line flow on Attachment B.

4.3.13 Stop 2P15B and observe its coastdown behavior for unusual noises, vibrations, or other abnormal conditions. Note results on Attachment B.

Time stop _____

4.3.14 Check pump operability by comparing the pump data with the limits in the Operations Standing Order.

NOTE: When post-maintenance or operability testing of 2SI-845A or B or E or F is not required, then N/A all of Section 4.4 sub-steps.

NOTE: Test of SI check valves per Section 4.4 should be performed whenever an SI pump is operated per Section 4.2 and/or 4.3.

4.4 Test of 2SI-845A, B, E & F

NOTE: This test measures the seat leakage of the four check valves in a parallel configuration against accumulator pressure, thereby verifying check valve position.

4.4.1 Verify 2SI-884 open, then open 2SI-879B, containment SI test line isolation valves.



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4.4.2 Observe test line flow and record.

2FI-929 _____ gpm

NOTE: If indicated flow in Step 4.4.2, was \geq a minimum discernable flow of 10 gpm, then NA Steps 4.4.3 and 4.4.4 and proceed to Step 4.4.5.

4.4.3 Shut 2SI-884 and observe 2PI-929 test line pressure for a period of 2 minutes and record pressure at the end of 2 minutes.

2PI-929 _____ psig

NOTE: If indicated pressure in Step 4.4.3 was ≤ 500 psig, then NA Step 4.4.4 and proceed to Step 4.4.5.

4.4.4 Depressurize the test line by throttling open 2SI-883 test line drain until a constant 100 psig test line pressure is indicated on 2PI-929. Measure the drain rate with a graduated cylinder and record, then shut 2SI-883.

Drain rate _____ sscm

4.4.5 Shut and lock containment SI test line isolation valves.

2SI-879B shut,

Lock No. _____

2SI-884 shut,

Lock No. _____

NOTE: When post-maintenance or operability testing of 2SI-826A or B or C is not required, then NA all of Section 4.5 sub-steps.

4.5 Stroke Test of 2SI-826A, B & C

4.5.1 Shut 2SI-826A.

Check the rising stem position indicator for shut indication.

4.5.2 Open 2SI-826B.

a. Time to open. _____ seconds

b. Check the rising stem position indicator for open indication.



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- 4.5.3 Shut 2SI-826B.
a. Time to shut. _____ seconds
b. Check the rising stem position indicator for shut indication.
- 4.5.4 Check valve operability by comparing the valve data with the limits in the Operations Standing Order.
- 4.5.5 Open 2SI-826C.
a. Time to open. _____ seconds
b. Check the rising stem position indicator for open indication.
- 4.5.6 Shut 2SI-826C.
a. Time to shut. _____ seconds
b. Check the rising stem indicator for shut indication.
- 4.5.7 Open 2SI-826A.
Check the rising stem indicator for open indication.
- 4.5.8 Check valve operability by comparing the valve data with the limits in the Operations Standing Order.
- 4.5.9 Record stop watch ID No. _____
- 4.5.10 Shut 2P-15 A&B SI pump suction from RWST MOV 2SI-825A.
- 4.5.11 Shut 2P-15 A&B SI pump suction from RWST MOV 2SI-825B.

4.6 Post-Test Independent Operator Verification:

Valve

POSITION

2SI-825A 2P-15A&B SI pump suction from RWST MOV
2SI-825B 2P-15A&B SI pump suction from RWST MOV
2SI-826A 2P-15A&B SI pump suction from BAT MOV
2SI-825B 2P-15A&B SI pump suction from BAT MOV
2SI-826C 2P-15A&B SI pump suction from BAT MOV
2SI-879B Containment SI test line manual
2SI-884 Containment SI test line manual
2SI-88C 2PI-974 gauge isolation
Safety injection/spray ready status panel lights normal

Auto-Shut
Auto-Shut
Auto-Open
Auto-Shut
Auto-Shut
Locked Shut
Locked Shut
Shut
Off



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5.0 ANALYSIS

NOTE: To be completed within 96 hours by manager - Operations or his representative.

5.1 Comparisons with allowable ranges of test values and analysis of deviations complete.

5.2 Any requirements for corrective action:

Yes _____ No _____

(If yes, give details in the remarks section.)

5.3 Data analyzed by _____

Time and date _____

Remarks:



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ATTACHMENT A
DATA SHEET
2P15A A SAFETY INJECTION PUMP

2PI-974 SAFETY INJECTION PUMP

PARAMETERS				INSTRUMENT	UNITS	READING	
Motor Current				C01 Amp	amps		
Pump Discharge Pressure				2PI-923	psig		
RWST Level During Test				2LI-972	%		
Pump Suction Pressure Before Test				2PI-974	psig		
Pump Suction Pressure During Test				2PI-974	psig		
Pump Differential Pressure				Note 3	psid		
Pump Vibration	Inboard Bearing	Vertical	C	Note 1, 5	mils/ips	mils	ips
		Horizontal	D	Note 1, 5	mils/ips		
		Axial	E	Note 1, 5	mils/ips		
	Outboard Bearing	Vertical	A	Note 1, 5	mils/ips		
		Horizontal	B	Note 1, 5	mils/ips		
Bearing Temperature (Note 2)	Pump	Inboard	H	Note 1, 5	°F		
		Outboard	J	Note 1, 5	°F		
	Motor	Inboard	F	Note 1, 5	°F		
		Outboard	G	Note 1, 5	°F		
	Ambient Air Temperature			Note 1, 4	°F		
RWST Temperature				2TI-960	°F		
Coastdown Behavior (v) If OK				N/A	N/A		

Valve Stroke Verification Data	INSTRUMENT	UNITS	READING
?SI-889B Test Line Flow	2FI-929	gpm	



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ATTACHMENT B
DATA SHEET
2P15B B SAFETY INJECTION PUMP

PARAMETERS				INSTRUMENT	UNITS	READING	
Motor Current				C01 Amp	amps		
Pump Discharge Pressure				2PI-922	psig		
RWST Level During Test				2LI-972	%		
Pump Suction Pressure Before Test				2PI-974	psig		
Pump Suction Pressure During Test				2PI-974	psig		
Pump Differential Pressure				Note 3	psid		
Pump Vibration	Inboard Bearing	Vertical C	Note 1, 5	mils/ips	mils	ips	
		Horizontal D	Note 1, 5	mils/ips			
		Axial E	Note 1, 5	mils/ips			
	Outboard Bearing	Vertical A	Note 1, 5	mils/ips			
		Horizontal B	Note 1, 5	mils/ips			
	Bearing Temperature (Note 2)	Pump	Inboard H	Note 1, 5	°F		
Outboard J			Note 1, 5	°F			
Motor		Inboard F	Note 1, 5	°F			
		Outboard G	Note 1, 5	°F			
Ambient Air Temperature			Note 1, 4	°F			
RWST Temperature				2TI-960	°F		
Coastdown Behavior (v) If OK				N/A	N/A		

Valve Stroke Verification Data	INSTRUMENT	UNITS	READING
2SI-889B Test Line Flow	2FI-929	gpm	

PARAMETER	TEST INSTRUMENT ID NO.
Vibration	
Bearing Temperature	
Ambient Air Temperature	



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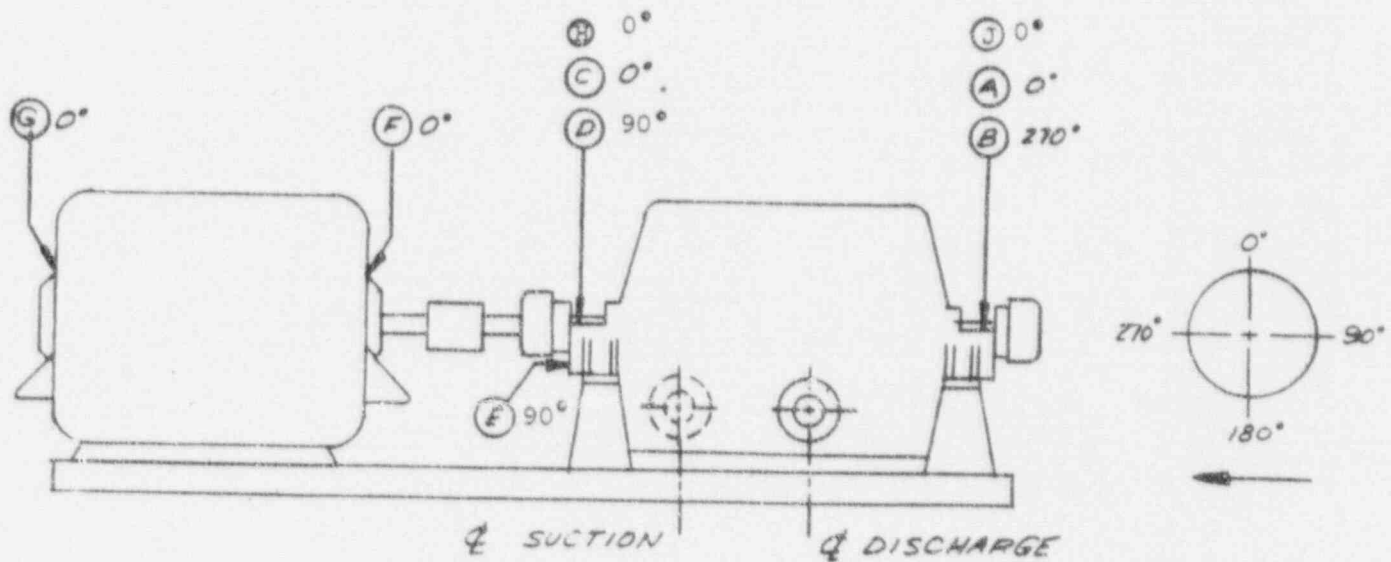
NOTES

- NOTE 1: *Log the identification number of the portable instrument being used.*
- NOTE 2: *Readings taken only during the first run of January, after pump maintenance, or when establishing new reference values. These readings will be taken after bearing temperatures have stabilized. Stabilized is defined as being three successive readings taken at 10-minute intervals that do not vary by more than 3% (approximately $\pm 3^{\circ}\text{F}$).*
- NOTE 3: *Differential pressure = Pump discharge pressure - Pump suction pressure during test.*
- NOTE 4: *Ambient air temperature is taken approximately one foot above the pump inboard bearing.*
- NOTE 5: *Vibration readings will be taken at Locations A, B, C, D, and E as shown on Figure 1. Temperature readings will be taken at locations F, G, H, and J.*



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SAFETY INJECTION PUMP

FIGURE 1