

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

Date _____
DSS _____

RECORD

PROCEDURE VERIFIED CURRENT AND CHECKED FOR TEMPORARY CHANGES. IF FIELD
COPIES REQUIRED, USE PBF-0026; LAW NP 1.2.4 AND DO NOT COMPLETE THIS BLOCK.

BY: _____ DATE: _____

1.0 PURPOSE

To detect and quantify leakage from the components comprising the high head safety injection and residual heat removal systems.

- 1.1 This test is part of the Leakage Reduction and Preventive Maintenance Program required by NUREG-0578, Item 2.1.6a.
- 1.2 This test is part of the program to evaluate the integrity of post-accident recovery systems outside containment as required by Technical Specification Table 15.4.1-2(22).
- 1.3 To hydrostatically test, inspect and measure leakage from components of the RHR system including intersystem leakage as required by the Containment Leakage Rate Testing Program Basis Document, Attachment 2.
- 1.4 Refueling frequency, quantified seat leakage testing of valves 2SI-854B, 2RH-706B, as required by ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inspection of Nuclear Power Plant Components."
- 1.5 This procedure fulfills the 40-month functional pressure test requirements for Class 2 HHSI and RHR piping in accordance with ASME Section XI and PBNP Pressure Test Program.

2.0 REFERENCES

- 2.1 EDS Nuclear Report, "Leakage Reduction and Preventive Maintenance Program at Point Beach Nuclear Plant," dated 07-24-80
- 2.2 EDS Nuclear, "High Pressure Safety Injection System Leakage Test," TMI-02, dated 12-17-80
- 2.3 P&IDs
 - 2.3.1 110E035, Sheets 1 and 2 SIS
 - 2.3.2 110E029, Sheet 1 Aux Coolant System
- 2.4 Technical Specification Table 15.4.1-2, Item 22

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

- 2.5 Containment Leakage Rate Testing Program Basis Document, Attachment 2
- 2.6 OI 65, "Post-Maintenance Pressure Testing"
- 2.7 NUREG-0578, Item 2.1.6.a, "Leakage Reduction and Preventive Maintenance Program"
- 2.8 IR 96-006, NRC Inspection Report; NRC Commitment for Operations Procedures PMT/QC Reviews

3.0 PRECAUTIONS

- 3.1 IF THERE IS ANY PROBLEM IN PERFORMING THIS TEST, IMMEDIATELY NOTIFY THE DUTY SHIFT SUPERINTENDENT. OPERATION OF THIS EQUIPMENT IS A TECHNICAL SPECIFICATION REQUIREMENT.
- 3.2 Liquids leaking from various components of the HHSI or RHR systems will be mildly radioactive, and appropriate health physics practices should be observed.
- 3.3 Hydro Pumps:
 - 3.3.1 Hydro pump skids must be prevented from rolling (i.e., wheels chocked, brakes locked, chained to wall, etc.) to minimize the risk of RHR piping damage in a seismic event.
 - 3.3.2 When a hydro pump is connected to a radioactive liquid system, maintain the test point valve shut until hydro pump pressure is established, and shut the test point valve before securing the hydro pump on depressurizing to prevent contamination of the hydro hose(s) and pump.
- 3.4 2PI-974, SI pump suction pressure gauge shall be isolated during this test, as it is outside the test boundary.
- 3.5 LHSI pump suction pressure will be read on the installed gauges in the No. 3 lower pipeway on El. 8'.

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

- 3.6 If, at any time, RHR or SI pump suction pressure is less than the NPSH required, this test must be discontinued until the problem is corrected. The SI pump must not be operated without the associated RHR pump operating and the associated low head to high head crossconnect open.
- 3.7 Limit the run time of the HHSI pumps to ≤ 25 minutes when solely on mini-recirc flow. Measured mini-recirc flow is 110 gpm. Minimum total flow for continuous operation is 225 gpm.
- 3.8 Limit the run time of the LHSI pumps to ≤ 30 minutes when solely on mini-recirc flow (design flow rate of 150 gpm). Minimum total flow for continuous operation is 520 gpm.

INITIALS

4.0 INITIAL CONDITIONS

- 4.1 RHR is aligned for LHSI per CL 7A. _____
- 4.2 HHSI is aligned per CL 7A. _____
- 4.3 Standby emergency power shall be available to the 4160 V safeguards buses 1A05, 1A06, 2A05, 2A06, or the component(s) to be tested is/are in the same train that is out of service. _____
- 4.4 The orifice is installed in:
- 4.4.1 2FE-659 of the HHSI high flow recirc line. _____
- 4.4.2 2FE-660 of the LHSI high flow recirc line. _____
- 4.5 An RWP is available, including entry into containment. _____
- 4.6 If a 40-month functional pressure test is required, then:
- 4.6.1 Pre-test data of Attachments E and F are completed. _____
- 4.6.2 The QTS inspector is notified of the test. _____
- 4.6.3 The ANII inspector is notified of the test. _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

4.7 The following equipment is available:

4.7.1 Stopwatch

4.7.2 Graduated cylinder in ml or cc

4.7.3 Leakage collection apparatus for 2 collection points

4.7.4 Pressure test gauge for 350 psig

4.8 A PAB qualified auxiliary operator with no other duties has been assigned to assist in performing this test.

4.9 Haskal hydro pump is available on the El. 8' of the PAB with hydro hose to connect to 2RH-V2, 2P-10B suction gauge isolation, and a rule to measure reservoir water level.

4.10 A SRO has conducted a briefing with all personnel involved in this test. This briefing consists of:

4.10.1 The possibility of exceeding design flow of the RHR pumps since both the RHR full flow recirc line and the SI pump full flow recirc line will be in operation.

4.10.2 Exercise caution when conducting the leak check of 2SI-829B so that a spill of RWST water does not occur from vent valve 2SI-V23.

4.11 **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 _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

5.0 SEAT LEAKAGE TEST OF RHR TRAIN B VALVES

5.1 Alignment of RHR High Flow Test Line

5.1.1 Verify 2RH-706A&B, test line isolation valves, are shut firmly. _____

5.1.2 Attach a Tygon tube to 2RH-V16 and route the tube to an elevation greater than the highest point within the boundary of 2RH-706A&B and 742. Secure the Tygon in place to act as a system overflow vent. _____

NOTE: *This procedure assumes that the 2FE-660 orifice is installed and the blank is removed. Otherwise the fill and vent of the test line will need to be modified by filling through 2RH-706A or B.*

5.1.3 With all test line vents and drains shut, partially open 2RH-742 and 742B. _____

5.1.4 Crack open 2RH-V16 to fill/prime the test line and leak detection hose until it overflows into a container, then shut 2RH-742 and 742B firmly. _____

5.1.5 Fully open 2RH-V16. Measure and record a stabilized baseline leak rate, if any, at 2RH-V16.
Baseline Leakage = _____ sccm _____

5.1.6 Shut 2RH-V16. _____

5.2 Alignment of Spray system

5.2.1 Attach a Tygon tube to the swagelock tee at 2SI-848K and route the tube to an elevation greater than the highest point within the boundary of 2SI-870B, 871B, 860C and 860D. Secure the Tygon in place to act as a system overflow vent. _____

5.2.2 Crack open 2SI-848K to prime the leak detection hose until it overflows into a container, then shut 2SI-848K. _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

5.3 Venting RHR to HHSI Piping

- 5.3.1 Route tubing to floor drain from 2RH-V4, HX-11B RHR HX supply to SI and spray vent. _____
- 5.3.2 Crack open 2RH-V4 and vent piping until a steady stream of water is apparent, then shut 2RH-V4. _____
- 5.3.3 Install the digital pressure gauge at 2RH-V4 and open 2RH-V4. _____

CAUTION AS RHR SYSTEM PRESSURE IS INCREASED TO TEST PRESSURE, THE LEAK-OFF POINT AT 2RH-V16 MUST BE MONITORED TO PREVENT LEAK-OFF CONTAINER OVERFILLING.

CAUTION IF A UNIT 2 SAFEGUARDS OR REACTOR PROTECTION ACTUATION OCCURS AT ANY TIME DURING PERFORMANCE OF THE REMAINDER OF THIS PROCEDURE SECTION:

- 1) VERIFY OPEN 2SI-856B AND 2SI-870B.
- 2) VERIFY 2P-10B AND 2P-14B CONTROL SWITCHES TO AUTO.
- 3) IF 2ICP-666B IS IN PROGRESS, DIRECT I&C PERSONNEL TO RESTORE 2RH-625 TO FULLY OPERATIONAL STATUS AND INFORM CONTROL ROOM WHEN RESTORATION IS COMPLETE.
- 4) SHUT 2RH-V2 AND SECURE THE HYDRO PUMP.

NOTE: Notify ISI inspector that 40 month inspection will take place at Step 5.10.1, if required.

- 5.4 Enter LCO for Train B RHR, if required, and notify I&C that 2ICP-666B may commence. _____
- 5.5 Place the 2P-10B RHR pump control switch in PULLOUT. _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

5.6 Verify the following valves shut, to isolate the test volume:

2SI-851B	2P-10B sump "B" suction MOV	_____
2SI-856B	2P-10B RWST suction MOV	_____
2SI-852B	LHSI Core Deluge MOV	_____
2SI-871B	RHR to 2P-14B suction MOV	_____
2RH-720	RHR Return to RCS MOV	_____
2RH-823B	2P-10B suction drain	_____
2RH-713B	2HX-11B/A inlet crossconnect	_____
2RH-716C	2HX-11B/A outlet crossconnect	_____
2SI-857B	RHR to 2P-15B suction manual isol	_____
2RH-704B	2P-10B loop suction manual isolation	_____

5.7 Shut 2RH-V2, then disconnect the suction gauge tubing at 2RH-V2 and connect the hydro hose to the welded reducer at 2RH-V2. _____

5.8 With 2RH-V2 shut, operate the hydro pump per appropriate part of OI 65 to raise discharge pressure to 100 psig. _____

5.9 Open 2RH-V2 and raise test volume pressure per OI 65 to 350 (+25, -0) psig as indicated on 2PI-629, and record pressure on digital pressure indicator. _____ psig _____

NOTE: *To save time, the following leakage measurements should be determined concurrently.*

5.10 Maintain a stable test pressure for 10 minutes, then quantify the following:

5.10.1 If 40-month pressure test is required, notify QTS/ANI to begin inspection, and record data required by Attachment F. _____

5.10.2 Walkdown piping and components, and record leakage to atmosphere on Attachment B. _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

NOTE: *RHR system pressure should indicate approximately the same pressure as Step 5.9 as read on the digital pressure indicator prior to taking ΔH and ΔT readings.*

- 5.10.3 Total input pumping rate in sccm by accurately measuring the pump reservoir draw down over a suitable period of time. Minimum run time for measurement is 15 minutes unless a high pumping rate ($>1"/\text{minute}$) is experienced. Measure the change in inches (ΔH) in reservoir level over a corresponding time interval (ΔT) in minutes and record.

ΔH = _____ inches
 ΔT = _____ minutes
1PI-629 = _____ psig

- 5.10.4 2RH-706B leak rate determination

- a. Open 2RH-V16 and record leak rate through 2RH-706B at 2RH-V16 = _____ sccm
- b. When leak rate measurement for 2RH-706B is complete, shut 2RH-V16.

- 5.10.5 Quantify 2P-10B seal leakage = _____ sccm

- 5.11 Calculate the boundary valve leak rate as follows:

_____ (5.10.4.a) sccm - _____ (5.1.5) sccm = _____ 2RH-706B sccm

(5.10.5) _____ 2P-10B Seal sccm

Boundary total (sum of above leak rates) _____ sccm

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

- 5.12 Calculate the leak rate attributable to 2SI-856B and 2RH-823B using the following:

$$946 \frac{\text{cc}}{\text{in}} \times \frac{\Delta H}{\Delta T} = 946 \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \text{ total sccm}$$

$$\text{total sccm} - 5.11 = 2\text{SI-856B/823B valve leakage}$$

$$\underline{\hspace{1cm}} - \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \text{ sccm}$$

- 5.13 2SI-871B Seat Leakage Test

5.13.1 Enter the LCO for Train B Spray system, if required.

5.13.2 Place the 2P-14B control switch in PULLOUT.

5.13.3 Shut 2SI-870B.

5.13.4 Open 2SI-848K and measure 2SI-871B leak rate at
2SI-848K = sccm

5.13.5 Shut 2SI-848K.

- 5.14 When inspection/data collection per Attachment(s) B and F (if required) is complete, evaluate Train B RHR Tech Spec leakage, and if >1.5 gal/hr (95 sccm), perform Attachment G troubleshooting.

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

NOTE: *RHR system pressure should indicate approximately the same pressure as Step 5.9 as read on digital pressure indicator pressure taking ΔH and ΔT readings.*

NOTE: *Although the target test pressure is 350 psig for seat leakage measurement of 2SI-854B, the minimum acceptable pressure is 100 psig as indicated by 2PI-629. If 2PI-629 pressure stabilizes at <100 psig after opening 2SI-856B, then record the maximum achievable hydro pump data per Step 5.15 and, in addition, perform the special test of Attachment A.*

- 5.15 Electrically open 2SI-856B, then operate the hydro pump to restore test volume pressure to 350 (+25, -0) psig and record as in Step 5.10.3.

ΔH	=	_____	inches
ΔT	=	_____	minutes
1PI-629	=	_____	psig

- 5.16 When inspection/data collection of Attachments B and F (if required) is complete, shut 2RH-V2.

5.16.1 Secure and disconnect the hydro pump per OI 65.

5.16.2 Depressurize test volume per OI 65 by opening 2RH-706B and 2RH-742A.

5.16.3 Shut 2RH-706B.

5.16.4 Shut 2RH-742A.

PMT

- 5.17 Reconnect the suction gauge tubing at 2RH-V2 and leak check by momentarily opening 2RH-V2.

5.18 Determine baseline leak rate for 2SI-871B by opening 2SI-848K and measuring leak rate at 2SI-848K = _____ sccm.

5.19 Shut 2SI-848K.

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

- 5.20 Open 2SI-870B. _____
- 5.21 Place 2P-14B control switch to AUTO. _____ / _____
- 5.22 End LCO for Train B Spray. _____
- 5.23 Verify open 2SI-856B. _____
- 5.24 Place 2P-10B control switch to AUTO. _____ / _____
- 5.25 Verify 2ICP-666B is complete and end LCO for Train B RHR, if required. _____
- 5.26 Shut 2RH-V4. Disconnect digital pressure gauge, then cap 2RH-V4. _____
- 5.27 Complete the test data sheet section for seat leakage rates of 2P-10B suction valves. _____
- 5.28 Remove and store all tygon tubing installed for this test. _____

6.0 TRAIN B LHSI/HHSI "PIGGYBACK" TEST

6.1 Pre-Test System Alignment/Verification

6.1.1 Verify the valve position of the following:

		<u>POSITION</u>	
2SI-897A	SI test line isolation AOV	Gag Open	_____
2SI-897B	SI test line isolation AOV	Gag Open	_____
2RH-742A	RHR to RWST low flow	Shut	_____
2SI-828	U2 blender to U2 RWST	Shut	_____
2SF-811	P-33 to U2 RWST	Shut	_____
2WL-1729	RCDT pump to U2 RWST	Shut	_____
2SI-876B	2P-15B mini-recirc	Open	_____

6.1.2 Verify oil level in 2P-15B at or above one-half sightglass.
Contact the DSS for the type of oil required. _____

6.1.3 Verify proper oil level in the thrust bearing housing of 2P-10B.
Contact the DSS for the type of oil required. _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

6.1.4 Verify a primed solid condition of the HHSI high flow test line:

- a. Verify 2SI-829A, B, and D shut. _____
- b. Open 2SI-V23, test line high point vent, to a container and observe no leakage of 2SI-829A, B, and D at static head. _____
- c. Crack open 2SI-829C&D to fill the test line until a solid stream is observed at 2SI-V23, then shut firmly 2SI-829C&D. _____
- d. If leakage persists at 2SI-V23, then verify shut 2SI-829A&B. _____
- e. Record background leak rate at 2SI-V23, if any.
_____ SCCM _____
- f. Shut 2SI-V23. _____

6.2 HHSI Train B Leakage Test

***CAUTION* IF A SAFEGUARDS ACTUATION OR A REACTOR PROTECTION SYSTEM ACTUATION SHOULD OCCUR ON UNIT 2 WHILE PERFORMING THIS TEST, THEN IMMEDIATELY PROCEED TO STEP 6.2.28 RECOVER SYSTEMS PER STEPS 6.2.28 THROUGH 6.2.40, THEN TERMINATE THIS TEST.**

- 6.2.1 Unlock and open 2RH-742, high flow test line RWST isolation. _____
- 6.2.2 Position 2RH-742B, high flow test line FCV, to 32% open position (~1000 gpm). _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

6.2.3 If 2FE-660 blank was removed and orifice installed for this test, then fill and vent the high flow test line until water issues at 2RH-V16 and V17 high point vents. Otherwise, N/A this step.

6.2.4 Enter LCO for Train B RHR, if required.

6.2.5 Place 2P-10B control switch to PULLOUT.

6.2.6 Shut 2RH-733B, 2P-10B mini-recirc isolation.

6.2.7 Unlock and open 2RH-706B, high flow test line inlet isolation.

6.2.8 Verify open 2SI-856B, 2P-10B RWST suction MOV.

6.2.9 Verify 2P-10B discharge pressure at <50 psig per 2PI-629.

6.2.10 Align 2PI-653B, 2P-10B suction pressure gauge, for service:

a. Shut 2RH-V2A, 2PI-653B vent.

b. Open 2RH-V2, suction gauge root isolation.

c. Open 2RH-V2B, 2PI-653B inlet isolation.

6.2.11 Start 2P-10B.

***CAUTION* MONITOR AND VERIFY 2P-10B SUCTION
PRESSURE IS >0 PSIG PER 2PI-653B ANYTIME
FLOW IS CHANGED.**

6.2.12 Verify 2P-10B suction pressure is >0 psig.

6.2.13 Position 2RH-742B for a test line flow of 600 \pm 50 gpm per 2FIT-660.

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

NOTE: *Identify in remarks section any leakage observed from the pump or mechanical seals. Also include amount (seals wet, drops per minute, etc.), color, and any other comments.*

- | | | |
|--------|---|-------|
| 6.2.14 | Check the pump and mechanical seals for leakage, unusual noise, and evidence of overheating. | _____ |
| 6.2.15 | Enter LCO for Train B HHSI, if required. | _____ |
| 6.2.16 | Place 2P-15B control switch to PULLOUT. | _____ |
| 6.2.17 | Shut 2SI-896B, 2P-15B suction MOV. | _____ |
| 6.2.18 | Slowly open 2SI-857B, low head to high head crossconnect, to full open. | _____ |
| 6.2.19 | Inspect bonnet vent tubing for leakage past the isolation valve, 2SI-857F. Collect, measure, and time any observed leakage. Record required data on Attachment D. | _____ |
| 6.2.20 | <u>If necessary</u> , shut 2SI-857E. | _____ |
| 6.2.21 | Visually inspect the shaft seals of 2P-15B. Collect, measure, and time any observed leakage. Record required data of Attachment C, Section 1.0. | _____ |

CAUTION **DO NOT SECURE 2P-10B WITHOUT FIRST SECURING 2P-15B OR A TOTAL LOSS OF 2P-15B SUCTION MAY OCCUR, RESULTING IN PUMP DAMAGE. IF 2P-10B POWER IS LOST FOR ANY REASON, THEN IMMEDIATELY SECURE 2P-15B.**

NOTE: *Reference P&L 3.7.*

- | | | |
|--------|---------------|-------|
| 6.2.22 | Start 2P-15B. | _____ |
|--------|---------------|-------|

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

6.2.23 Open 2SI-V23 to a container and when a stable leak rate, if any, is observed, quantify the leakage over time and record the required data of Attachment C, Section 2.0. Then shut and cap 2SI-V23.

6.2.24 With 2SI-829B shut, collect and record 2SI-829B leakage to atmosphere on Attachment D.

NOTE: *The 2P-15B SI pump must run 10 minutes at test pressure prior to start of inspection for Attachment E.*

6.2.25 For a 40-month test, perform the following substeps. Otherwise N/A these substeps.

- a. Open 2SI-829B, open and backseat 2SI-829D, HHSI high flow test line isolation valves.
- b. Adjust 2SI-829C for a test line flow of 250 ± 25 gpm per 2FIT-659.
- c. Unlock and shut 2SI-876B, 2P-15B mini-recirc isolation valve.
- d. Record pressure achieved and inspection start data on Attachment E.

6.2.26 Visually inspect the shaft seals of 2P-15B. Collect, measure, and time any observed leakage. Record required data of Attachment C, Section 3.0.

6.2.27 Visually inspect the piping system and components: valve stems and body to bonnet joints, pipe flanges/orifices, vent and drain plugs/caps, instrument line fittings/gauges listed on Attachment D. Collect, measure, time, and record observed leakage. Record data on Attachment D.

6.2.28 When all data is completed, including Attachment E for 40-month tests, secure 2P-15B and place control switch to PULLOUT.

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

		<u>INITIALS</u>
6.2.29	Secure 2P-10B and place control switch to PULLOUT.	_____
6.2.30	Red lock open 2SI-876B. Lock No. _____	_____/_____ _____
6.2.31	Red lock shut:	
	2SI-829B Lock No. _____	_____/_____ _____
	2SI-829D Lock No. _____	_____/_____ _____
	2RH-742 Lock No. _____	_____/_____ _____
6.2.32	Shut 2SI-857B.	_____/_____ _____
6.2.33	Shut 2SI-829C.	_____ _____
6.2.34	Open 2SI-896B, 2P-15B suction MOV.	_____/_____ _____
6.2.35	Place 2P-15B control switch to AUTO.	_____/_____ _____
6.2.36	Exit LCO for Train B HHSI, if required.	_____ _____
6.2.37	Remove 2P-10B suction gauges from service:	
	a. Shut 2RH-V2.	_____ _____
	b. Open 2RH-V2A.	_____ _____
	c. Shut 2RH-V2B.	_____ _____
6.2.38	Red lock shut 2RH-706B. Lock No. _____	_____/_____ _____
6.2.39	Red lock open 2RH-733B. Lock No. _____	_____/_____ _____
6.2.40	Place 2P-10B control switch to AUTO.	_____/_____ _____
6.2.41	Exit LCO for Train B RHR, if required.	_____ _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

INITIALS

7.0 ACCEPTANCE CRITERIA

Leakage criteria of the Leakage Reduction and Preventive Maintenance Program are used to evaluate the leakage from safety injection system components to atmosphere. Total leakage from all post-accident system (not just safety injection system) components, located in a specific area of the plant, is limited by Criterion 1 or Criterion 2. Total post-accident system leakage from all areas of the plant is limited by Criterion 3. Thus, acceptance of these test results require their evaluation together with the results of the other post-accident system leakage tests.

8.0 ANALYSIS

TO BE COMPLETED BY THE OPERATIONS MANAGER OR HIS
REPRESENTATIVE.

8.1 Comparison with allowable ranges of test values and analysis of
deviations complete. _____

8.2 Any requirements for corrective action?

Yes _____ No _____

If yes, give details in the remarks section and MWR No. _____

8.3 Data analyzed. By _____

Date _____

Remarks:

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

TEST DATA SHEET

1.0 Valve Seat Leakage

NOTE: All leak rates are in sccm.

NOTE: Column A data is information only. Column B data is applicable to Technical Specifications and NUREG 0578.

		<u>Col. A</u>	<u>Col. B</u>
1.1	2SI-856B and 2RH-823B (Reference Step 5.12)		<u> </u>
1.2	2SI-854B (Reference Step 5.15 and Attachment A)		
	$946 \frac{\text{cc}}{\text{in}} \times \frac{\Delta H}{\Delta T} = 946 \times \underline{\hspace{1cm}} = \underline{\hspace{1cm}} \text{ sccm}$ <p>minus Boundary leakage (Step 5.11) =</p> <p>or Attachment A = <u> </u> gpm</p>		<u> </u>
1.3	2RH-706B (Reference Step 5.11) =		<u> </u>

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

ATTACHMENT A

Seat Leakage Test of 2SI-854B Using P-33

NOTE: *This test is required when the seat leakage of 2SI-854B exceeds the pumping rate of the hydro pump and test system pressure per 2PI-629 is <100 psig per Step 5.16.*

INITIALS

- | | | |
|------|---|------------|
| 1.0 | Shut 2RH-V2, then secure the hydro pump. | _____ |
| 2.0 | Secure SFP recirc or Unit 1 RWST recirc (Refer to U1 PC-25A, Part 1), if in operation. | _____ |
| 3.0 | Align P-33 for Unit 2 RWST recirc (Refer to U2 PC-25) at 20 gpm per FI-636 by throttling with 2SF-811. | _____ |
| 4.0 | Verify 2RH-701 shut, then open 2SF-819 and verify FI-636 flow remains at 20 gpm. | _____ |
| 5.0 | Shut 2RH-709B and 733B. | _____ |
| 6.0 | Open 2RH-704B to ~25% open and allow flow at FI-636 to stabilize. | _____ |
| 7.0 | Record the following data: | |
| | P-33 flow per FI-636 | _____ gpm |
| | P-33 pressure per PI-651 | _____ psig |
| | Test volume pressure per 2PI-629 | _____ psig |
| | | _____ |
| 8.0 | Shut 2SF-819 and 2RH-704B. | _____ |
| 9.0 | When P-33 flow has stabilized, record the following data: | |
| | P-33 flow per FI-636 | _____ gpm |
| | P-33 pressure per PI-651 | _____ psig |
| | Test volume pressure per 2PI-629 | _____ psig |
| | | _____ |
| 10.0 | Open 2RH-733B and 709B, then return P-33 to previous status or as directed by the DSS when the testing is complete. | _____ |

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

Attachment A

INITIALS

11.0 Calculate 2SI-854B seat leakage as P-33 flow in Step 7.0 minus P-33 flow in
Step 9.0 = _____ gpm. Record this leakage on the test data sheet, Step 1.2.

12.0 Return to procedure Step 5.15.

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

ATTACHMENT B

<u>Component ID</u>	<u>Component Description</u>	<u>Leakage Rate (sccm)</u>
<u>2P-10B RHR Pump Cubicle</u>		
2RH-823B	2P-10B suction low point drain	_____
2RH-V12	2P-10B seal supply vent	_____
2RH-V13	2P-10B seal heat exchanger inlet vent	_____
2RH-711F	2P-10B seal leak telltale	_____
Flange	2P-10B seal RO flange	_____
2RH-711B	2PT-629 root valve	_____
2P-10B	Pump seals	_____
<u>PAB General Area South, El. -19'</u>		
2PT-629	2P-10B discharge pressure transmitter	_____
<u>Unit 2 RHR Pipeway</u>		
2RH-710B	2P-10B discharge check valve	_____
2RH-709B	2P-10B discharge isolation	_____
2RH-713B	2P-10B discharge crossconnect	_____
2SI-851B	2P-10B "B" sump suction MOV	_____
2SI-851D	Pressure equalizer for 2SI-851B	_____
2RH-715B	2HX-11B inlet isolation	_____
2RH-D5	2HX-11B interpass drain	_____
2RH-D6	2HX-11B interpass drain	_____
2RH-D7	2HX-11B interpass drain	_____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

Attachment B

Leakage Rate
(sccm)

Component ID Component Description

PAB General Area South, El. -5'

2RH-625	2HX-11B discharge TCV	_____
2RH-716B	2HX-11B outlet isolation	_____
2RH-716C	2HX-11B outlet crossconnect	_____

PAB General Area South, El. 8'

2RH-V7	Train B RHR to SI and spray suction line vent (above HR-36)	_____
2RH-D12	Train B RHR to SI and spray suction line drain	_____
2RH-711E	2P-10B seal water supply	_____
2FT-928	Train B RHR flow transmitter	_____
2RH-V4	Train B RHR to SI and Spray suction line vent (above 2RH-742)	_____

Lower Pipeway #3

2RH-V2B	2PI-653B root valve	_____
2RH-V2A	2PI-653B bleed-off for seat leakage of 2RH-V2B	_____
2RH-V2C	2PI-654B root valve	_____
2PI-654B	2P-10B RHR suction pressure indication	_____
2SI-856B	2P-10B RWST suction MOV	_____
2SI-854B	2P-10B RWST suction check	_____
2RH-V2	2PI-653B and 654B root valve	_____
2RH-704B	2P-10B RCS loop suction isolation	_____
2RH-848F	2FT-928 high pressure root	_____
2RH-848E	2FT-928 low pressure root	_____
2FE-928	Train B RHR flow orifice	_____
2RH-733B	2P-10B mini-recirc isolation	_____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

Attachment B

Lower Pipeway #3 (continued)

2RH-706A	2P-10A high flow test line isolation	_____
2RH-706B	2P-10B high flow test line isolation	_____
2RH-D14	High flow test line drain	_____
2RH-V16	High flow test line vent	_____
2RH-V17	High flow test line downstream vent	_____
2RH-D15	High flow test line drain	_____
2RH-742B	High flow test line flow control	_____
2RH-890C	RH-742 RHR return thermal release	_____
2FE-660	High flow test line orifice flange	_____
2RH-662A	2FIT-660 high side root	_____
2RH-662B	2FIT-660 low side root	_____
2FIT-660	High flow test line flow indicator transmitter	_____
P22	Train B RHR discharge containment penetration	_____

Containment Spray and SI Pump Area

2SI-871B	Train B RHR/CS crossconnect MOV	_____
2SI-857B	Train B RHR/SI crossconnect isolation	_____
2SI-857F	2SI-857B second off isolation	_____

Other miscellaneous system components _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

ATTACHMENT C

2P-15B PUMP SEAL LEAKAGE & 2SI-829B SEAT LEAKAGE

1.0 SEAL LEAK RATE WITH 2P-15B SECURED

2P-10B Discharge Pressure Per 2PI-629 = _____ psig

_____ cc/collected _____ seconds

Leak Rate = (cc collected/sec) (60 sec/min) = _____ SCCM

2.0 2SI-829B SEAT LEAK RATE

2P-15B Discharge Pressure per 2PI-922 = _____ psig

_____ cc/collected _____ seconds

Leak Rate = (cc collected/sec)(60 sec/min) = _____ SCCM

Background Leak Rate (Step 6.1.4.e) = _____ SCCM

3.0 SEAL LEAK RATE WITH 2P-15B OPERATING

2P-10B Discharge Pressure Per 2PI-629 = _____ psig

2P-15B Discharge Pressure Per 2PI-922 = _____ psig

_____ cc collected _____ seconds

Leak Rate = (cc collected/sec) (60 sec/min) = _____ SCCM

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

ATTACHMENT D

TRAIN B ATMOSPHERIC LEAKAGE

<u>COMPONENT</u>	<u>DESCRIPTION</u>	<u>LEAKAGE RATE (SCCM)</u>
<u>Components Located in Containment Spray/SI Pump Area</u>		
2SI-857B	RHR/SI crossconnect.....	_____
2SI-857F	2SI-857B second off isolation	_____
2SI-896B	2P-15B suction MOV	_____
Flange	2P-15B suction flange	_____
2SI-D9	2P-15B discharge line drain	_____
Flange	2P-15B discharge flange.....	_____
2SI-881B	2PT-922 root valve	_____
2PT-922	2P-15B discharge pressure transmitter	_____
2SI-803B	2PI-913B root valve.....	_____
2SI-889B	2P-15B discharge check valve.....	_____
2SI-888B	2P-15B discharge isolation.....	_____
2SI-829A	2P-15A&B SI pumps discharge crossconnect.....	_____
2SI-891B	2P-15B mini-recirc check valve	_____
2SI-829B	2P-15A&B SI pumps discharge crossconnect.....	_____
2SI-V23	HHSI high flow test line vent	_____
2SI-D32	HHSI high flow test line drain.....	_____
2FI-659	HHSI high flow test line orifice flange.....	_____
2SI-663B	2FI-659 high side isolation	_____
2FI-659	High side sensing line.....	_____
MISC	Other miscellaneous system components	_____
2SI-663A	2FI-659 low side isolation	_____
2SI-V22	HHSI high flow test line vent	_____
2SI-D28	HHSI high flow test line drain.....	_____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

Attachment D

LEAKAGE
RATE
(SCCM)

COMPONENT

DESCRIPTION

Components Located in Pipeway No. 4

2SI-848C	2FI-924 LP root valve	_____
2SI-848D	2FI-924 HP root valve	_____
2FE-924	SI Train B flow orifice	_____
2FT-924	SI Train B flow transmitter	_____
2SI-866B	SI Train B discharge MOV	_____
MISC	Other miscellaneous system components	_____
2SI-D20	2P-15B SI pump discharge drain	_____
2SI-D21	2P-15B SI pump discharge drain	_____
2P-10B discharge pressure, 2PI-629	_____	psig
2P-15B discharge pressure, 2PI-922	_____	psig

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

ATTACHMENT E

HHSI 40-MONTH INSERVICE PRESSURE TEST

PRE-TEST DATA

Record calibration dates for:

2PI-922 _____ 2PI-936 _____

Record RWST Level per 2LI-972 _____ %

2T-34B Accumulator Level Per 2LI-934 _____ %

TEST DATA

Train B

Test pressure achieved:

2PI-922 _____ psig Time _____

10-minute hold/Inspection started:

2PI-922 _____ psig Time _____

Inspection completed:

2PI-922 _____ psig Time _____

2T-34B SI ACCUMULATOR

Inspection started:

2PI-936 _____ psig Time _____

Inspection completed:

2PI-936 _____ psig Time _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

Attachment E

ACCEPTANCE CRITERIA

The test is considered acceptable if the pressure retaining piping and components within the test boundary withstand the test pressure without loss of structural integrity.

The test is considered acceptable if there is no leakage from the system other than controlled leakage or leakage through boundary valves.

_____/_____
Test Director Date

_____ QTS Reference Report Number

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

ATTACHMENT F

RHR TRAIN B 40-MONTH FUNCTIONAL PRESSURE TEST

PRE-TEST DATA

Record calibration dates for:

2PI-629 _____

TEST DATA

Test pressure achieved:

2PI-629 _____ psig Time _____

10-minute hold/Inspection started:

2PI-629 _____ psig Time _____

Inspection completed:

2PI-629 _____ psig Time _____

ACCEPTANCE CRITERIA

The functional pressure test is considered acceptable if the pressure retaining piping and components withstand the test pressure without loss of structural integrity.

Additionally, the test is considered acceptable if there is no leakage from the system other than controlled leakage or leakage through boundary valves.

_____/_____
Test Director Date

QTS Reference Report Number: _____

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

ATTACHMENT G

TROUBLESHOOTING TRAIN B RHR LEAKAGE >1.5 gal/hr

INITIALS

1. Firmly SHUT the following valves:

2RH-713A, 2HX-11A/B Inlet Crossconnect
2RH-713B, 2HX-11A/B Inlet Crossconnect
2RH-716C, 2HX-11A/B Outlet Crossconnect
2RH-716D, 2HX-11A/B Outlet Crossconnect
2RH-823B, 2P-10B Suction Drain
2SI-857B, 2P-15B RHR Suction
2SI-851D, Interdisc thermal release isol for 2SI-851B

2. Station a dedicated operator whose duty will be to shut 2CV-133 in the event of a Unit 2 reactor protection or safeguards actuation.
3. Open 2CV-133 to pressurize Train A RHR to letdown line pressure.
4. Raise letdown pressure to between 325 and 350 psig, not to exceed 350 psig, as read at 2PI-628.

NOTE: *Ensure measurements are taken on the Train B hydro pump.*

5. Measure and record total Train B RHR input pumping rate (as in Step 5.10.3)

ΔH = _____ inches

ΔT = _____ minutes

2PI-629 = _____ psig

$$\text{Total input} = 946 \frac{\text{cc}}{\text{in}} \times \frac{\Delta H}{\Delta T} = 946 \times \frac{\Delta H}{\Delta T} = \text{_____ sccm}$$

6. Shut 2CV-133, secure dedicated operator for 2CV-133 and restore Unit 2 letdown system and pressure to normal, per DSS.

LEAKAGE REDUCTION AND PREVENTIVE
MAINTENANCE PROGRAM TEST OF THE TRAIN B
HHSI AND RHR SYSTEMS (REFUELING)
UNIT 2

Attachment G

INITIALS

7. Depressurize Train A RHR:
 - a. Open 2RH-V1 and crack open 2RH-V1B. _____
 - b. When Train A RHR is depressurized, as indicated on 2PI-628, shut 2RH-V1 and 2RH-V1B. _____
8. Open 2SI-851D and return to procedure step 5.15. _____

REMARKS: