

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

Date _____

DSS _____

RECORD

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

BY: _____ DATE: _____

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 and Pressure Vessel Code, Section XI, Rules for Inservice Inspection of Nuclear Power Plant Components

1.1.1 A functional test of 2P-10A&B LHSI pumps as required per Technical Specification 15.4.5.II.A.1.

1.1.2 Quarterly full stroke test of the following valves, as required by ASME Section XI.

2RH-710A, 2P-10A discharge check valve
2RH-710B, 2P-10B discharge check valve
2SI-854A, 2P-10A suction check valve
2SI-854B, 2P-10B suction check valve
2SI-856A, 2P-10A RWST suction MOV
2SI-856B, 2P-10B RWST suction MOV

1.2 The functional test of the LHSI 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 LHSI pump suction pressure will be read on the installed gauges in the No. 3 lower pipeway on El. 8'. To arrive at the true LHSI pump suction pressure, 11.7 psig must be added to the as-read gauge pressure due to the elevation difference between the pump suction and discharge gauges.

2.3 Suction and discharge pressure gauges are to be isolated, except for the time required to perform this test. Open the vents for the pressure gauges when testing is complete.

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

- 2.4 If at any time pump suction pressure is less than the NPSH required, this test must be discontinued until the problem is corrected.
- 2.5 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.
- 2.6 Technical Specifications prohibit the testing of a safeguards component if the opposite train's standby emergency power is out of service.
- 2.7 When stroking valves, the stroke time is the time it takes the valve to stroke from full open to full shut or full shut to full open by control board indication.

INITIALS

3.0 INITIAL CONDITIONS

NOTE: *Contact the System Engineer for new acceptance criteria if test is being performed following pump maintenance prior to returning to service.*

3.1 This test is being done to satisfy:

- _____ The normally scheduled callup. WO No. _____
- _____ .Post-maintenance operability test for _____ (equip. ID)
WO No.(s) _____
- _____ Special test - no numbers
- _____ Explain: _____

CAUTION **THIS TEST MUST NOT BE PERFORMED IF THE RHR SYSTEM IS OPERATING IN THE DHR MODE PER OP 7A OR IS ALIGNED PER CL 7B.**

NOTE: *When recovering from a cold shutdown condition, OP 7B must be performed before attempting this test.*

- 3.2 The LHSI system is aligned per CL 7A. _____
- 3.3 The orifice is installed in 2FE-660 of the high flow recirc line. _____

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

INITIALS

3.4 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. _____

3.5 The following test equipment has been assembled: _____

3.5.1 A stopwatch for timing valve strokes ID No. _____

3.5.2 A vibration instrument for pump data ID No. _____

3.6 **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 - PUMP TESTING

NOTE: *When post-maintenance or operability testing of 2P-10A or Train A components is not required, then N/A all of Section 4.1.*

4.1 2P-10A and Train A Test

CAUTION IF A SAFEGUARDS ACTUATION OR A REACTOR PROTECTION SYSTEM ACTUATION SHOULD OCCUR ON UNIT 2 WHILE PERFORMING THE TEST OF TRAIN A, THEN IMMEDIATELY PROCEED TO STEP 4.1.24. PERFORM STEPS 4.1.24 AND 4.1.27 THROUGH 4.1.29; THEN TERMINATE THIS TEST.

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

4.1.2 Unlock and open 2RH-742, high flow test line RWST isolation. _____

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

INITIALS

- 4.1.3 Position 2RH-742B, high flow test line FCV, to 32% open position (~1000 gpm). _____
- 4.1.4 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. _____
- 4.1.5 Enter LCO for 2P-10A, if required _____
- 4.1.6 Place 2P-10A control switch to "PULLOUT." _____
- 4.1.7 Clean boric acid off of 2P-10A seal area. _____
- NOTE:** *Steps 4.1.8 and 4.1.10 provide a second barrier to leakage of letdown water to an unmonitored RWST should 2CV-133 and/or 2RH-702 leak by the seat during the test.*
- 4.1.8 Shut the following valves:
2RH-716A, 2HX-11A outlet isolation _____
2RH-714A or 2RH-714B, bypass FCV isolation _____
- 4.1.9 Unlock and shut 2RH-733A, 2P-10A mini-recirc isolation _____
- 4.1.10 Verify shut 2SC-958, RHR sample isolation. _____
- 4.1.11 Unlock and open 2RH-706A, high flow test line inlet isolation. _____
- 4.1.12 Verify open 2SI-856A, 2P-10A RWST suction MOV. _____
- 4.1.13 Verify 2P-10A discharge pressure at <50 psig per 2PI-628. _____
- 4.1.14 Align 2PI-653A, 2P-10A suction pressure gauge, for service:
a. Shut 2RH-V1A, 2PI-653A vent _____
b. Open 2RH-V1, suction gauge root isolation _____
c. Open 2RH-V1B, 2PI-653A inlet isolation _____

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

INITIALS

4.1.15 Record 2P-10A static suction pressure in Attachment A. _____

4.1.16 Start 2P-10A. _____

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

4.1.17 Verify 2P-10A suction pressure is >0 psig. _____

4.1.18 Position 2RH-742B for a test line flow of 1560 gpm per
2FI-660.
Record time _____

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.*

4.1.19 Check the pump and mechanical seals for leakage, unusual
noise, and evidence of overheating. _____

4.1.20 Check all flanges, packing and joints up to 2RH-714A or
2RH-714B and 1RH-716A for leaks. _____

4.1.21 After a 15-minute run time at 1560 gpm, record 2P-10A data
on Attachment A. _____

NOTE: *Step 4.1.22 is not routinely required. N/A Step 4.1.22, unless
specifically requested by the inservice testing engineer or the
Operations staff for pump profile or reference base line data.*

4.1.22 Position 2RH-742B for test line flows of 400, 800, 1200 and
1800 gpm per 2FI-660 and record the required data at each
flow point on Attachment A1. No specific run time between
data points is required as long as flow stability is achieved. _____

4.1.23 Stop 2P-10A and observe the coastdown behavior of the pump
for any unusual noises, vibrations, or other abnormal
conditions. Record any observations on Attachment A.
Time stop _____

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

INITIALS

- | | | |
|--------|---|----------------------|
| 4.1.24 | Place 2P-10A control switch to "PULLOUT." | _____ |
| 4.1.25 | Flush the seal area of 2P-10A by spraying the seal area with warm DI water. | _____ |
| 4.1.26 | When periodic operability testing of 2SI-856A is required, then perform Section 5.1, steps 5.1.3, 5.1.4, 5.1.6, and 5.1.7. (N/A steps 5.1.1, 5.1.2, 5.1.5, and 5.1.8). Otherwise N/A this step. | _____ |
| 4.1.27 | Remove 2P-10A suction gauges from service: | |
| | a. Shut 2RH-V1 | _____ |
| | b. Open 2RH-V1A | _____ |
| | c. Shut 2RH-V1B | _____ |
| 4.1.28 | Position the following: | |
| | a. Lock shut 2RH-706A.
Red Lock No. _____ | _____/_____
_____ |
| | b. Lock open 2RH-733A.
Red Lock No. _____ | _____/_____
_____ |
| | c. Lock open 2RH-716A.
Red Lock No. _____ | _____/_____
_____ |
| | d. Verify open 2RH-714A. | _____/_____
_____ |
| | e. Verify open 2RH-714B. | _____/_____
_____ |
| 4.1.29 | Place 2P-10A control switch to "AUTO." | _____/_____
_____ |
| 4.1.30 | If not continuing with 2P-10B testing per Section 4.2, then shut and lock 2RH-742.
Red Lock No. _____
Otherwise N/A this step. | _____/_____
_____ |

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

INITIALS

- 4.1.31 Check pump operability by comparing the pump data with the limits in the IST Acceptance Criteria binder. _____
- 4.1.32 Exit LCO for 2P-10A, if required. _____

NOTE: *When post-maintenance or operability testing of 2P-10B or Train B components is not required, then N/A all of Section 4.2.*

4.2 2P-10B and Train B Test

CAUTION IF A SAFEGUARDS ACTUATION OR A REACTOR PROTECTION SYSTEM ACTUATION SHOULD OCCUR ON UNIT 2 WHILE PERFORMING THE TEST OF TRAIN B, THEN IMMEDIATELY PROCEED TO STEP 4.2.22. PERFORM STEPS 4.2.22 AND 4.2.25 THROUGH 4.2.27; THEN TERMINATE THIS TEST.

- 4.2.1 Verify proper oil level in the thrust bearing housing of 2P-10B. Contact the DSS for the type of oil required. _____
- 4.2.2 Unlock and open or verify open 2RH-742, high flow test line RWST isolation. _____
- 4.2.3 Position 2RH-742B, high flow test line FCV, to 32% open position (~1000 gpm). _____
- 4.2.4 If not performed in Section 4.1 and if the 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. _____
- 4.2.5 Enter LCO for 2P-10B, if required. _____
- 4.2.6 Place 2P-10B control switch to "PULLOUT". _____
- 4.2.7 Clean boric acid off of 2P-10B seal area. _____

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

	INITIALS	
4.2.8	Unlock and shut 2RH-733B, 2P-10B mini-recirc isolation.	_____
4.2.9	Unlock and open 2RH-706B, high flow test line inlet isolation.	_____
4.2.10	Verify open 2SI-856B, 2P-10B RWST suction MOV.	_____
4.2.11	Verify 2P-10B discharge pressure at <50 psig per 2PI-629.	_____
4.2.12	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	_____
4.2.13	Record 2P-10B static suction pressure in Attachment B.	_____
4.2.14	Start 2P-10B.	_____
CAUTION	MONITOR AND VERIFY 2P-10B SUCTION PRESSURE IS >0 PSIG PER 2PI-653B ANYTIME FLOW IS CHANGED.	
4.2.15	Verify 2P-10B suction pressure >0 psig.	_____
4.2.16	Position 2RH-742B for a test line flow of 1560 gpm per 2FI-660. Record time _____.	_____
NOTE:	<i>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.</i>	
4.2.17	Check the pump and mechanical seals for leakage, unusual noise, and evidence of overheating.	_____
4.2.18	Check all flanges, packing, and joints up to P-22 containment penetration for leaks.	_____

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

INITIALS

4.2.19 After a 15-minute run time at 1560 gpm, record 2P-10B data on Attachment B. _____

NOTE: *Step 4.2.20 is not routinely required. N/A Step 4.2.20 unless specifically requested by the inservice testing engineer or the Operations staff for pump profile or reference base line data.*

4.2.20 Position 2RH-742B for test line flows of 400, 800, 1200, and 1800 gpm per 2FI-660 and record the required data at each flow point on Attachment B1. No specific run time between data points is required as long as flow stability is achieved. _____

4.2.21 Stop 2P-10B and observe the coastdown behavior of the pump for any unusual noises, vibrations, or other abnormal conditions. Record any observations on Attachment B. Time Stop _____

4.2.22 Place 2P-10B control switch to "PULL-OUT." _____

4.2.23 Flush the seal area of 2P-10B by spraying the seal area with warm DI water. _____

4.2.24 When periodic operability testing of 2SI-856B is required, then perform Section 5.2, steps, 5.2.3, 5.2.4, 5.2.6 and 5.2.7. (N/A steps 5.2.1, 5.2.2, 5.2.5, and 5.2.8). Otherwise N/A this step. _____

4.2.25 Remove 2P-10B suction gauges from service: _____

- a. Shut 2RH-V2 _____
- b. Open 2RH-V2A _____
- c. Shut 2RH-V2B _____

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

INITIALS

- 4.2.26 Position the following:
- a. Lock shut 2RH-706B
Red Lock No. _____ / _____
 - b. Lock shut 2RH-742
Red Lock No. _____ / _____
 - c. Lock open 2RH-733B
Red Lock No. _____ / _____
- 4.2.27 Place 2P-10B control switch to "AUTO." / _____
- 4.2.28 Check pump operability by comparing the pump data with the limits in the IST Acceptance Criteria binder. _____
- 4.2.29 Exit LCO for 2P-10B, if required. _____

NOTE: *When a post-maintenance valve stroke test is required, then the testing shall include at least two complete strokes/cycles of the valve with documentation on PBF-2059.*

5.0 PROCEDURE - VALVE TESTING

NOTE: *When post-maintenance or operability testing of 2SI-856A is not required, then N/A all of Section 5.1.*

5.1 Stroke test of 2SI-856A, 2P-10A RWST Suction MOV

- 5.1.1 Enter LCO for 2P-10A, if required. _____
- 5.1.2 Place 2P-10A control switch in "PULLOUT." _____
- 5.1.3 Shut 2SI-856A, 2P-10A RWST suction MOV, and record:
Time to shut _____ seconds _____
Check the rising stem indicator for shut indication. _____
Check 2SI-856A ready status board light is on. _____

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

INITIALS

- 5.1.4 Open 2SI-856A and record:
Time to open _____ seconds _____
Check the rising stem indicator for open indication. _____ /
Check 2SI-856A ready status board light is off. _____
- 5.1.5 Place 2P-10A control switch in "AUTO." _____ /
- 5.1.6 Second independent operator verify:
SI/Spray ready status panel lights off. _____
2SI-856A 2P-10A RWST Suction MOV open. _____
- 5.1.7 Check valve operability by comparing the valve data with the limits in the IST Acceptance Criteria binder. _____
- 5.1.8 Exit LCO for 2P-10A, if required. _____

NOTE: *When post-maintenance or operability testing of 2SI-856B is not required, then N/A all of Section 5.2.*

5.2 Stroke test of 2SI-856B, 2P-10B RWST Suction MOV

- 5.2.1 Enter LCO for 2P-10B, if required. _____
- 5.2.2 Place 2P-10B control switch in "PULLOUT." _____
- 5.2.3 Shut 2SI-856B, 2P-10B RWST suction MOV, and record:
Time to shut _____ seconds _____
Check the rising stem indicator for shut indication. _____
Check 2SI-856B ready status board light is on. _____

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

INITIALS

- 5.2.4 Open 2SI-856B and record:
 - Time to open _____ seconds _____
 - Check the rising stem indicator for open indication. _____ / _____
 - Check 2SI-856B ready status board light is off. _____
- 5.2.5 Place 2P-10B control switch in "AUTO." _____ / _____
- 5.2.6 Second independent operator verify:
 - SI/Spray ready status panel lights off. _____
 - 2SI-856B 2P-10B RWST Suction MOV open. _____
- 5.2.7 Check valve operability by comparing the valve data with the limits in the IST Acceptance Criteria binder. _____
- 5.2.8 Exit LCO for 2P-10B, if required. _____

6.0 ANALYSIS

**TO BE COMPLETED WITHIN 96 HOURS BY OPERATIONS
MANAGER OR HIS REPRESENTATIVE.**

- 6.1 Comparisons with allowable ranges of test values and analysis of deviations complete. _____
- 6.2 Any requirements for corrective action? _____
 - Yes _____ No _____
 - (If yes, give details in the remarks section.)
- 6.3 Data analyzed by _____
- Time and date _____

Remarks:

NUCLEAR POWER BUSINESS UNIT
INSERVICE TESTS

IT 04
MAJOR
Revision 35
April 7, 1997
TOTAL REWRITE

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

ATTACHMENT A
DATA SHEET
2P-10A, LHSI PUMP

PARAMETER		Note 4	INSTRUMENT	UNITS	READING
Pump Static Suction Pressure			2PI-653A	psig	
Corrected Pump Static Suction Pressure			Note 2	psig	
Pump Suction Pressure @ 1560 gpm			2PI-653A	psig	
Pump Discharge Pressure @ 1560 gpm			2PI-655A	psig	
Corrected Pump Suction Pressure @ 1560 gpm			Note 2	psig	
Pump Differential Pressure @ 1560 gpm			Note 2	psid	
Loop Temperature			2TI-622A	°F	
Pump Vibration	Inboard Bearing	Vertical	C	Note 1, 3	ips
		Horizontal	D	Note 1, 3	ips
		Axial	E	Note 1, 3	ips
	Outboard Bearing	Vertical	A	Note 1, 3	ips
		Horizontal	B	Note 1, 3	ips
Pump Seal Leakage			Note 5	Drops/Minute	
Pump Coastdown Behavior Check (✓) if OK			N/A	N/A	

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

ATTACHMENT A1
DATA SHEET
2P-10A LHSI PUMP

NOTE: *Flow must be adjusted precisely for the required flow value, then suction and discharge pressure data observed simultaneously.*

Flow (gpm) 2FI-660	Suction Pressure (psig), 2PI-653A	Discharge Pressure (psig), 2PI-655A
400	_____	_____
800	_____	_____
1200	_____	_____
1800	_____	_____

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

ATTACHMENT B
DATA SHEET
2P-10B, LHSI PUMP

PARAMETER		Note 4	INSTRUMENT	UNITS	READING
Pump Static Suction Pressure			2PI-653B	psig	
Corrected Pump Static Suction Pressure			Note 2	psig	
Pump Suction Pressure @ 1560 gpm			2PI-653B	psig	
Pump Discharge Pressure @ 1560 gpm			2PI-655B	psig	
Corrected Pump Suction Pressure @ 1560 gpm			Note 2	psig	
Pump Differential Pressure @ 1560 gpm			Note 2	psid	
Loop Temperature			2TI-623A	°F	
Pump Vibration	Inboard Bearing	Vertical	C	Note 1, 3	ips
		Horizontal	D	Note 1, 3	ips
		Axial	E	Note 1, 3	ips
	Outboard Bearing	Vertical	A	Note 1, 3	ips
		Horizontal	B	Note 1, 3	ips
Pump Seal Leakage			Note 5	Drops/Minute	
Pump Coastdown Behavior Check (✓) if OK			N/A	N/A	

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

ATTACHMENT B1
DATA SHEET
2P-10B LHSI PUMP

NOTE: *Flow must be adjusted precisely for the required flow value, then suction and discharge pressure data observed simultaneously.*

Flow (gpm) 2FI-660	Suction Pressure (psig), 2PI-653B	Discharge Pressure (psig), 2PI-655B
400	_____	_____
800	_____	_____
1200	_____	_____
1800	_____	_____

NOTE 1: Log identification number of portable instrument being used.

NOTE 2: Corrected pump suction pressure = pump suction pressure read on gauge +11.7 psi.

Pump differential pressure = pump discharge pressure - corrected pump suction pressure during test.

NOTE 3: Vibration readings will be taken at Locations A, B, C, D & E, as shown on Figure 1.

NOTE 4: Bearing temperature data is not required to assess pump operability per ASME, Section XI. If bearing temperature is required as a post-maintenance test, then the temperature monitoring point should be as shown on Figure 1 for locations A, C, E & F. Ambient air temperature should be measured at approximately one foot above the pump inboard bearing.

NOTE 5: Submit a WO if seal leakage is ≥ 30 drops/minute after 15 minute run time.

LOW HEAD SAFETY INJECTION PUMPS AND VALVES
(QUARTERLY)
UNIT 2

FIGURE 1 - RHR PUMP

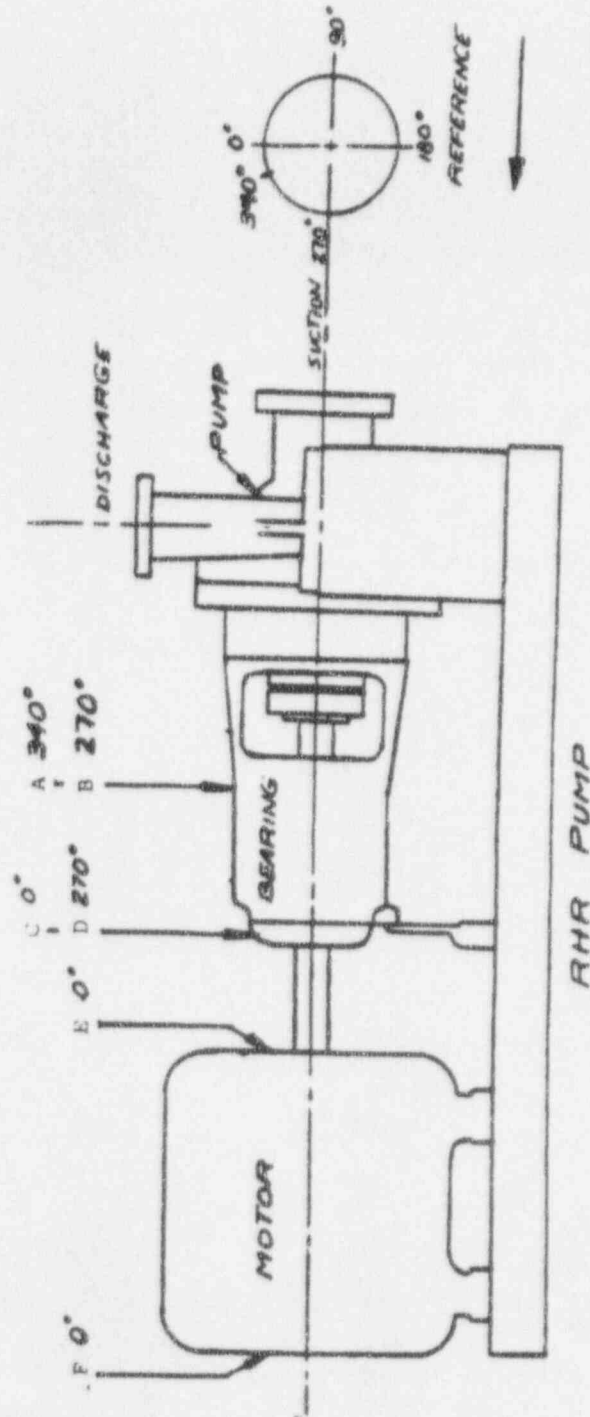


FIGURE 1