PF-298

APR 02 1998 4 STA# 4

ENGINEERING DATA TRANSMITTAL

Page 1 of 2

1. EDT 623670

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Distribution	Replacement Cross-Site Transfer System	N/A
5. Proj./Prog./Dept./Div.:	**6. Design Authority/ Design Agent/Cog. Engr.:**	**7. Purchase Order No.:**
W-058/Startup	GL Parsons	N/A
8. Originator Remarks:		**9. Equip./Component No.:**
For Release		N/A
		10. System/Bldg./Facility:
11. Receiver Remarks: **11A. Design Baseline Document?** [ ] Yes [X] No		**12. Major Assm. Dwg. No.:**
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: N/A

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	HNF-2504		0	Preoperational Test Report, Cross-Site Transfer System Integrated Test (POTR-007)	SQ	1	1	

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 4. Review 2. Release 5. Post-Review 3. Information 6. Dist. (Receipt Acknow. Required)	1. Approved 4. Reviewed no/comment 2. Approved w/comment 5. Reviewed w/comment 3. Disapproved w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name (K) Signature (L) Date (M) MSIN	(G) Reason	(H) Disp.	(J) Name (K) Signature (L) Date (M) MSIN
1/2	1	Design Authority WG Brown Warren Brown 4/1/98 H4-07			
N/A	N/A	Design Agent N/A			
1/2	1	Proj. Startup EA Pacquet 3/31/98 R3-47			
1/2	1	Proj. Mgr. GL Parsons 4-1-98 R3-47			
1/2	1	QA LR Hall 4/1/98 R3-47			
1/2	1	Safety OM Jaka 3/31/98 S5-12			
N/A	N/A	Env. N/A			

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No.
EA Pacquet 3/31/98 Signature of EDT Originator Date	EA Pacquet 3/31/98 Authorized Representative for Receiving Organization Date	GL Parsons 4-1-98 Design Authority/ Cognizant Manager Date	[ ] Approved [ ] Approved w/comments [ ] Disapproved w/comments

BD-7400-172-2 (05/96) GEF097

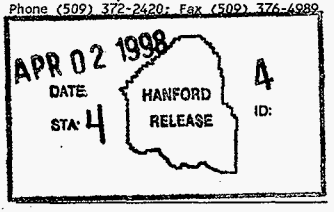
PREOPERATIONAL TEST REPORT, CROSS-SITE TRANSFER SYSTEM INTEGRATED TEST (POTR-007)

EA Pacquet
Numatec Hanford Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 623670 UC: 2030
Org Code: 8C610 Charge Code: N58U7
B&R Code: 39EW31301 Total Pages: 296

Key Words: Project W-058, Transfer Headers 3150 and 3160, interlocks, slurry booster pumps P3125A and P3125B, variable speed drives, automatic flow control, header venting and draining.

Abstract: This report documents the testing of the booster pump instrumentation and interlocks, performance tesing of the booster pumps and transfer headers using water for Project W-058.



Release Approval 4/2/98
Release Stamp Date

Approved for Public Release

Author
E.A. Pacquet

APPROVAL DESIGNATOR SQ

TEST REPORT APPROVAL BY TEST REVIEW BOARD (TRB)

TRB Chair	Date 3/31/98	TWRS Operations	Date 4-1-98
TWRS Engineering	Date 4-1-98 (Warren Brown 4/1/98)	TWRS Safety	Date 3/31/98
Startup Engineer	Date 3/31/98	Quality Assurance	Date 4/1/98
Project Management	Date 4-1-98		

TABLE OF CONTENTS

1.0 ATTACHMENTS

1.1 HNF-1857, Rev O-A, with recorded data and test exception reports, and Engineering Change Notice W-058-373
1.2 Engineering Change Notice W-058-395
1.3 W-058 Interlock Test Listing
1.4 NHC letter 9852239

2.0 REFERENCES

2.1 HNF-SD-W058-SUP-002, Rev. 1, Project W-058 Startup Test Plan
2.2 W-058-PI, Rev 2, Procurement Specification, Slurry Transfer Pumps
2.3 VI# 22798, Supp 28, Slurry Transfer Pumps Factory Acceptance test
2.4 Incroporated Engineering Change Notices, W-058-391, W-058-393, W-058-394
2.5 NCR W-O58-27
2.6 W-058 OAC Part II
2.7 FDNW letter LMHC-96W0-0006, CO-98-TWRS-202

3.0 INTRODUCTION

This report documents the results obtained during the performance of Preoperational Test POTP-007, from December 12, 1997 to March 27, 1998. Six test exceptions were generated during the performance of this test. One unresolved test exception remained at the time of completion of the test.

4.0 OBJECTIVES

The main objectives were to demonstrate the operation of the following Cross-Site Transfer System components:

- Booster pumps P-3125A and P-3125B interlocks and controls, both local and remote.
- Booster pump P-3125A and P-3125B and associated variable speed drives VSD-1 and VSD-2 performance in both manual and automatic modes.
- Water filling, circulation, venting and draining of the transfer headers (supernate and slurry line).

As described in reference 1, the following components of the Cross-Site Transfer System that would normally be used during an actual waste transfer, are not used in this specific test:

- Water Flush System.
- Valving and instrumentation associated to the 241-SY-A valve pit jumpers.
- Valving and instrumentation associated to the 244-A lift station.

5.0 SUMMARY OF TEST RESULTS

Acceptance criteria were met.

5.1 The following interlocks operate properly:

- I-2: On high pressure shutdown, operating booster pump, P-3125A or P-3125B (**Criteria Met**)
- I-6: The operating booster pump, P-3125A or P-3125B will shutdown:
  - A) On high pump bearing temperature (**Criteria Met**)
  - B) On high motor winding temperature (**Criteria Met**)
  - C) On high vibration (**Criteria Met**)
  - D) On pump seal failure (**Criteria Met**)
  - E) On low oil level (**Criteria Met**)
- I-7: The pump will not be permitted to operate if the inlet pressure is lower than 10 psig (**Criteria Met**)
- I-9: Transfer pump P-102-SY-02A will not be permitted to start if operating booster pump is shutdown (**Criteria Met**)
- I-10: Upstream transfer pump P-102-SY-02A will be shutdown if inlet pressure reaches 70 psig (**Criteria Met**)
- I-14: On high discharge pressure, shutdown appropriate operating pump (**Criteria Met**)
- I-15: The booster pump will not be permitted to start if the associated vent and drain valves are not closed (**Criteria Met**)
- I-20: (With respect to supernate line vent only): On high pressure, shutdown transfer pump P-102-SY-02A (**Criteria Met**)

5.2 Booster pumps P-3125A and P-3125B operated at the design flowrates of 104 gpm $\pm$ 7 gpm and 140 gpm $\pm$ 7 gpm, and at a high flow condition of 160 gpm $\pm$ 7 gpm, under control of system flow feedback. (**Criteria Met**)

5.3 Transfer headers 3150 and 3160 from the Diversion Box to the Vent Station were filled with water; water was circulated through them by the booster pumps; and the headers were vented and drained. (**Criteria Met**)

6.0 TESTING CONFIGURATION

Water testing of the headers and the pumps was carried out by connecting the slurry and supernate headers in a temporary loop circuit from the Diversion box to the Vent station. Details of the circuit and its configuration are provided in Attachment 1, Appendix A.

7.0 RESULTS - DISCUSSION

7.1 Pump Instrumentation and Interlocks

Attachment 3 provides a complete inventory and boundaries of W-058 interlock tests, and associated alarm and/or trip set points. All interlocks were tested when practical from the sensing device.

One set-point worthy of interest is the low-oil level set according to the pump vendor's recommendations:

- Normal oil level in bearing housing: 2.625 inches below shaft centerline
- Minimum oil level in bearing housing: 3.06 inches below shaft centerline
- Drained oil volume to reach minimum oil level: approximately 175 ml to 250 ml

It was also visually checked that the minimum oil level ensured oil coverage of the sling rings in order to provide adequate bearing lubrication.

7.2 Slurry Booster Pumps Performance

Prior to site installation both pumps were submitted to a 48 hour factory acceptance test (reference #2).

Over the complete performance of this preoperational test both pumps have undergone the following cumulative run-in time:

P-3125A: 15.0 Hours
P-3125B: 12.0 Hours

Data points were collected at varying flowrates (76 to 173 gpm), speeds (50 to 100%), and back pressures in order to cover the full range of operating conditions for the pumps and variable speed drives. Tables 1A and 1B highlight the selected operating conditions and main results for each pump run.

Figures 1 and 2 illustrate the pump curves established for both pumps. Both curves are above the required performance points: (reference #2)

138 gpm at 2260 feet TDH (Total Dynamic Head)
104 gpm at 1850 feet TDH (Total Dynamic Head)

Throughout the selected operating conditions drive and thrust end bearing temperatures remained stable:

	Pump P-3125A		Pump P-3125B	
	Min	Max	Min	Max
Thrust end Temp.°F	64	75	62	80
Drive end Temp. °F	66	81	62	90

Aside from the exception discussed in section 8.5, vibration levels (horizontal velocity measurements from installed vibration sensors) for both pumps remained low throughout the range of operating speeds typically ranging as indicated below:

	Thrust end vibration (Velocity, inch/sec)	Drive end vibration (Velocity, inch/sec)
P-3125A	0.01 to 0.09	0.01 to 0.06
P-3125B	0.01 to 0.13	0.01 to 0.09

7.3 Variable Speed Drives

In accordance with the manufacturer's recommendations both variable speed drives (VSD) were set as follows:

- Frequency range: 30 Hz to 60 Hz
- Speed range: 1800 rpm to 3600 rpm (50 to 100%)
- In order to avoid over current or over voltage conditions during acceleration or deceleration, linear ramps were set as indicated below per the manufacturer's recommendations:
  - PCU ramp limit (auto mode) = 60 seconds for a 100% speed change
  - VSD Acceleration time (manual mode) = 20 seconds for a 100% speed change
  - VSD Deceleration time (manual mode) = 60 seconds for a 100% speed change

Attachment 1 sections 7 through 10, provide recordings of variable speed drives electrical parameters in all the selected operating conditions. Section 8.4 provides a description of the malfunction experienced during initial testing of one of the drives.

7.4 Transfer Headers Pressure Drop

Figure 3 illustrates the measured, circuit, supernate, and slurry line pressure drops as a function of flow. Although these pressure drops are specific of the test circuit and its boundaries, they can easily be extrapolated to the full length of each header. It is also interesting to note that the measurements match quite well the calculated pressure drops established for the design of the test circuit (figure 4).

7.5 Transfer Headers Insulation

No significant temperature drop could be measured across the headers during the first day of testing (Attachment 1, Appendix G, System data) where slightly heated water was used (~64°F), hence confirming the good insulation of the lines.

7.6 Automatic Flow Control

Satisfactory and stable pump operation under automatic flow control was obtained by tuning the PID (Proportional, Integral, and Derivative) parameters of the flow control loops as indicated below:

P = 0.8
I = 0.06 1/sec
D = 0 sec

These parameters established with water, may possibly need to be readjusted with actual waste slurry.

7.7 Transfer Headers Venting and Draining

Venting and draining of both headers was performed without any difficulty at an average flow rate of 35 gpm. It was also verified upon completion of this operation that the vent line filters remained dry.

7.8 Pump Long Term Maintenance

Refer to Attachment 4 for booster pump long term and storage recommendations.

8.0 NOTABLE EVENTS AND TEST EXCEPTIONS

8.1 Pump 3125A Failure (TE-001)

One December 20, 1997, pump P-3125A failed to startup. It was determined that the pump had "locked-up". Decision was made to disassemble both pumps under vendor supervision in order to determine the cause of failure. The vendor determined that the pump had lock-up because if was provided with a non protected (non overlaid) surface on the hub side of the impellers. Both pumps were subsequently modified to include a hub side wear ring and all wear rings were overlaid with the same type of material as the eye side wear ring for abrasive service. Further details regarding the mode of failure and corrective actions can be found in attachments to test exception TE001. Testing was resumed on February 11, 1998 upon completion of the corrective work and closeout of the associated nonconformance reports.

8.2 Pump Seals Replacement (TE-002)

During the initial run of Pump 3125A, leakage was observed from the pump air seals. All seals were replaced by upgraded "wavy face" technology seals upon the seal vendor's recommendation. Further details can be found in attachments to test exception TE002.

8.3 Pump 3125A Vent Valve MOV-3125AK (TE-003)

MOV 3125AK was found to be leaking and was replaced. Pump runs performed on P-3125A prior to the valve replacement were repeated as pump discharge pressure recordings (see Attachment 1, Appendix G System data) were affected by the leak.

8.4 Pump 3125B Variable Speed Drive (TE-004)

Refer to test exception TE-004 and its attachments for the details and resolution of the encountered malfunction.

8.5 Pump 3125A and 3125B Vibration (TE-005)

During the pump runs, abnormal vibrations (horizontal velocity from installed vibration sensors) at critical speeds were identified:

- P-3125A: 0.6 to 0.8 IPS at 3000 rpm
- P-3125B: 0.2 to 0.3 IPS at 2950 rpm

In the case of P-3125A, the level of vibration is high enough to activate the pump shutdown interlock set at 0.6 IPS. For P-3125B, the pump and motor vendors have determined that these vibration levels are acceptable.

A first diagnosis established by the pump vendor (see vibration analysis report attached to Test Exception 005) seem to attribute the vibration levels to a resonance generated by a motor imbalance. The vibration analysis also identified high overall vertical vibration levels at full speed (3600 rpm) for both pumps. Subsequent attempts to balance both motors by the motor vendor (field report pending) have not allowed any significant

reduction of the observed vibration levels. At the time of writing of this report, resolution of the problem is being carried as an exception to the W-058 OAC Part II (reference 5 - Facility Testing - Exception 1) and considered a pump warranty item.

Further diagnosis and corrective actions (see reference 7) are still needed.

8.6 Pump Stop/Start Signal (TE-006)

It was observed that both pumps restarted automatically after shutdown by a variable speed drive fault. This problem was corrected by ECN W058-391 and W-058-393 and retested accordingly.

8.7 Loss of Communication to PCU-2

Upon loss of communication or power to PCU-2, it was noticed that the operating booster pump continues to run. Loss of communication was simulated in this case by disconnecting the input/output fiber optic connections at PCU-2. Loss of power was simulated by disconnecting the fuses to the PCU-2 processor (note: the analog input/output power supply remained energized).

9.0 CONCLUSION

Components included in this test procedure have been tested to the engineering requirements established by the design documentation and are deemed to have satisfactorily met their functional design criteria. One exception however subsists (slurry booster pump vibration level) and will need to be resolved.

10.0 LIST OF FIGURES AND TABLES

TABLE 1 A

POTP 007 SELECTED OPERATING CONDITIONS - RESULTS

SLURRY BOOSTER PUMP P3125A

VSD rpm	MODE	Inlet P psig	Outlet P psig	FLOW gpm	TDH feet	PI 3126B psig	PI temp2 psig	DP cicuit psig	DP SLL psig	DP SNL psig	DP1-DP2 psig
1650	Manual	66	287	76	580	184	155	132	103	29	74
2608	Manual	57	570	110	1255	404	310	260	166	94	72
3529	Manual	52	971	148	2192	624	443	528	347	181	166
3522	Manual	33	871	173	2005	557	310	561	314	247	67
1875	Auto	58	273	110	567	109	13	260	164	96	68
1965	Auto	58	302	110	634	137	45	257	165	92	73
2150	Auto	59	375	110	800	213	120	255	162	93	69
2430	Auto	47	415	140	920	182	20	395	233	162	71
2530	Auto	47	460	140	1024	227	68	392	233	159	74
2725	Auto	47	555	140	1243	324	163	392	231	161	70
2690	Auto	42	490	155	1105	225	30	460	265	195	70
2745	Auto	42	520	155	1174	254	60	460	266	194	72
2850	Auto	42	575	155	1301	306	110	465	269	196	73

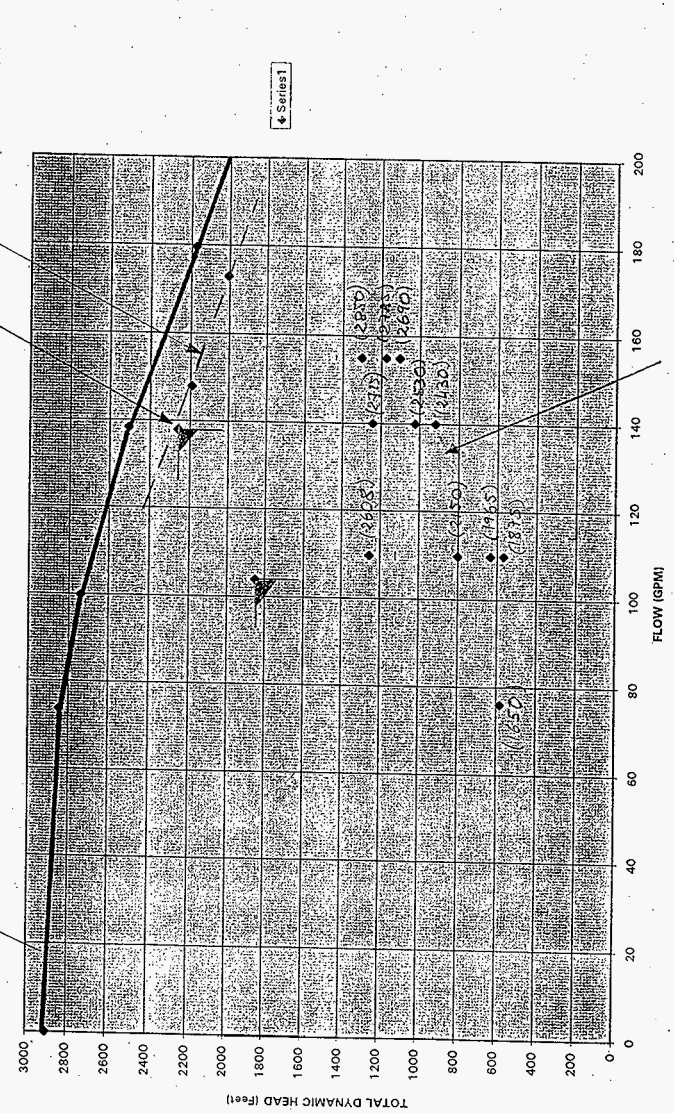
TABLE 1 B

POTP 007 SELECTED OPERATING CONDITIONS - RESULTS

SLURRY BOOSTER PUMP P3125B

VSD rpm	MODE	Inlet P psig	Outlet P psig	FLOW gpm	TDH feet	PI 3126B psig	PI temp2 psig	DP cicuit psig	DP SLL psig	DP SNL psig	DP1-DP2 psig
1820	Manual	65	301	84	615	181	130	171	120	51	69
2200	Manual	60	403	97	862	260	180	223	143	80	63
2560	Manual	56	522	110	1146	350	240	282	172	110	62
2915	Manual	51	663	123	1483	460	310	353	203	150	53
3650	Manual	54	1027	147	2317	763	570	457	264	193	71
3650	Manual	54	970	164	2185	660	400	570	310	260	50
2000	Auto	57	295	110	620	120	15	280	175	105	70
2100	Auto	57	330	110	700	156	55	275	174	101	73
2300	Auto	57	410	110	885	235	130	280	175	105	70
2610	Auto	46	455	140	1015	202	20	435	253	182	71
2710	Auto	46	507	140	1135	262	85	422	245	177	68
2910	Auto	46	610	140	1373	366	195	415	244	171	73
2850	Auto	40	525	155	1190	242	25	500	283	217	66
2950	Auto	40	573	155	1301	285	75	498	288	210	78
3150	Auto	40	692	155	1576	404	195	497	288	209	79

FIGURE 1
FACTORY ACCEPTANCE TEST CURVE (3585 rpm)
SLURRY PUMP P 3125A

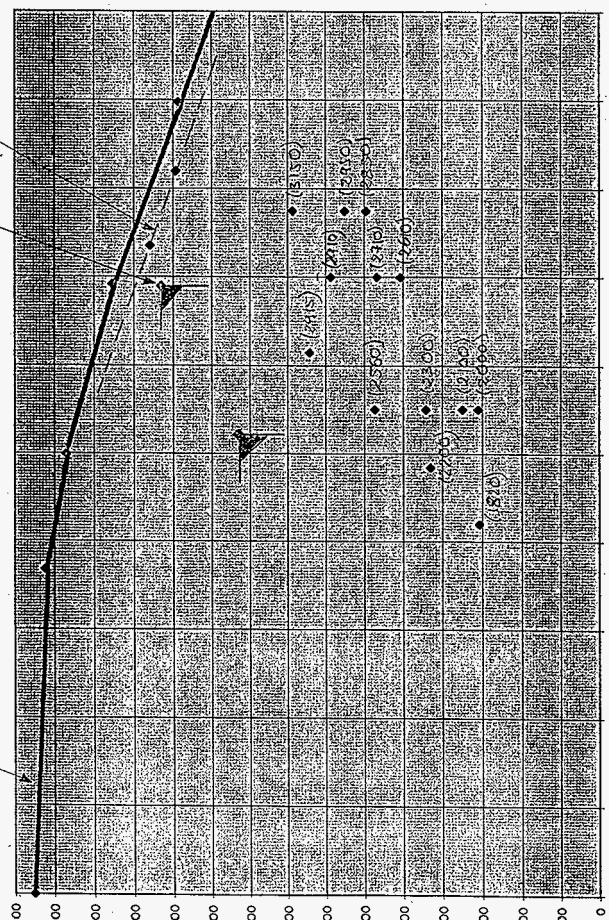


NB: All other points are POTP007 data at varying speeds (rpm)

HNF-2504

FIGURE 2

SLURRY PUMP P3125B



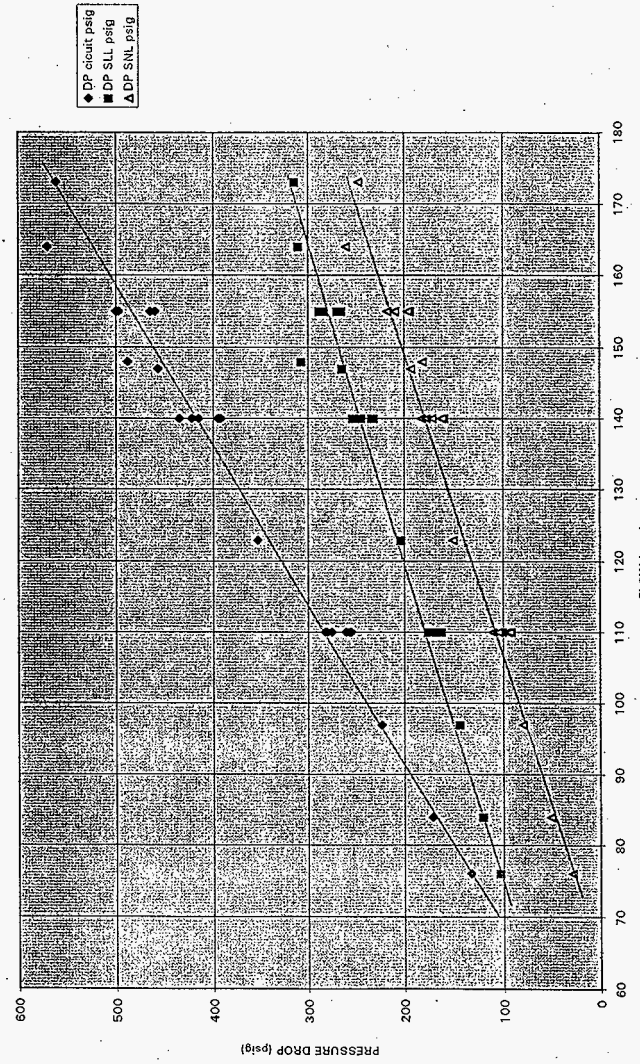


FIGURE 3

POTP 007 CIRCUIT AND LINE PRESSURE DROP

HNF-2504

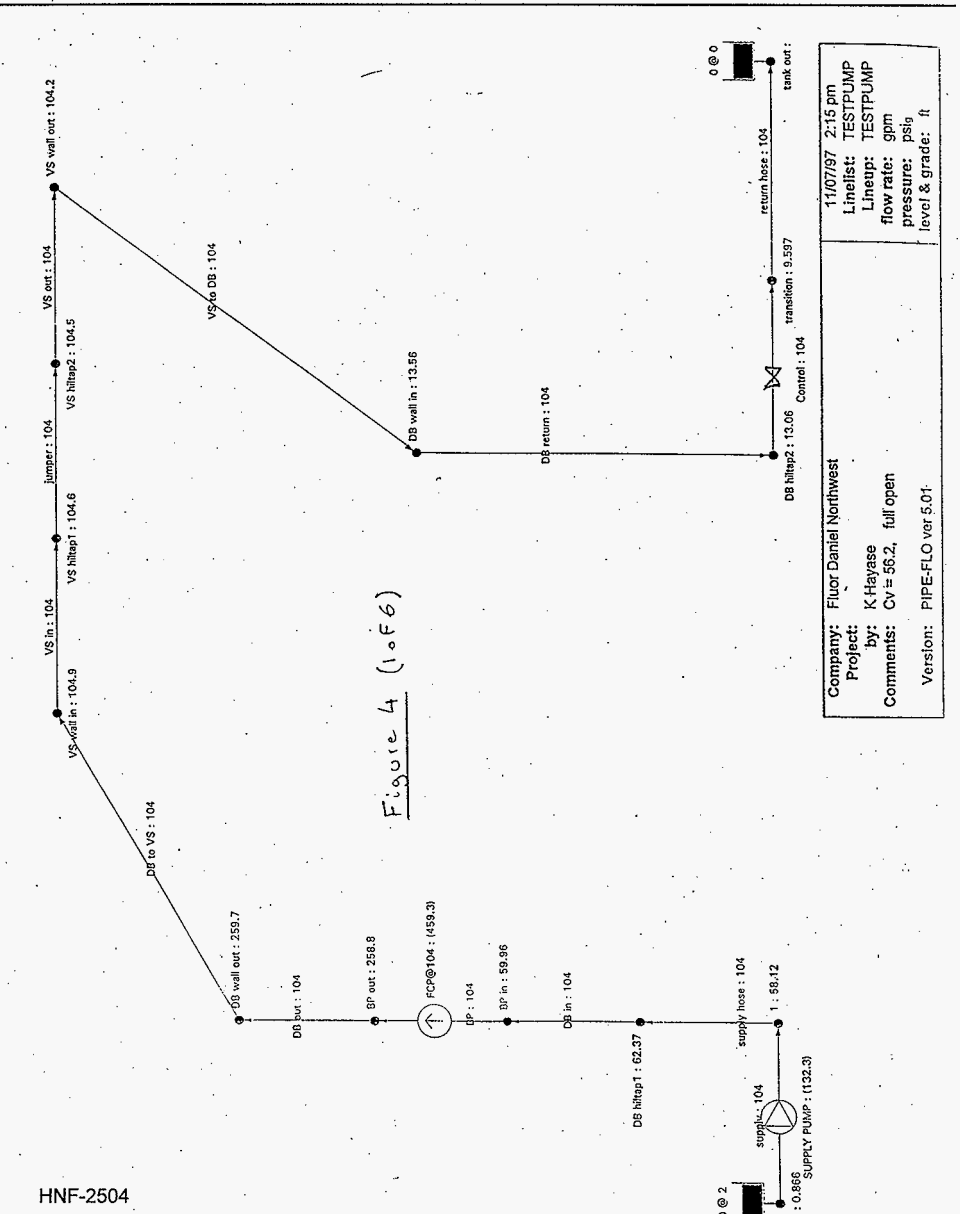


Figure 4 (1 of 6)

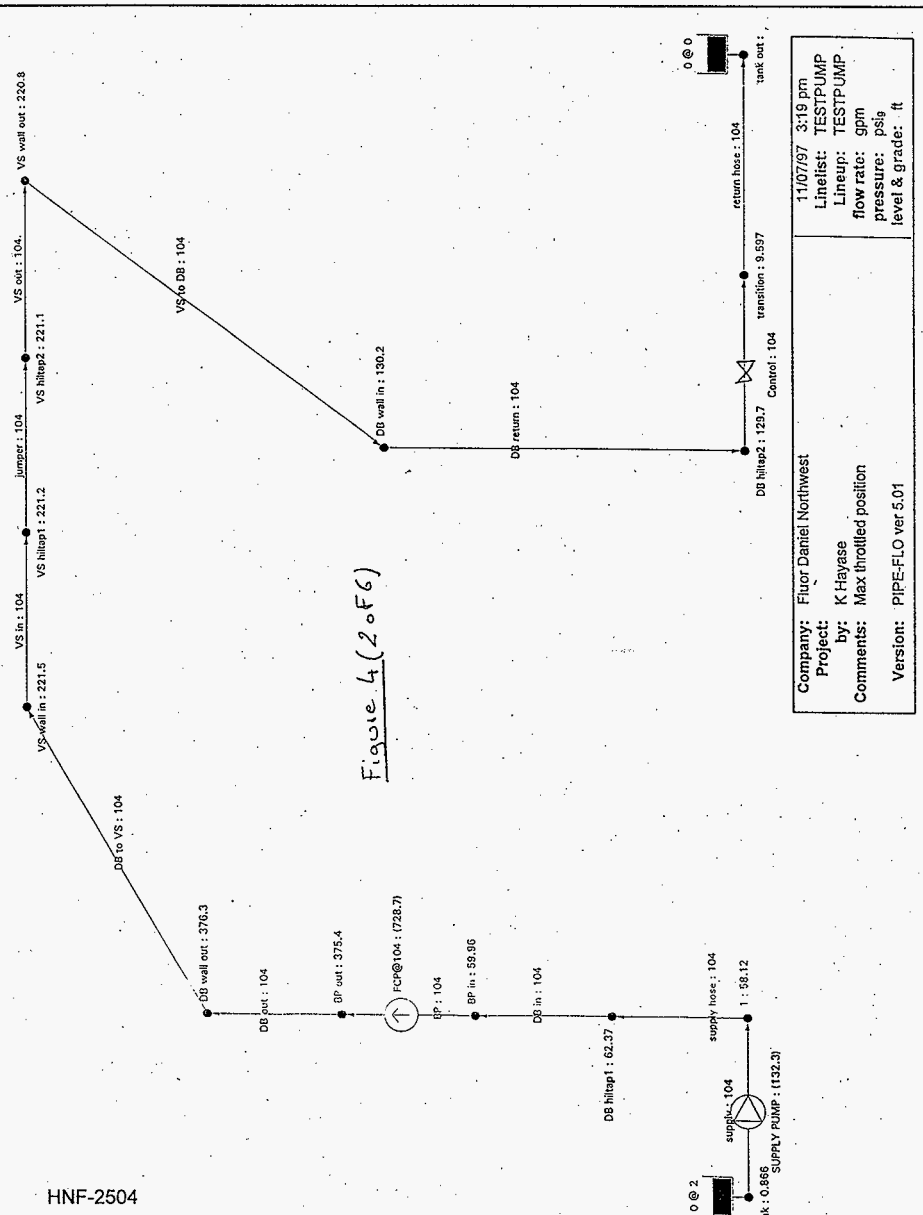
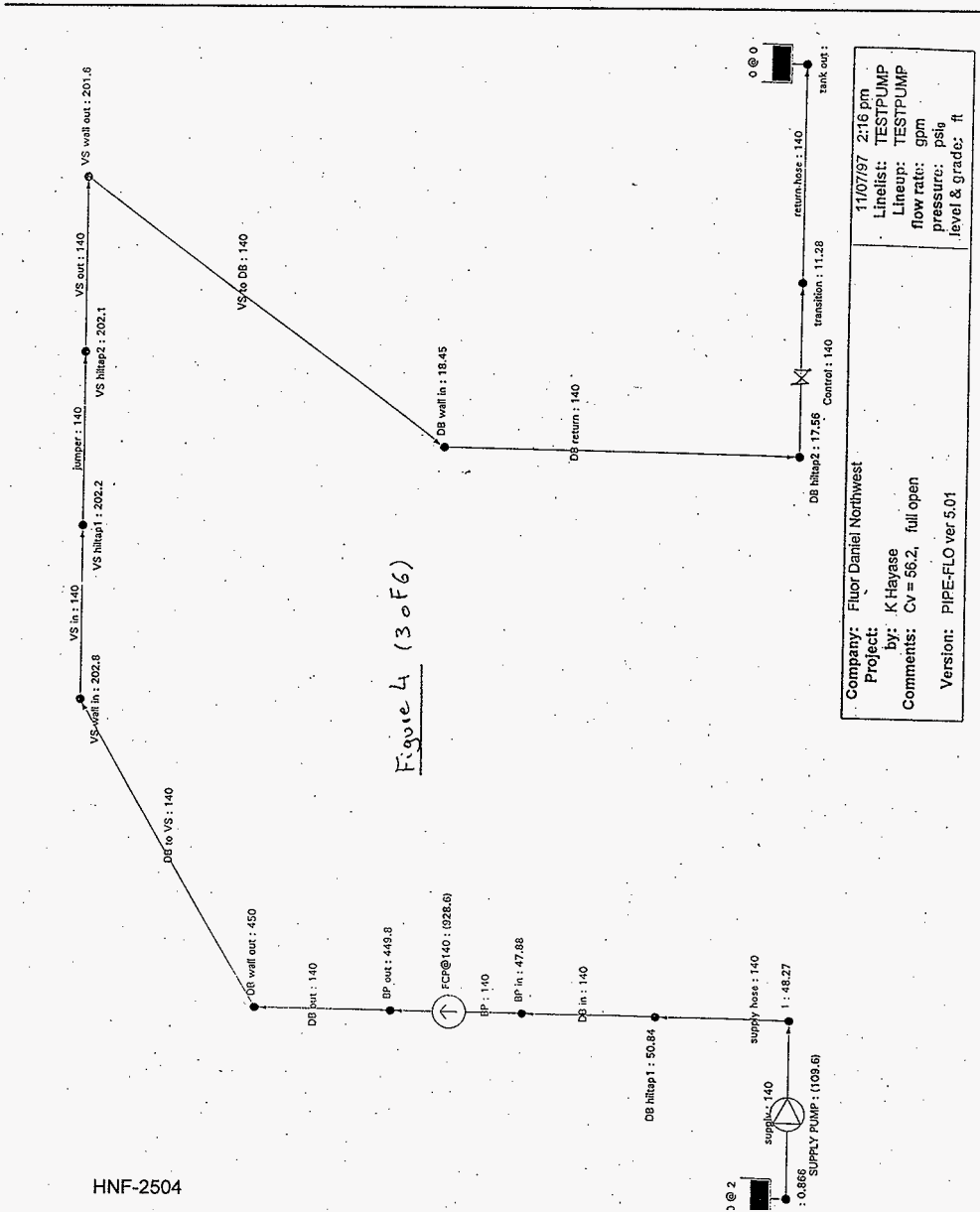


Figure 4 (2 of 6)



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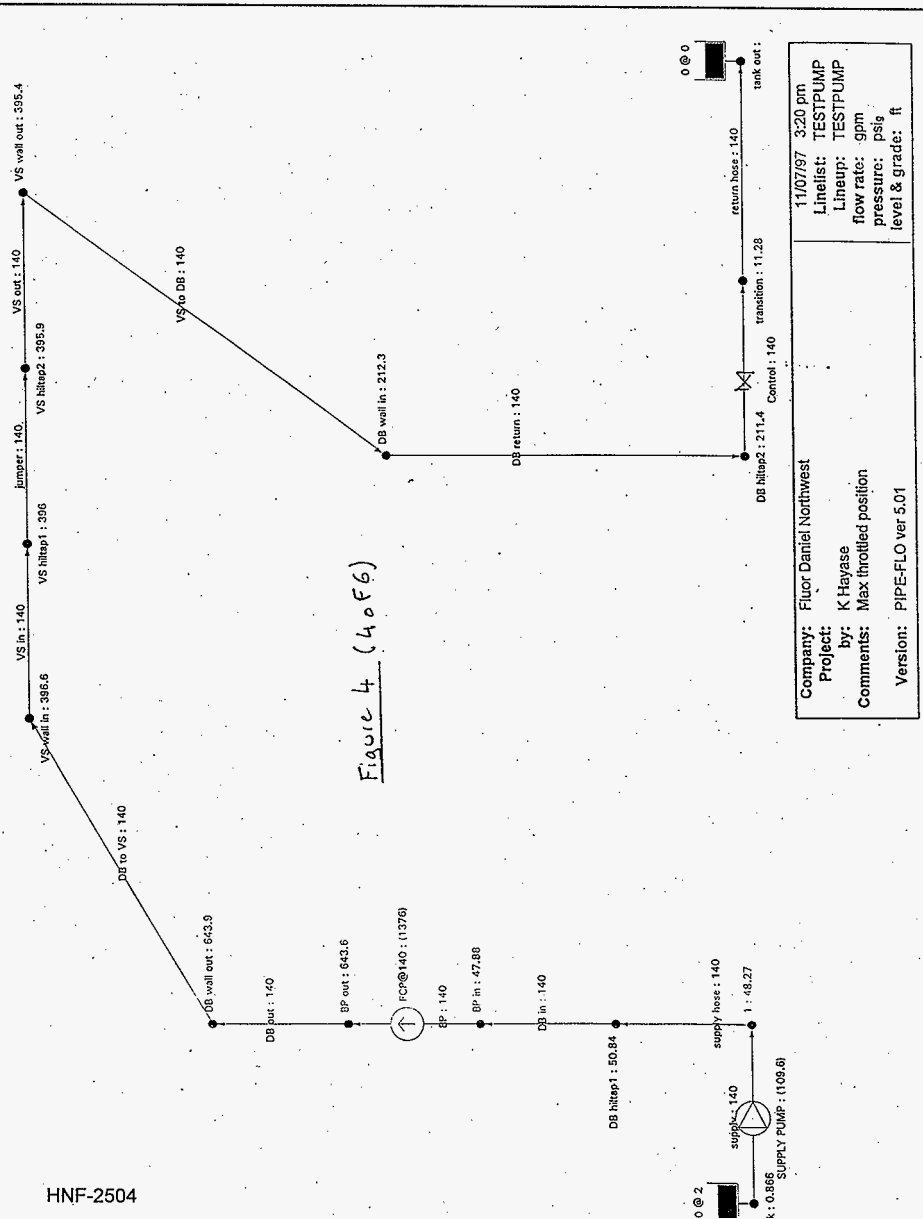
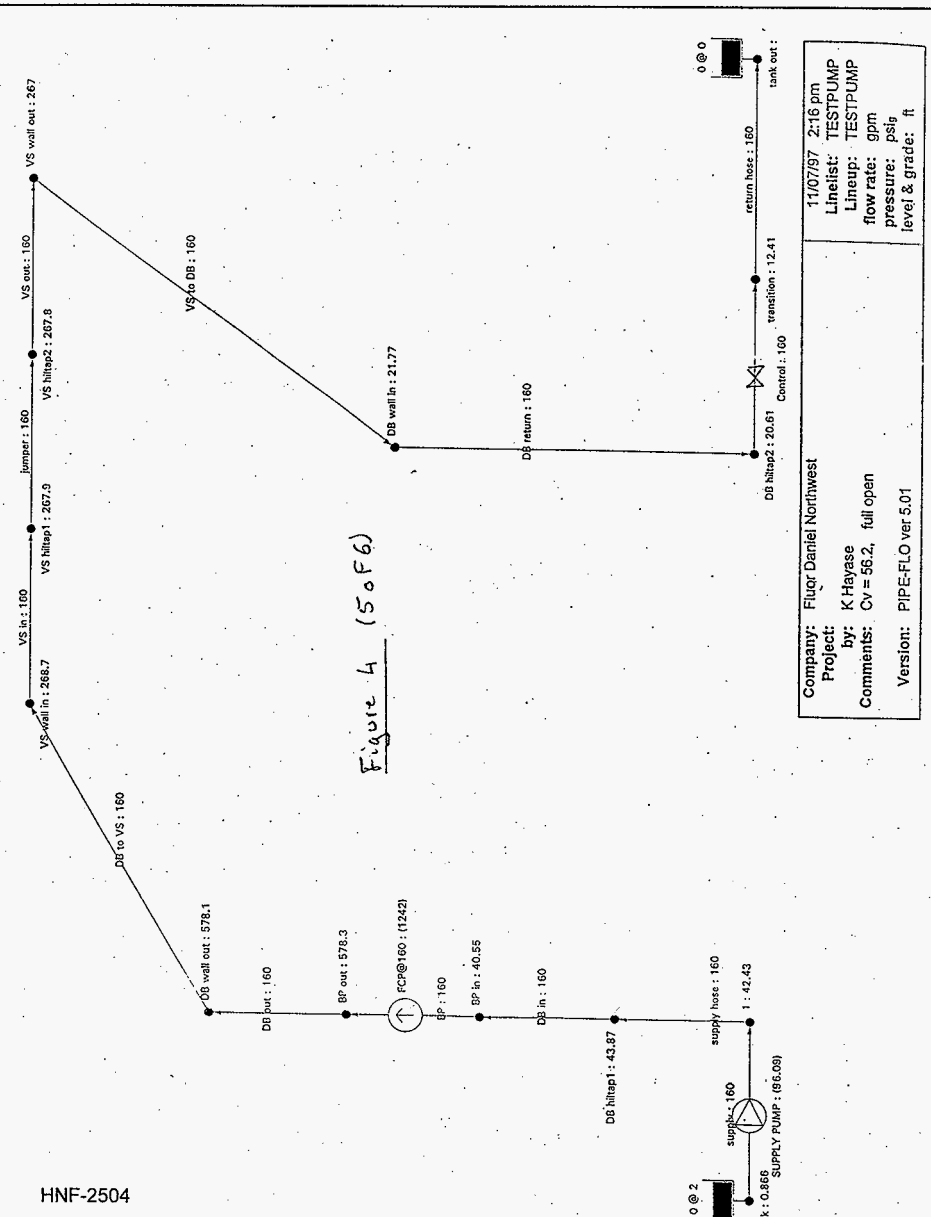


Figure 4 (4 of 6)



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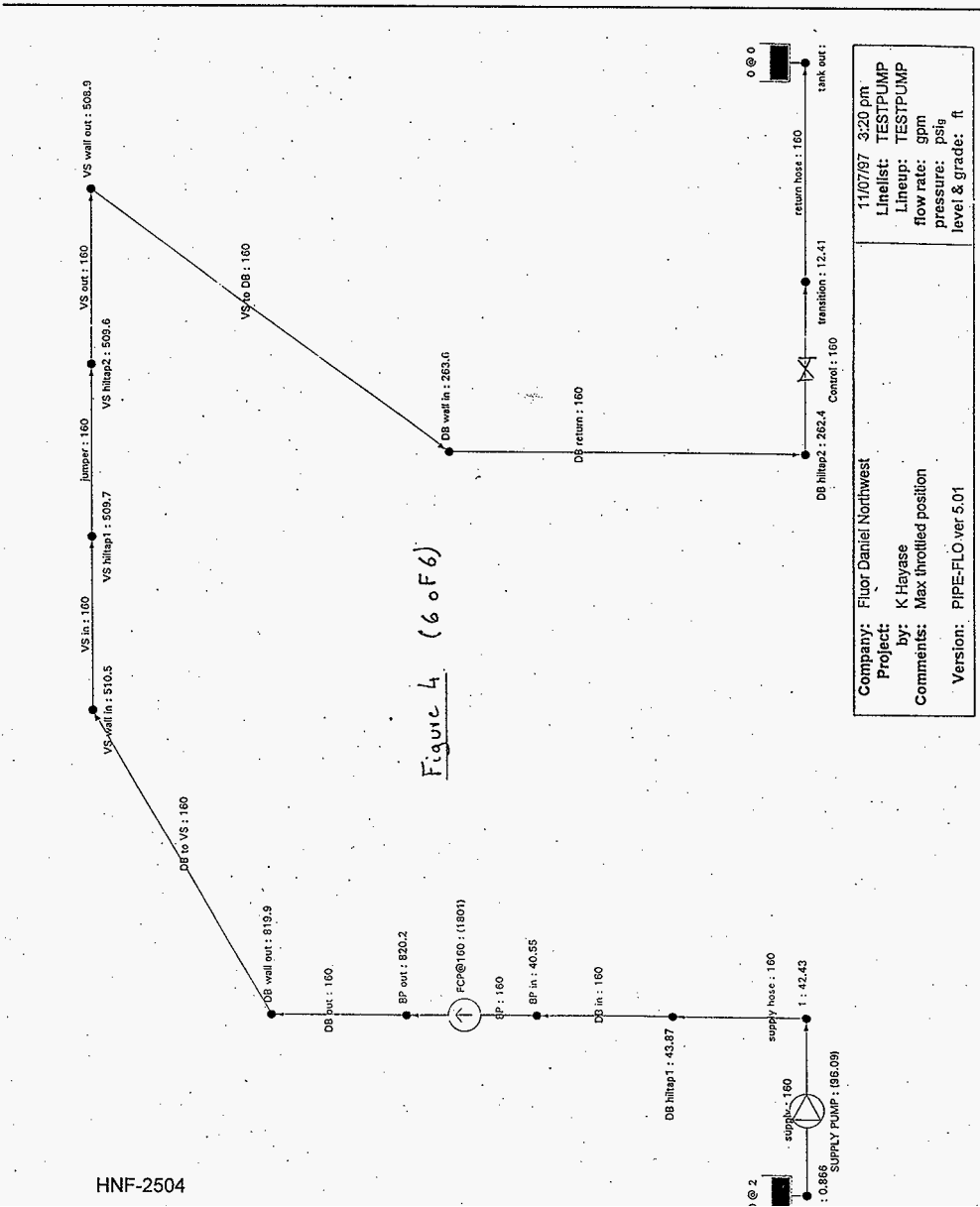


Figure 4 (6 of 6)

ENGINEERING CHANGE NOTICE

Page 1 of 2 ~~57~~ 42 LR 12/15/97

1. ECN ~~644614~~

Proj. ECN W-058-373

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [] LR 12/15/97 Direct Revision X [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	GA Leshikar SESC, S2-24, 373-4434	[] Yes [X] No	12/15/97
	6. Project Title/No./Work Order No. W-058, Replacement Cross-Site Transfer System/N58U7	7. Bldg./Sys./Fac. No. 6241-A	8. Approval Designator SQ
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-1857, Rev. 0	10. Related ECN No(s). N/A	11. Related PO No. N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	N/A	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change 13b. Design Baseline Document? [] Yes [X] No

Replace pages 13 and 14 of HNF-1857, Rev. 0.

Replace pages 20 of 150, 24-43 of 150, 47-63 of 150, 68 of 150, 77-78 of 150 and 88-90 of 150 in attachment A of HNF-1857, Rev. 0.

Add pages ~~49~~ 42a, 63a, and 63b of 150 to attachment A of HNF-1857, Rev. 0.

LR 12/15/97

14a. Justification (mark one)

Criteria Change	[]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[X]

14b. Justification Details

Testing of the booster pump(s) P-3125A and P-3125B bearing oil level switches and vibration instrumentation improved, eliminated redundant testing of interlock 9 within the interlock 6 test, added test of interlock 2, added booster pump motor rotation direction check and miscellaneous changes.

15. Distribution (include name, MSIN, and no. of copies)

FDNW DISTRIBUTION		DISTRIBUTION	
LR Hall	R3-47	GA Leshikar, SESC	R3-47
~~L~~ Dowell	G3-21	EA Pacquet, NHC	R3-47
Friedrich	G3-14	C van Katwijk, NHC	R3-47
nst Doc Control	S2-53	MD Gerken, NHC	R3-38
		GL Parsons, NHC	R3-47
		MJ Sutey, LMHC	T4-08
		CR Reichmuth, LMHC	T4-07

RELEASE STAMP
DATE: DEC 15 1997
STA: 4
HANFORD RELEASE
ID: 3

A-7900-013-2 (05/96) GEF095

ENGINEERING CHANGE NOTICE

12/15/97 Page 2 of 35 | 1. ECN (use no. from pg. 1) 644614 W-058-373

16. Design Verification Required	17. Cost Impact		18. Schedule Impact (days)
[ ] Yes	ENGINEERING NA	CONSTRUCTION NA	NA
[X] No	Additional [ ] $	Additional [ ] $	Improvement [ ]
	Savings [ ] $	Savings [ ] $	Delay [ ]

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	[ ]	Seismic/Stress Analysis	[ ]	Tank Calibration Manual	[ ]
Functional Design Criteria	[ ]	Stress/Design Report	[ ]	Health Physics Procedure	[ ]
Operating Specification	[ ]	Interface Control Drawing	[ ]	Spares Multiple Unit Listing	[ ]
Criticality Specification	[ ]	Calibration Procedure	[ ]	Test Procedures/Specification	[ ]
Conceptual Design Report	[ ]	Installation Procedure	[ ]	Component Index	[ ]
Equipment Spec.	[ ]	Maintenance Procedure	[ ]	ASME Coded Item	[ ]
Const. Spec.	[ ]	Engineering Procedure	[ ]	Human Factor Consideration	[ ]
Procurement Spec.	[ ]	Operating Instruction	[ ]	Computer Software	[ ]
Vendor Information	[ ]	Operating Procedure	[ ]	Electric Circuit Schedule	[ ]
OM Manual	[ ]	Operational Safety Requirement	[ ]	ICRS Procedure	[ ]
FSAR/SAR	[ ]	IEFD Drawing	[ ]	Process Control Manual/Plan	[ ]
Safety Equipment List	[ ]	Cell Arrangement Drawing	[ ]	Process Flow Chart	[ ]
Radiation Work Permit	[ ]	Essential Material Specification	[ ]	Purchase Requisition	[ ]
Environmental Impact Statement	[ ]	Fac. Proc. Samp. Schedule	[ ]	Tickler File	[ ]
Environmental Report	[ ]	Inspection Plan	[ ]		[ ]
Environmental Permit	[ ]	Inventory Adjustment Request	[ ]		[ ]

20. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
N/A		

21. Approvals

	Signature	Date
Design Authority WG Brown	Wayne Brown	12/15/97
~~Cog. Eng.~~ SU Mgr EA Pacquet		12/15/97
~~Cog.~~ Proj. Mgr. GL Parsons	M L Parsons	12/15/97
QA LR Hall (Fax)	Larry R. Hall	12/15/97
Safety OM Jaka	M. O'Brien Jaka	12/15/97
Environ. NA		NA
Other NA		NA
Engineering MJ Sutey	M J Sutey	12-15-97
TWRS OPs	Robert Lesshier	12-15-97
Originator GA Leshikar	G A Leshikar	12-15-97
Informal Review MD Gerken	Doug Gerken	12/15/97
NA		NA

	Signature	Date
Design Agent	NA	NA
PE		
QA		
Safety		
Design		
Environ.		
Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

RECORD OF REVISION	(1) Document Number HNF-1857, Rev. 1	Page 1

(2) Title
Preoperational Test POTP-007, Cross-Site Transfer System Integrated Test

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
	EDT-608654	(5) Cog. Engr.	(6) Cog. Mgr. Date
0 1 RS	(7) Replace pages 13 and 14 of HNF-1857, Rev. 0	12/15/97	12/15/97
	Replace pages 20 of 150, 24-43 of 150, 47-63 of 150, 68 of 150, 77-78 of 150 and 88-90 of 150 in attachment A		
	Add pages ~~49a~~ 42a, 63a, and 63b of 150 to attachment of HNF-1857, Rev. 0 (ECN-W058-373)		

PREOPERATIONAL TEST POTP-007, CROSS-SITE TRANSFER SYSTEM INTEGRATED TEST

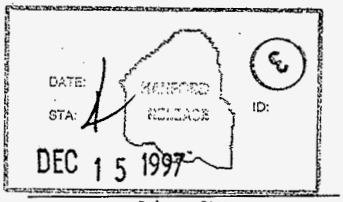
G. L. Parsons
Numatec Hanford Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: W058-373 UC: 2030
Org Code: 8C610 Charge Code: N58U7
B&R Code: EW3120071 Total Pages: 154

Key Words: Project W-058, Transfer Header, 3160, P-3125A, P-3125B, Cross-site, transfer system, slurry, Sulzer, P-102-SY, P-102-SY-02A

Abstract: This procedure tests the operability of the Project W-058 Cross-Site Transfer System booster pumps, slurry header 3160, and supernate header 3150, per the criteria given in Project W-058 Startup Test Plan, HNF-SD-W058-SUP-002.

12/15/97
Christine L. McKell
Release Approval Date



Release Stamp

Approved for Public Release

DEC 03 1997

ENGINEERING DATA TRANSMITTAL

1. EDT 623654

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
Distribution	Replacement Cross-Site Transfer System	N/A
5. Proj./Prog./Dept./Div.:	**6. Design Authority/ Design Agent/Cog. Engr.:**	**7. Purchase Order No.:**
W-058/Startup	GL Parsons	N/A
8. Originator Remarks:		**9. Equip./Component No.:**
For Release		P-3125A, P-3125B
		10. System/Bldg./Facility: 6241-A/6241-V
11. Receiver Remarks: 11A. Design Baseline Document? [ ] Yes [X] No		**12. Major Assm. Dwg. No.:** H-2-822403
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: N/A

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	HNF-1857		0	Preoperational Test POTP-007, Cross-Site Transfer System Integrated Test	SQ	1	1	

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name (K) Signature (L) Date (M) MSIN	(G) Reason	(H) Disp.	(J) Name (K) Signature (L) Date (M) MSIN
N/A	N/A	Design Authority N/A (For Approvals, see page 1 of Document)			
N/A	N/A	Design Agent N/A			
1/2	1	Cog. Mgr. GL Parsons /s/ GL Parsons 12/4/97 R3-47			
1/2	1	Cog. Proj. Startup EA Pacquet /s/ EA Pacquet 12/4/97 R3-47			
N/A	N/A	QA ~~N/A~~ SEE APPROVAL SHT.			
N/A	N/A	Safety ~~N/A~~ SEE APPROVAL SHT.			
N/A	N/A	Env. N/A			

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No.
GA Leshikar /s/ GA Leshikar 12-3-97	EA Pacquet /s/ EA Pacquet 12-3-97	GL Parsons /s/ GL Parsons 12/4/97	[ ] Approved [ ] Approved w/comments [ ] Disapproved w/comments
Signature of EDT Originator / Date	Authorized Representative for Receiving Organization / Date	Design Authority/ Cognizant Manager / Date	

BD-7400-172-2 (05/96) GEF097

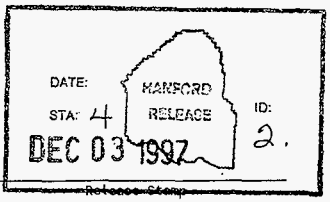
PREOPERATIONAL TEST POTP-007, CROSS-SITE TRANSFER SYSTEM INTEGRATED TEST

G. L. Parsons
Numatec Hanford Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 623654 UC: 2030
Org Code: 8C610 Charge Code: N58U7
B&R Code: EW3120071 Total Pages: 151

Key Words: Project W-058, Transfer Header, 3160, P-3125A, P-3125B, Cross-Site, transfer system slurry, Sulzer, P-102-SY, P-102-SY-02A, POTP

Abstract: This procedure tests the operability of the Project W-058 Cross-Site Transfer System booster pumps, slurry header 3160, and supernate header 3150, per the criteria given in Project W-058 Startup Test Plan, HNF-SD-W058-SUP-002.



Release Approval 12/4/97 Date

Approved for Public Release

HNF-2504, REV 0 ATT 1 PG 27

Author
G.A. Leshikar/J.L. Dowell Print Name/Signature

APPROVAL DESIGNATOR SQ

PROCEDURE APPROVAL BY TEST REVIEW BOARD (TRB)

TRB Chair	12/3/97 Date	TWRS Operations	12-4-97 Date
TWRS Engineering	12/4/97 Date	TWRS Safety	12/3/97 Date
Startup Engineer	12/3/97 Date	Quality Assurance	12/3/97 Date
Project Management	12-3-97 Date	FDNW Construction	12/3/97 Date

TABLE OF CONTENTS PAGE

1.0 PURPOSE

1.1 This procedure tests the operability of the Project W-058 Cross Site Transfer System booster pumps, slurry header 3160, and supernate header 3150.

2.0 INFORMATION

2.1 SCOPE

2.1.1 The transfer system will be configured for the slurry line booster pumps to move water from a temporary reservoir located outside 6241-A Diversion Box through a loop which starts at the slurry line inside the Diversion Box, jumpers from the slurry line to the supernate line inside 6241-V Vent Station, and returns thru the supernate line. Utilizing system valves as barriers, the Diversion Box will be isolated from 241-SY-A and 241-SY-B valve pits in 200 West Area, and 6241-V Vent Station will be isolated from Lift Station 244-A in 200 East Area.

2.1.2 This test will demonstrate filling, venting, and draining of the transfer headers.

2.1.3 This procedure will demonstrate the operation of the following Cross Site Transfer System components:

- Booster Pump P-3125A and VSD-1
- Booster Pump P-3125B and VSD-2

2.1.4 The following components of the Cross Site Transfer System that would normally be utilized during an actual waste transfer, are not used in this test:

- Water Flush System
- Valving and interlocks at 241-SY-A valve pit (jumper not yet installed)
- Valving and interlocks at 244-A Lift Station (jumpers not yet installed)

2.1.5 This procedure is governed by HNF-PRO-446 which establishes the requirements for project, program, department, or division testing activities.

2.2 TERMS AND DEFINITIONS

2.2.1 HASP - Health and Safety Plan
2.2.2 M&TE - Measurement and Test Equipment
2.2.3 MCS - Monitoring and Control Station
2.2.4 MOV - Motor Operated Valve
2.2.5 PI - Pressure Indicator
2.2.6 PIC - Process Instrument Calibrator
2.2.7 PID - Proportional Integral Derivative
2.2.8 PCU - Process Control Unit
2.2.9 POTP - Pre Operational Test Procedure
2.2.10 SOV - Solenoid Operated Valve
2.2.11 VTPS - Variable Test Pressure Source
2.2.12 TSR - Technical Safety Requirements

2.3 RESPONSIBILITIES

2.3.1 The Construction Forces craft personnel are responsible for:

- Providing assistance during the test.

2.3.2 Test Director responsiblities:

- Ensures the equipment found in Step 4.10 of this procedure is available.
- Safe and productive accomplishment of the tests necessary to achieve startup.
- Ensure safe working conditions and practices.
- Ensure compliance with test documents and Technical Safety Requirements documents (TSRs) during testing.
- Communicate and coordinate the tests with the Tank Farm Shift Managers.
- Ensure appropriate review/approval of any modifications to test procedures are completed prior to returning to work

- Direct line of communication and centralized point of control.
- Conducts pre-job planning meeting.
- Scheduling/rescheduling of the test as required.
- Delegates any of the above responsibilities as needed to a deputy.

2.3.3 Test Engineer responsibilites:

- Conducting pre-job system walkdown.
- Recording equipment status and data per this procedure.
- Directing preoperational testing
- Providing technical support during testing.
- Providing programming support during testing.
- Forcing data in PLC program during testing.
- Recording data exceptions and other notes as required on the POTP Data Sheets.
- Review test documents to validate acceptance
- Prepare post testing documents

2.3.4 Operations Personnel responsibilities:

- Observing testing activities for training purposes.

2.4 CHANGE CONTROL

2.4.1 Test procedure administrative or editorial changes required during testing may be accommodated by the Test Engineer red-lining the controlled copy of the test procedure, if such changes will not affect operating facility safety, function, or performance and will not compromise or influence test data. Requirement changes, changes to acceptance criteria, or changes to Danger, Caution, Special Precautions, or other safety or environmental instructions must be made by engineering change notice. Such changes shall not prevent the running of another portion of the test unaffected by the change.

2.5 EXCEPTIONS

2.5.1 Exceptions to the test results will be given a sequential number and recorded on Attachment E, Test Exception Log sheet. Errors in the POTP itself shall not be processed as exceptions (see Section 2.4, CHANGE CONTROL). A Test Exception Report, Attachment D, will be filled out to record and disposition each test exception.

2.6 REFERENCES

2.6.1 The following documents were used to write or are referenced in this procedure:

- Project W-058 Startup Test Plan, WHC-SD-W058-SUP-002
- Project W-058 Replacement of Cross Site Transfer System Functional Design Criteria, WHC-SD-W058-FDC-001
- H-2-822400, Sheet 1,2 & 3, P&ID Legend
- H-2-822402, P&ID SY Valve Pits
- H-2-822403, P&ID Diversion Box 6241-A
- H-2-822404, P&ID Vent Station 6241-V
- H-2-822405, P&ID Lift Station 244-A
- H-2-822505, Electrical One-Line Diversion Box 6241-A
- H-2-822513,Sheet 1-9, Electrical Elementary Diagrams Diversion Box 6241-A
- H-6-14009, Electrical One Line Diagram Ventilation Station 6241-V
- ES-058-Y40 through Y90, Logic Diagrams
- VI 22798, Supplement 1, Electronic Pressure Transmitter, Ametek Model 88 Series
- VI 22798, Supplement 33, Air Operated Ball Valves, Herion/Hi-Gear Inc./Hytork
- VI 22798, Supplement 39, Ultrasonic Flowmeter, Panametrics
- VI 22798, Supplement 40, Slurry Transfer Pump, Sulzer Bingham Pumps

2.7 ENVIRONMENTAL

2.7.1 Spills of hazardous materials should be reported to Environmental Reports group at 373-4942.

2.8 SAFETY

Warning - Operators should be aware of the possibility of coming into contact with poisonous snakes and spiders.

2.8.1 The following administrative procedures control work performed in this procedure:

- Safety: HNF-PRO-074 thru -096 and HNF-PRO-100 thru -105.
- Industrial Hygiene: HNF-PRO-110, -111, -115, -119 thru -121.
- Tank Farm Health and Safety Plan (HASP), WHC-SD-WM-HSP-002

2.9 RADIATION AND CONTAMINATION CONTROL

2.9.1 For any work requiring entry into a radiation/contamination area, comply with the facility requirements. The work covered by this procedure is performed outside of the tank farm and does not require entry into a radiation/contamination control area, except access is required to 241-SY-271 building.

2.10 QUALITY ASSURANCE

2.10.1 Quality Assurance shall review and approve the test procedure, the final test report and the disposition of all test exceptions. LMHC QC will witness tests performed under this POTP.

2.11 GENERAL INFORMATION

2.11.1 All Measuring and Test Equipment (M&TE) used during performance of this procedure to collect qualitative data with the exception of timing devices shall meet the following requirements:

- Be within its current calibration cycle as evidenced by an affixed calibration label.
- Be capable of desired range.
- Have an accuracy (consistent with state-of-the-art limitations) equal to or greater than the accuracy specified in the procedure.

2.11.2 Timing measurements shall be made with commercially available time devices.

2.11.3 All readings are to be taken and recorded for each location where the capability exists (i.e. local instrument, PCU, MCS).

2.12 LIMITS AND PRECAUTIONS

2.12.1 If during performance of this procedure, any of the following conditions are found, **immediately** notify the Test Engineer:

- Any equipment malfunction which could prevent fulfillment of it's functional requirements.
- Personnel error or procedural inadequacy which could prevent fulfillment of procedural requirements.

The Test Engineer may choose to stop work and place equipment in a safe condition based on the significance of the malfunction, error or inadequacy.

2.12.2 The Test Engineer has overall control of the testing process and change authorization for this procedure. The Test Engineer is responsible for running the test, data collection, and ensuring compliance with all requirements in this procedure.

2.12.3 Contact Test Director for additional instructions if changing plant conditions affect work or delays in work extend past end of shift.

2.12.4 If any waste is generated during performance of this instruction consult Facility/Plant/Area Hazardous Waste Coordinator for specific instructions to ensure compliance with HNF and DOE environmental standards, as applicable, for disposal.

2.12.5 Comply with FDNW and plant/facility specific lock and tag or over-tagging requirements, as applicable.

3.0 RECORDS

3.1 This procedure as well as all completed attachments/appendices are kept as a permanent record.

4.0 PREREQUISITES

The following items are prerequisite actions to be performed before Interlock Testing, Sections 2.0 and 3.0 of Attachment A. Prerequisite actions may be performed in any order.

4.1 Perform a walkdown of the system tested by this procedure.
Test Engineer: G A Leshikar

4.2 Perform a pretest briefing for all personnel involved in the performance of this test.
Test Director:

4.3 All personnel who will be involved with this test have provided the required signature verification information in Attachment B.
Test Engineer: G A Leshikar

4.4 The test engineer has verified that all appropriate components within and including the test boundary have been "blue" tagged.
Test Engineer: G A Leshikar

4.5 The following equipment has been prepared for operation in accordance with vendor manuals:

4.5.1 Booster Pumps P-3125A and P-3125B and associated variable speed drives.

Test Engineer GG Lenhart

4.6 Communications between personnel in 242-S and field test personnel has been verified.

Test Director GG Lenhart

4.7 The official copy of this POTP and all other copies that will be used during the test have been verified to be the latest revision.

Test Engineer GG Lenhart

4.8 All open items have been evaluated and verified to not affect the performance of this POTP (Quality Assurance Nonconformance Reports, Construction Punch Lists, outstanding Engineering or Field Change Notices, Startup-originated Design Change Requests, Test Deficiency Reports, and Master System Punch List items).

Test Director

Test Engineer GG Lenhart

The following additional items are prerequisite actions to be performed before Transfer Line Filling, Section 5.0 of Attachment A.

4.9 **VERIFY** process blanks OR VAPOR SEALS are installed on header 3150 at 241-SY-A valve pit, header 3160 at 241-SY-B valve pit, and both headers 3150 and 3160 at 244-A Lift Station.

Test Director

4.10 The HEPA filters in the transfer system vent lines at the Vent Station are NOT installed.

Test Director

The following additional items are prerequisite actions to be performed before Booster Pump P-3125A Startup Testing, Section 7.0 of Attachment A.

4.11 **VERIFY** the system flowmeter FE-3125 is installed on the slurry line pipe in the Diversion Box. (See VI 22798, Supplement #39)

Test Engineer: GG Lenhart

4.12 VERIFY correct parameters have been programmed into the Panametrics flowmeter DF868 electronics console, per Test Engineer's direction. (See VI 22798, Supplement #39) Recorded in test log on 12/17/97
Test Engineer: [signature]

4.13 EQUIPMENT/INSTRUMENTS

4.13.1 Jumper #1 (connects temporary water reservoir to slurry line upstream of booster pumps). See sketch in Attachment A, Appendix A.

4.13.1.1 Connector to female Hiltap coupling, 3", stainless steel

4.13.1.2 Pressure indicator (local), scale range approximately 1 to 100 psig
Manufacturer: Ashcroft Model No. Duragauge
Serial No. N/A Calibration Date 3/19/97
Calibration Due Date 3/19/98 Cal. code: 950-31-04-067
MITE Control No.: 0041

4.13.1.3 Valve (isolation between supply pump and booster pumps)

4.13.1.4 Piping/hose as required, 100 psig or better

4.13.1.5 Pressure control valve or bypass regulator, 30 to 75 psi adjustment range, return system excess to water reservoir

4.13.1.6 Supply pump, rated to provide approximately 140 gpm, to inlet of booster pump (pressure/head required is dependent on jumper properties, i.e. hose dia., length, component losses, etc).

4.13.2 Jumper #2 (connects slurry line to supernate line at Hiltap connectors in Vent Station). See sketch in Attachment A, Appendix A.

4.13.2.1 Connector to female Hiltap coupling, 3", stainless steel, rated to 1500 psig, quantity (2)

4.13.2.2 Hose, rated to 1500 psig

4.13.3 Jumper #3 (connects supernate line in Diversion Box to temporary water reservoir). See sketch in Attachment A, Appendix A.

4.13.3.1 Connector to female Hiltap coupling, 3", stainless steel, rated to 1500 psig

4.13.3.2 Pressure indicator (local), scale range approximately 0 to 600 psig
Manufacturer: TRANSCAT Model No. DGV 95/2-D)
Serial No. 590765 Calibration Date 7/23/97
Calibration Due Date 7/23/98

4.13.3.3 Flow control (throttling) valve, sized to avoid cavitation during test conditions, rated to 1500 psig

4.13.3.4 Pressure indicator (local), scale range approximately 0 to 300 psig
Manufacturer: Ashcroft Model No. N/A
Serial No. N/A Calibration Date 8/8/97
Calibration Due Date 8/8/98 Cal. Code: 950-31-04-103
M&TE Control No: 1020

4.13.3.5 Flow measuring device, range 0 to 200 gpm

4.13.3.6 Piping/hose as required, 100 psig or better

4.13.4 Two Variable Test Pressure Sources range 0-3000 psig.
1. Manufacturer: Sensotec Model No. AG813-10000psi
Serial No. 590765 Calibration Date 1/27/97
Calibration Due Date 1/27/98

2. Manufacturer: WIKA Model No. N/A
Serial No. BAT-PG-001 Calibration Date 11/17/97
Calibration Due Date 11/17/98 Range -30 in Hg to 60psig

4.13.5 ~~Clamp-on Ammeter: 0-40 Ampere.~~
~~Manufacturer: _____ Model No. _____~~
~~Serial No. _____ Calibration Date _____~~
~~Calibration Due Date _____~~
NOT REQUIRED D.G. 3/30/98

4.13.6 Multi-meter 0-600V.
Manufacturer: _____ Model No. _____
Serial No. _____ Calibration Date _____
Calibration Due Date _____
NOT REQUIRED D.G. 3/30/98

4.13.7 Process Instrument Calibrator, with 4-20 mA signal capability ~~and simulating a 100 ohm (type 385) RTD~~. D.G. 12/17/97
Manufacturer: Beta Model No. 110
Serial No. 1776 Calibration Date 7/9/97
Calibration Due Date 7/9/98 Cal. Serial No. 817-23-01-002

4.13.8 Bucket, with volumetric markings on side, to collect oil drained from booster pump bearing housings

4.13.9 Decade Box
DGG 12/17/97
Manufacturer: General Resistance Inc. Model No. DA-74-3X
Serial No.: 723 Calibration Date: 5/97
Calibration Due Date: 5/98

5.0 PROCEDURE

5.1 Preoperational testing shall be performed using Attachment A of this procedure.

*QC WITNESS OF CIRCUIT DRAIN CAN BE REMOVED FROM POTP-007. CIRCUIT DRAINING IS ASSURED, THROUGH THE REMOVAL OF THE JUMPER. THIS JUMPER CANNOT BE REMOVED WITHOUT DRAINING CIRCUIT. MJ Bailey 4/1/98

6.0 ACCEPTANCE CRITERIA

6.1 Transfer headers 3150 and 3160 from the Diversion Box to the Vent Station were filled with water; water was circulated through them by the booster pumps; and the headers were vented and drained.

*LMHC QC DID NOT WITNESS SECTIONS 11 AND 12 OF THIS POTP WHICH COVERS VENTING AND DRAINING OF HEADERS; THEREFORE, THAT PORTION OF THIS CRITERIA WAS NOT VERIFIED. PJE 4.1.98

Test Engineer Doug Hahn MJ Bailey FOR K WILLOUGHBY 4/1/98

LMHC Quality Control PJ Elmendorf 4.1.98

REF TE-001, -003, -004, -005, & 006.

6.2 Booster pumps P-3125A and P-3125B operated at the design flowrates of ~~104~~ gpm ± 5 gpm and 140 gpm ± 7 gpm, and at a high flow condition of ~~160~~ gpm ± 8 gpm, under control of system flow feedback. (Sections 9.0 and 10.0).

OK D.G.

TOLERANCE IS ±7GPM (SEE ECN W058-395)

Test Engineer Doug Hahn D.G. 4/1/98

LMHC Quality Control PJ Elmendorf 4.1.98
MJ Bailey FOR K WILLOUGHBY 4/1/98

6.3 The following interlocks operate properly:

- I-2: On high pressure shutdown operating booster pump, P-3125A or P-3125B.
- I-6: The operating booster pump, P-3125A or P-3125B will shutdown:
  A) On high pump bearing temperature
  B) On high motor winding temperature
  C) On high vibration
  D) On pump seal failure
  E) On low oil level
- I-7: The pump will not be permitted to operate if the inlet pressure is lower than 10 psig
- I-9: Transfer pump P-102-SY-02A will not be permitted to operate if operating booster pump is shutdown
- I-10: Upstream transfer pump P-102-SY-02A will be shutdown if inlet pressure reaches 70 psig
- I-14: On high discharge pressure, shutdown appropriate operating pump DJ 4/1/98 START ECN W-058-39
- I-15: The booster pump will not be permitted to ~~operate~~ if the associated vent and drain valves are not closed.
- I-20 (with respect to supernate line vent only): On high pressure, shutdown transfer pump P-102-SY-02A.

Test Engineer Doug Baker

LMHC Quality Control PJ Klemundson 4.1.98
REF. TE-002 by Bailey for K.W. Loughey 4/1/98

1.0 Initial Conditions / Pre-Interlock Tests

1.1 VERIFY all system instrumentation in Appendix B is calibrated.
Test Engineer: GA

1.2 ALIGN the Instrument Air system valves and transfer line instrument isolation valves in accordance with Appendix C.
REVERIFIED D.D. 2/11/98
Test Engineer: GA Leshikar

1.3 VERIFY system electrical circuit breakers and disconnects are aligned in accordance with Appendix D.
REVERIFIED D.D. 2/11/98
Test Engineer: GA Leshikar

D.D. 2/12/98 1.3.1 VERIFY ALL FORCES (B310) ARE REMOVED FROM PLC PRIOR TO STARTING TEST, EXCEPT FORCES NOTED IN STEPS 4.16 THRU 4.24

1.4 PLACE Diversion Box Compressor SA-CMP-3101A local Start Switch in the ON position.

1.5 PLACE Diversion Box Compressor SA-CMP-3101A local ON/OFF Switch in the ON position.

1.6 OPEN the following valves (air supply to the SOV's and pump seal control panels):

1.6.1 IA-V-3105A OPEN Test Engineer: GA Leshikar
1.6.2 IA-V-3102A OPEN Test Engineer: GA Leshikar
D.D. 2/11/98 ~~D.D. 2/11/98 1.6.3 IA-V-3106A OPEN TEST ENGINEER Doug Jenkins~~

1.7 After compressor has come up to operating pressure (approximately 125 to 150 psig), VERIFY air pressure supplied to Diversion Box SOV's is greater than 110 psig.

1.7.1 PI-3108A 110* psig REVERIFIED 116 D.D. 2/11/98
*Adjusted PCV-3100A so that PI-3108A reads 114 psig Test Engineer: GA Leshikar

1.8 VERIFY the air pressure supplied to the pump seals is greater than ~~95~~ 110 psig per the pressure indicators on the seal control panels: D.D. 2/12/98

1.8.1 PI-3125A1 113 psig ~~114~~ 125 ~~116~~ PS14
1.8.2 PI-3125A2 118 psig ~~114~~ 125 ~~103~~ PS14
1.8.3 PI-3125B1 122 psig ~~114~~ 125 ~~102~~ PS14
1.8.4 PI-3125B2 125 psig ~~114~~ 125 ~~103~~ PS14
REVERIFIED D.D. 2/11/98
Test Engineer: GA Leshikar

1.9 RECORD the instrument air flow rate to each pump seal per the flow indicators on the pump seal control panels:

1.9.1 FI-3125A1 4.2 scfh .60 7.4 SCFH
1.9.2 FI-3125A2 1.8 scfh 2.2 1.9 SCFH
1.9.3 FI-3125B1 0 scfh 2.05 1.4 2.2
1.9.4 FI-3125B2 2.8 scfh .50 SCFH

REVERIFIED 2/11/98 D.D. FLOWS TO BE MULTIPLIED BY 3.0 TO GET ACTUAL SCFH NOTE

Test Engineer: Gl Lehukas

Below .50

3.0

1.10 PLACE Vent Station Compressor SA-CMP-3101B local Start Switch in the ON position.

1.11 PLACE Vent Station Compressor SA-CMP-3101B local ON/OFF Switch in the ON position.

1.12 OPEN the following valve (air supply to SOV's):

1.12.1 IA-V-3101B 5 OPEN Test Engineer: Gl Lehukas D.D. 2/11/98

1.13 After compressor has come up to operating pressure (approximately 125 to 150 psig), VERIFY air pressure supplied to the Vent Station SOV's is greater than 110 psig.

1.13.1 PI-3108B 112 psig 112 PSIG REVERIFIED D.D 2/11/98

Test Engineer: Gl Lehukas

NOTE: The following 6 steps require access to 241-SY-271 building.

1.14 OPEN Transfer Pump 241-SY-02A Main Disconnect.
Test Engineer: D.D.

1.15 LOCK & TAG Transfer Pump 241-SY-02A Main Disconnect OPEN.
Test Engineer: D.D.

1.16 DISCONNECT Transfer Pump 241-SY-02A leads from starter.
Test Engineer: D.D.

1.17 INSULATE motor leads.
Test Engineer: D.D.

1.18 REMOVE Lock & Tag from Transfer Pump 241-SY-02A Main Disconnect.
Test Engineer: D.D.

1.19 CLOSE Transfer Pump 241-SY-02A Main Disconnect.
Test Engineer: DJ

1.20 OPEN VSD-1 Main Disconnect.

1.21 LOCK & TAG VSD-1 Main Disconnect OPEN.
Test Engineer: N/A

1.22 DISCONNECT Booster Pump (P-3125A) Motor Leads T1, T2, & T3. Tape the ends and stow within the enclosure.
Test Engineer: HA Lubitkar *

* Verified leads T1, T2, T3 disconnected. Were previously disconnected to complete ~~see~~ POTP's -001 thru -005. HA Lubitkar 12/12/97

1.23 REMOVE Lock & Tag from VSD-1 Main Disconnect.
Test Engineer: N/A

1.24 CLOSE VSD-1 Main Disconnect.
Test Engineer: HA Lubitkar

1.25 OPEN VSD-2 Main Disconnect.

1.26 LOCK & TAG VSD-2 Main Disconnect OPEN.
Test Engineer: N/A

1.27 DISCONNECT Booster Pump (P-3125B) Motor Leads T1, T2, & T3. Tape the ends and stow within the enclosure.
Test Engineer: N/A *

* Disconnected previously per above.

1.28 REMOVE Lock & Tag from VSD-2 Main Disconnect.
Test Engineer: N/A

1.29 CLOSE VSD-2 Main Disconnect.
Test Engineer: N/A HA Lubitkar

1.30 **POSITION** P-3125A drain valves and vent valve as follows: REVERIFIED FOR RETEST

Valve No.	Description	MCS Position	Initials
MOV-3125AA	P-3125A Drain Valve	CLOSED	
MOV-3125AB	P-3125A Drain Valve	CLOSED	
MOV-3125AC	P-3125A Drain Valve	CLOSED	
MOV-3125AD	P-3125A Drain Valve	CLOSED	
MOV-3125AE	P-3125A Drain Valve	CLOSED	
MOV-3125AF	P-3125A Drain Valve	CLOSED	
MOV-3125AG	P-3125A Drain Valve	CLOSED	
MOV-3125AH	P-3125A Drain Valve	CLOSED	
MOV-3125AJ	P-3125A Drain Valve	CLOSED	
MOV-3125AK	P-3125A Vent Valve	CLOSED	

D.G. 2/12/98

Test Engineer: GA Leshuka

1.31 **POSITION** P-3125B drain valves and vent valve as follows:

Valve No.	Description	MCS Position	Initials
MOV-3125BA	P-3125B Drain Valve	CLOSED	
MOV-3125BB	P-3125B Drain Valve	CLOSED	
MOV-3125BC	P-3125B Drain Valve	CLOSED	
MOV-3125BD	P-3125B Drain Valve	CLOSED	
MOV-3125BE	P-3125B Drain Valve	CLOSED	
MOV-3125BF	P-3125B Drain Valve	CLOSED	
MOV-3125BG	P-3125B Drain Valve	CLOSED	
MOV-3125BH	P-3125B Drain Valve	CLOSED	
MOV-3125BJ	P-3125B Drain Valve	CLOSED	
MOV-3125BK	P-3125B Vent Valve	CLOSED	

D.G. 2/12/98

Test Engineer: GA Leshuka

1.32 VERIFY the following on the MCS: ~~FOR RETEST~~ REVERIFIED FOR RETEST

1.32.1 TRANSFER mode is illuminated on MCS screen PCU-1 for P-102-SY-02A transfer pump.
Test Engineer: D.G D.G 2/12/98

1.32.2 PAL-3100A COMPRESSOR PRESSURE LOW is illuminated in GREEN on the display for Diversion Box 6241-A.
Test Engineer: D.G.

1.32.3 PAL-3100B COMPRESSOR PRESSURE LOW is illuminated in GREEN on the display for Vent Station 6241-V.
Test Engineer: D.G.

1.32.4 LDA-3160 ENCASEMENT LEAK DETECTION is illuminated in GREEN on the display for Diversion Box 6241-A.
Test Engineer: G.A. Lukkas

1.32.5 LDA-3150 SUMP LEAK DETECTION is illuminated in GREEN on the display for Diversion Box 6241-A.
Test Engineer: D.G

1.32.6 LDA-3161 ENCASEMENT LEAK DETECTION is illuminated in GREEN on the display for Vent Station 6241-V.
Test Engineer: D.G.

1.32.7 LDA-3151 SUMP LEAK DETECTION is illuminated in GREEN on the display for Vent Station 6241-V.
Test Engineer: D.G.

1.32.8 LDA-3162 ENCASEMENT LEAK DETECTION is illuminated in GREEN on the display for 244A Lift Station.
Test Engineer: D.G.

1.32.9 Pump P-841 Status OFF is illuminated on the display for 244A Lift Station.
Test Engineer: D.G.

Signatures Transferred from Rev. 0
GAL 12/16/97

2.0 Booster Pump P-3125A Interlock Test - Interlocks 2,6,7,9,10,14,15,20

> Steps 2.1 through 2.24 must be completed prior to attempting to start the booster pump. THIS IS A SIMULATED START, neither the booster pump shaft nor the transfer pump shaft will rotate because the motor leads have been lifted in Section 1.0.

REVERIFIED FOR RETEST

2.1 **PRESS** the OFF key on VSD-1 keypad.

2.2 **VERIFY** the OFF key is illuminated on VSD-1 keypad.
Test Engineer: GAL 12/12/97 D.J. 2/12/98

2.3 **PRESS** the LOCAL key on VSD-1 keypad.

2.4 **PRESS** the MONITOR key on VSD-1 keypad.

2.5 **VERIFY** the MONITOR and DRIVE READY LEDs are illuminated on VSD-1.
Test Engineer: GAL D.J. 2/12/98

NOTE: The variable speed drive has a minimum frequency output of 2 Hz, corresponding to a minimum motor speed of 120 rpm, which may or may not produce enough torque to cause the pump shaft to rotate. Disconnecting the leads to the motor assures the pump shaft can not rotate. However, the VSD, being a current controlled type, will trip out if it is started without a load unless the NO MOTOR TEST MODE parameter is enabled.

2.6 **PRESS** the Control Speed DOWN arrow until FREQ SET equals 2 Hz.
Test Engineer: GAL D.J. 2/12/98

2.7 **SET-UP** VSD-1 for simulated motor operation per the following steps.

2.7.1 **PRESS** the PROGRAM key on VSD-1 keypad.

2.7.2 **SELECT** PARAM and **PRESS** the ENTER key.

2.7.3 **SCROLL** thru the list of drive parameters using the UP and DOWN arrows until ACCEL TIME is shown.

2.7.4 **PRESS** the LINE key (moves cursor from upper to lower line).

REVERIFIED FOR RETEST D.G. 2/12/98

2.7.5 SELECT 20 (CHANGED TO 5 ON 2/12/98 D.G. 2/12/98) and PRESS the ENTER key. D.G. 2/12/98
Test Engineer: GA Sobieski

2.7.6 SCROLL thru the list of drive parameters using the UP and DOWN arrows until DECEL TIME is shown.

2.7.7 PRESS the LINE key.

2.7.8 SELECT ~~20~~ 5 N/A D.G. 2/12/98 and PRESS the ENTER key. 12/12/97 D.G. 2/12/98
Test Engineer: GA Sobieski

2.7.9 SCROLL thru the list of drive parameters using the UP and DOWN arrows until NO MOTOR TEST MODE is shown.

2.7.10 PRESS the LINE key.

2.7.11 SELECT YES (under NO MOTOR TEST MODE) and PRESS the ENTER key. D.G. 2/12/98
Test Engineer: GA Sobieski

2.8 PRESS the MONITOR key on VSD-1 keypad.

2.9 PRESS the REMOTE key on VSD-1 keypad (enables speed reference from the MCS). D.G. 2/12/98
Test Engineer: GA Sobieski

2.10 PRESS the AUTO key on VSD-1 keypad (enables start/stop control from the MCS). D.G. 2/12/98
Test Engineer: GA Sobieski

2.11 VERIFY P-102-SY-02A Transfer Pump DRIVE STOPPED is illuminated on MCS screen PCU-1. D.G. 2/12/98
Test Engineer: GA Sobieski

2.12 VERIFY ENABLE ENERGIZED, REMOTE, and OFF are illuminated on MCS screen PCU-2 for Booster Pump P-3125A. D.G. 2/12/98
Test Engineer: GA Sobieski

2.13 SELECT the PID MAN Button on MCS screen PCU-2 for Booster Pump P-3125A.

2.14 SET the Fluid FLOW (SP) value to 0 gpm on MCS screen PCU-2 for Booster Pump P-3125A. D.J. 12/12/97 D.J. 2/12/98

D.J. 2/11/98 Test Engineer: D.J.

FOR RETEST THESE INTERLOCKS WILL BE FORCED IN MCS SOFTWARE TO ALLOW TESTING OF LOW OIL LEVEL SENSOR.

NOTE: The following two steps are required to override Interlock 7. If steps are completed out of sequence, make sure a VTPS is connected to PT-3125A and set at 20 psig or else the booster pump will not start.

FORCE LOG #162 & 163

2.15 CONNECT a VTPS to the calibration port next to PT-3125A.

2.16 SET the VTPS to approximately 20 psig.

D.J. 2/11/98 FOR RETEST THIS INTERLOCK WILL BE FORCED IN MCS SOFTWARE TO ALLOW TESTING OF LOW OIL LEVEL SENSORS

NOTE: The following two steps are required to override MCS logic (Ref. ES-058-Y74) requiring at least 50 psig discharge pressure, 10 seconds or more after booster pump start or pump FAILURE will appear on MCS screen PCU-2.

2.17 CONNECT the second VTPS to the calibration port next to PT-3125C.

2.18 SET the VTPS to approximately 60 psig.

NOTE: Transfer Scheme 2A must be selected and initiated in order for booster pump P-3125A be started remotely. DG 2/12/98

2.19 SELECT the Transfer Sequencing RESET button.
Test Engineer: H A Lushkar

2.20 VERIFY Alarm Table on MCS shows no valve positioning failures.
Test Engineer: H A Lushkar

2.21 SELECT the Transfer Sequencing INITIATE Button.

2.22 SELECT the Transfer Sequencing TYPE 2A transfer button.
Test Engineer: H A Lushkar

NOTE: The boxes on the MCS overview screen that denote PCU-1 thru PCU-5 indicate status of the transfer path. All boxes GRAY and paths GREEN indicates that the transfer path is ready for use. Boxes filled in RED indicates that an alarm associated with the transfer is activated (i.e. mispositioned valve, leak detected, 200W pump shutdown, etc). The booster pump will not start unless associated alarms are either cleared or over-ridden.

REVERIFIED FOR RETEST DL 2/12/98

2.23 IF any of the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in RED, DETERMINE the reason why and perform the following:

2.23.1 Disposition the problem by fixing it and clearing alarm, or by overriding the alarm IF the Test Engineer determines that the problem will not affect the performance of this test. RECORD disposition on the Test Log or on a Test Exception Sheet, at the discretion of the Test Engineer. N/A this step if not performed.

Test Engineer: DL

2.24 VERIFY the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in GRAY, unless a RED box has been determined to be acceptable per the previous step.

SEE TEST LOG ENTRY 2/12/98 DL

Test Engineer: DL

Interlock 9: The transfer pump will not be permitted to operate if the operating booster pump is shutdown.

2.25 TEST the Transfer Pump shutoff per the following steps:

2.25.1 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.25.2 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/13/97

Test Engineer: GA Sobota

2.25.3 VERIFY the RUN LED is illuminated on VSD-1.

Test Engineer: GA Sobota

Signatures Transferred from Rev. 0
GLS 12/16/97

2.25.4 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data (information only):

2.25.4.1 Motor Freq 2 Hz
2.25.4.2 Motor Speed 3.3 %
2.25.4.3 Motor RPM 119 RPM

2.25.4a **BYPASS** hi/low level limit alarm on P-102-SY-02A Transfer Pump (resets after 5 minutes).

2.25.5 **SELECT** P-102-SY-02A Transfer Pump START on MCS screen PCU-1.

2.25.6 **VERIFY** DRIVE RUNNING is illuminated on MCS screen PCU-1.
Test Engineer: DG

2.25.7 **PRESS** the STOP key on VSD-1 keypad.
Test Engineer: DG

2.25.8 **VERIFY** the RUN LED is no longer illuminated on VSD-1.
Test Engineer: DG

2.25.8a **LOWER** pressure provided to PT-3125C by the VTPS to approximately 40 psig.

2.25.9 **VERIFY** FAILURE and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: DG

2.25.10 **VERIFY** DRIVE STOPPED is illuminated on MCS screen PCU-1 for transfer pump.
Test Engineer: DG

2.25.11 **VERIFY** locally that the contactor for P-102-SY-02A has OPENED.
Test Engineer: DG

Signatures transferred from Rev. 0
JAS 12/16/97

2.25.11a **RAISE** pressure provided to PT-3125C by the VTPS to approximately 60 psig.

2.25.11b **BYPASS** hi/low level limit alarm on P-102-SY-02A Transfer Pump (resets after 5 minutes).

2.25.12 **SELECT** P-3125A Booster Pump START on MCS screen PCU-2.

2.25.13 **VERIFY** P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: DG

2.25.14 **VERIFY** the RUN LED is illuminated on VSD-1.
Test Engineer: DG

2.25.15 **SELECT** P-102-SY-02A Transfer Pump START on MCS screen PCU-1.

2.25.16 **VERIFY** DRIVE RUNNING is illuminated on MCS screen PCU-1.
Test Engineer: DG

2.25.17 **PRESS** P-3125A Booster Pump STOP on MCS screen PCU-2.

2.25.18 **VERIFY** the RUN LED is no longer illuminated on VSD-1.
Test Engineer: DG

2.25.19 **VERIFY** ENERGIZE ENABLED and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: DG

2.25.20 **VERIFY** DRIVE STOPPED is illuminated on MCS screen PCU-1 for transfer pump.
Test Engineer: DG

2.25.21 **VERIFY** locally that the contactor for P-102-SY-02A has OPENED.
Test Engineer: DG

2.25.22 **DISCONNECT** VTPS's from PT-3125A and PT-3125C.

2.25.23 **INSTALL** software jumper (or "force" bit) to disable Interlocks 7 and 10 (booster pump inlet pressure).
Test Engineer: DAL 12/15/97

2.25.24 **INSTALL** software jumper (or "force" bit) to disable minimum discharge pressure requirement ("booster pump is running" in MCS logic, Ref. ES-058-Y74).
Test Engineer: DAL

Interlock 6: The operating booster pump will shut down on High Bearing Temperature, High Motor Winding Temperature, High Vibration, Pump Seal Failure, and Low Oil Level.

High Bearing Temperature TSH-3125A1

MCS PYROMETER
AMBIENT 59 | 60 °F } COMPARED TO CALIBRATED PYROMETER
FREEZE -32° | -28° °F }
817-79-09-001
DUE 6/17/98
CALD 6/17/97

2.26 **TEST** TSH-3125A1 per the following steps:

NOTE: Measuring Device is a three-wire RTD

2.26.1 **CONNECT** the temperature calibrator to ~~PCU-2B-TB2-03, PCU-2B-TB2-I3, and PCU-2B-TB2-R3.~~ RTD AT PUMP SKID
D.D 12/16/97

NOTE: If this test instrument only accepts a two lead RTD connection then PCU-2B-TB2-03 and PCU-2B-TB2-R3 should be connected together as one lead to the instrument.

2.26.2 **SELECT** P-3125A Booster Pump START on MCS screen PCU-2.

2.26.3 **VERIFY** P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.D

2.26.4 **VERIFY** the RUN LED is illuminated on VSD-1.
Test Engineer: D.D

2.26.5 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data (information only):

2.26.6 Motor Freq 2 Hz
2.26.7 Motor Speed 33 %
2.26.8 Motor RPM 119 RPM

2.26.9 Step deleted.

2.26.10 Step deleted.

2.26.11 SET the temperature (RTD) simulator to 190°F. (133.9 Ω) TRIPPED AT 191°F (134.4 Ω)

2.26.12 VERIFY at the MCS that TSH-3125A1 alarms.
Test Engineer: D.Y

2.26.13 SET the temperature (RTD) simulator to 200°F. (136 Ω) TRIPPED AT 201°F (136.5 Ω)

2.26.14 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: D.Y

2.26.15 VERIFY the RUN LED is no longer illuminated on VSD-1.
Test Engineer: D.Y.

2.26.16 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)
Test Engineer: D.Y.

2.26.17 DISCONNECT ~~the temperature calibrator from PCU-2B-TB2-03, PCU-2B-TB2-I3, and PCU-2B-TB2-R3~~ RTD AT PUMP SKID D.Y 12/16/97

2.26.18 RECONNECT wires ~~numbers TE3125A1-A, TE3125A1-B, and TE3125A1-C to the correct terminal points.~~ TO RTD AT PUMP SKID

2.26.19 VERIFY the wires are reconnected properly.
Test Engineer: D.Y.

D.J 2/12/98
MCS PYROMETER
AMBIENT 57/58 °F } CONFIRMED TO CALIBRATED PYROMETER
FREEZE -10/-11 °F }

High Bearing Temperature TSH-3125A2

2.27 TEST TSH-3125A2 per the following steps:

812-99-09-001 CAL'D 6/12/98

NOTE: Measuring Device is a three-wire RTD

RTD AT PUMP SKID DISCONNECTED 12/18/98

2.27.1 CONNECT the temperature calibrator to ~~PCU-2B-TB2-04, PCU-2B-TB2-I4, and PCU-2B-TB2-R4~~. D.J 12/16/97

NOTE: If this test instrument only accepts a two lead RTD connection then PCU-2B-TB2-04 and PCU-2B-TB2-R4 should be connected together as one lead to the instrument.

2.27.2 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.27.3 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.J.

2.27.4 Step deleted.

2.27.5 Step deleted.

TRIPPED AT 191°F (134.5Ω)
2.27.6 SET the temperature (RTD) simulator to 190°F. (133Ω)

2.27.7 VERIFY at the MCS that TSH-3125A2 alarms.

TRIPPED AT 201°F (136.5Ω)
2.27.8 SET the temperature (RTD) simulator to 200°F. (136Ω)

2.27.9 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: D.J.

2.27.10 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)

2.27.11 DISCONNECT the temperature calibrator from RTD AT PUMP SKID ~~PCU-2B-TB2-04, PCU-2B-TB2-I4, and PCU-2B-TB2-R4~~. D.J 12/16/97

TO RTD AT PUMP SKID
2.27.12 RECONNECT wire numbers ~~TE3125A2-A, TE3125A2-B, and TE3125A2-C to the correct terminal points~~.

2.27.13 VERIFY the wires are reconnected properly.
Test Engineer: D.J.

High Motor Winding Temperature TSH-3125A.

2.28 TEST TSH-3125A per the following steps:

NOTE: Temperature sensor is a factory set, normally open temperature switch set to close at 175 °F.

2.28.1 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.28.2 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.S.

2.28.3 Step deleted.

2.28.4 Step deleted.

2.28.5 LIFT Either wire ~~TSH-3125A-1~~ from pump skid junction box. WIRE LIFT 229, D.S. 12/16/97

2.28.6 VERIFY at the MCS that TAH-3125A alarms.
Test Engineer: D.S.

2.28.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: D.S.

2.28.8 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)
Test Engineer: D.S.

2.28.9 RE-LAND wire ~~TSH-3125A-1~~ on pump skid junction box. LIFTED IN STEP 2.28.5 D.S. 12/16/97

2.28.10 VERIFY TAH-3125A alarm clears at MCS.
Test Engineer: D.S.

High Vibration VSH-3125A1

2.29 TEST VSH-3125A1 per the following steps:

2.29.1 * 3-31-98 At the pump skid, in the junction box for the 24 volt signals, DISCONNECT wire PS2(+) and connect it to the positive lead of the PIC.

2.29.2 * 3-31-98 At the pump skid, in the junction box for the 24 volt signals, DISCONNECT wire VT-3125A1(-) and connect it to the negative lead of the PIC.

2.29.3 SET the PIC to 4 mA.

2.29.4 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.29.5 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.H.

2.29.6 Step deleted.

2.29.7 Step deleted.

2.29.8 TRIPPED AT .31"/SEC (8.9mA)
SET the PIC to 8.8 mA corresponding to a vibration of 0.30 in/sec ± 0.05 in/sec.

2.29.9 VERIFY at the MCS that VSH-3125A1 alarms.
Test Engineer: D.H.

2.29.10 TRIPPED AT .60 IN/SEC
SET the PIC to 13.6 mA corresponding to a vibration of 0.60 in/sec ± 0.05 in/sec.

2.29.11 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: D.H.

2.29.12 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)

2.29.13 DISCONNECT the PIC.

* 3/31/98 2.29.14 RECONNECT wire numbers PS2(+) and VT-3125A1(-) to the correct terminal points.

2.29.15 **RAP** on the bearing housing adjacent to VE/VT-3125A1 and **VERIFY** output fluctuates for VI-3125A1 on MCS screen for booster pump P-3125A. REVERIFIED FOR RETEST D.S 2/12/98
Test Engineer: D.S. 2/12/98

High Vibration VSH-3125A2

2.30 **TEST** VSH-3125A2 per the following steps:

2.30.1 At the pump skid, in the junction box for the 24 volt signals, **DISCONNECT** wire PS2(+) and connect it to the positive lead of the PIC. * 3/31/98

2.30.2 At the pump skid, in the junction box for the 24 volt signals, **DISCONNECT** wire VT-3125A2(-) and connect it to the negative lead of the PIC. *

2.30.3 **SET** the PIC to 4 mA.

2.30.4 **SELECT** P-3125A Booster Pump START on MCS screen PCU-2.

2.30.5 **VERIFY** P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.S.

2.30.6 Step deleted.

2.30.7 Step deleted.

2.30.8 **SET** the PIC to 8.8 mA corresponding to a vibration of 0.30 in/sec ± 0.05 in/sec.

2.30.9 **VERIFY** at the MCS that VSH-3125A2 alarms.
Test Engineer: D.S.

2.30.10 **SET** the PIC to 13.6 mA corresponding to a vibration of 0.60 in/sec ± 0.05 in/sec.

2.30.11 **VERIFY** STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: D.S.

2.30.12 VERIFY P-102-SY-02A shut down. (0:7/3 and 0:7/4, PCU1)
Test Engineer: D.G.

2.30.13 DISCONNECT the PIC.

X 3/3/98 2.30.14 RECONNECT wire numbers PS2(+) and VT-3125A2(-) to the correct terminal points. REVERIFIED FOR RETEST

2.30.15 RAP on the bearing housing adjacent to VE/VT-3125A2 and VERIFY output fluctuates for VI-3125A2 on MCS screen for booster pump P-3125A. D.G.
Test Engineer: D.G. 2/12/98

Low Oil Level LAL-3125A1

2.31 TEST LAL-3125A1 per the following steps:

2.31.1 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.31.2 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.G. 2/12/98

2.31.3 Step deleted.

2.31.4 Step deleted.

2.31.5 DRAIN oil from bearing housing A1 into a measurable container until LAL-3125A1 alarms at MCS, THEN IMMEDIATELY REPLACE drain plug.

2.31.6 MEASURE and RECORD the amount of oil drained.
220 mL gallons
D.G. 2/12/98 Test Engineer: D.G. 2/12/98

2.31.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: D.G.

2.31.7a ~~DRAIN remaining oil from bearing housing A1.~~ D.G. 2/12/98

~~2.31.7b MEASURE and RECORD the total amount of oil drained. gallons~~ D.G. 2/12/98
~~Test Engineer:~~

2.31.8 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)
Test Engineer: D.G. 2/12/98

2.31.9 REFILL bearing housing A1 with oil per manufacturer's instructions.
Test Engineer: D.G. 2/12/98

2.31.10 Step deleted.

Low Oil Level LAL-3125A2

2.32 TEST LAL-3125A2 per the following steps:

2.32.1 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.32.2 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.G. 2/12/98

2.32.3 Step deleted.

2.32.4 Step deleted.

2.32.5 DRAIN oil from bearing housing A2 into a measurable container until LAL-3125A2 alarms at MCS, THEN IMMEDIATELY REPLACE drain plug.

2.32.6 MEASURE and RECORD the amount of oil drained.
255 ~~gallons~~ mL.
D.G. 2/12/98 Test Engineer: D.G. 2/12/98

2.32.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: D.G. 2/12/98

~~2.32.7a DRAIN remaining oil from bearing housing A1.~~ D.G. 2/12/98

~~2.32.7b MEASURE and RECORD the total amount of oil drained. gallons.~~
~~Test Engineer:~~ D.L. 2/12/98

2.32.8 Step deleted.

2.32.9 REFILL bearing housing A2 with oil per manufacturer's instructions.
Test Engineer: D.L. 2/12/98

2.32.10 Step deleted.

PUMP SEAL FAILURE FAH-3125A1

2.33 TEST FAH-3125A1 per the following steps:

2.33.1 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.33.2 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/16/97
Test Engineer: GA Lobnitz

2.33.3 Step deleted.

2.33.4 Step deleted.

2.33.5 LIFT LEAD from PCU-2A-TB3-36.
~~PLACE a jumper between PCU-2A-TB3-36 and PCU-2A-TB3-37.~~ GAL 12/16/97

2.33.6 VERIFY at the MCS that FAH-3125A1 alarms.
Test Engineer: GA Lobnitz

2.33.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: GA Lobnitz

2.33.8 VERIFY P-102-SY-02A shut down. (0:7/3 and 0:7/4, PCU1)
Test Engineer: GAL

2.33.9 RECONNECT LEAD TO PCU-2A-TB3-36.
~~REMOVE the jumper from between PCU-2A-TB3-36 and PCU-2A-TB3-37.~~ GAL 12/16/97

2.33.10 VERIFY the ~~jumper~~ LEAD is ~~removed~~ RECONNECTED D.D. 12/16/97.
Test Engineer: GaL

PUMP SEAL FAILURE FAH-3125A2

2.34 TEST FAH-3125A2 per the following steps:

2.34.1 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.34.2 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/16/97
Test Engineer: GaL

2.34.3 Step deleted.

2.34.4 Step deleted.

2.34.5 Lift LEAD PCU-2A-TB3-38. ~~PLACE a jumper between PCU-2A-TB3-38 and PCU-2A-TB3-39.~~ GaL 12/16/97

2.34.6 VERIFY at the MCS that FAH-3125A2 alarms.
Test Engineer: GaL

2.34.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: GaL

2.34.8 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)
Test Engineer: GaL

2.34.9 RECONNECT WIRE TO PCU-2A-TB3-38. ~~REMOVE the jumper from between PCU-2A-TB3-38 and PCU-2A-TB3-39.~~ GaL 12/16/97

2.34.10 VERIFY the ~~jumper~~ LEAD is ~~removed~~ RECONNECTED D.D 12/16/97.
Test Engineer: GaL

PUMP SEAL FAILURE PAL-3125A1

2.35 TEST PAL-3125A1 per the following steps:

2.35.1 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.35.2 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: GaL 12/16/97

2.35.3 Step deleted.

2.35.4 Step deleted.

2.35.5 LIFT the lead from PCU-2A-TB3-66.

2.35.6 VERIFY at the MCS that PAL-3125A1 alarms.
Test Engineer: GaL

2.35.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: GaL

2.35.8 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)
Test Engineer: GaL

2.35.9 RECONNECT the lead to PCU-2A-TB3-66.

2.35.10 VERIFY the wires are reconnected properly.
Test Engineer: GaL

PUMP SEAL FAILURE PAL-3125A2

2.36 TEST PAL-3125A2 per the following steps:

2.36.1 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.36.2 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: DJ.

2.36.3 Step deleted.

2.36.4 Step deleted.

2.36.5 LIFT the lead from PCU-2A-TB3-58.

2.36.6 VERIFY at the MCS that PAL-3125A2 alarms.
Test Engineer: D.G.

2.36.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: D.G.

2.36.8 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)
Test Engineer: D.G.

2.36.9 RECONNECT the lead to PCU-2A-TB3-58.

2.36.10 VERIFY the wires are reconnected properly.
Test Engineer: D.G.

Interlock 2: On high pressure, shutdown operating booster pump, P-3125A or P-3125B.

PAH-3168

2.37 TEST Interlock 2 for P-3125A per the following steps:

2.37.1 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.37.2 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.G.

2.37.3 CLOSE valve V-3168.
Test Engineer: D.G.

2.37.4 CONNECT VTPS to PT-3168 and increase pressure until PI-3168 reads 12 psig at the MCS.

2.37.5 VERIFY at the MCS that PAH-3168 Alarms.
Test Engineer: D.G.

2.37.6 **VERIFY** STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: D.L.

2.37.7 **DISCONNECT** the VTPS from PT-3168.

2.37.8 **OPEN** valve V-3168.
Test Engineer: D.L.

Interlock 10: Upstream Transfer Pump P-102-SY-02A will be shutdown if inlet pressure reaches 70 psig.

Interlock 7: The booster pump will not be permitted to operate if the inlet pressure is lower than 10 psig.

PAH-3125A

2.38 **TEST** PAH-3125A per the following steps:

2.38.1 **CONNECT** VTPS to calibration port near PT-3125A and increase pressure until PI-3125A reads 8 psig at the MCS.

2.38.1a **CONNECT** a VTPS to calibration port near PT-3125C and set pressure to approximately 60 psig.

2.38.1b **REMOVE** software jumper or forced bit disabling Interlocks 7 and 10 (booster pump inlet pressure).

2.38.1c **REMOVE** software jumper or forced bit disabling minimum discharge pressure requirement ("booster pump is running" in MCS logic, Ref. ES-058-Y74).

2.38.2 **SELECT** booster pump P-3125A START at the MCS.

2.38.3 **VERIFY** booster pump P-3125A STOPS after approximately 5 seconds.
12/13/97
Signature transferred from Rev. 0 dat 12/16/97 Test Engineer: DG

2.38.4 **INCREASE** pressure using VTPS until PI-3125A reads 12 psig at the MCS.

Signatures transferred from Rev. 0
Dag 12/16/97

2.38.5 **SELECT** P-3125A Booster Pump START on MCS screen PCU-2.

2.38.6 **VERIFY** P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/13/97
Test Engineer: DG

2.38.6b **BYPASS** hi/low level limit alarm on P-102-SY-02A Transfer Pump (resets after 5 minutes).

2.38.7 **SELECT** P-102-SY-02A Transfer Pump START on MCS screen PCU-1.

2.38.8 **VERIFY** DRIVE RUNNING is illuminated on MCS screen PCU-1.
Test Engineer: DG

2.38.9 **INCREASE** pressure, using VTPS connected to PT-3125A, until PI-3125A reads 72 psig at the MCS.

2.38.10 **VERIFY** at the MCS that PAH-3125A alarms.
Test Engineer: DG

2.38.11 Step deleted.

2.38.12 **VERIFY** DRIVE STOPPED is illuminated on MCS screen PCU-1 for transfer pump.
Test Engineer: DG

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DGL 12/12/97

Interlock 14: On High discharge pressure, shutdown appropriate operating pump.

PAH-3125C

2.39 TEST PAH-3125C per the following steps:

2.39.1 SET the VTPS that is currently connected to PT-3125A to a pressure between 12 psig and 68 psig.

2.39.2 Step deleted.

2.39.3 SELECT P-3125A Booster Pump START on MCS screen PCU-2.

2.39.4 VERIFY P-3125A Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/13/97
Test Engineer: DG

2.39.4b BYPASS hi/low level limit alarm on P-102-SY-02A Transfer Pump (resets after 5 minutes).

2.39.5 SELECT P-102-SY-02A Transfer Pump START on MCS screen PCU-1.

2.39.6 VERIFY DRIVE RUNNING is illuminated on MCS screen PCU-1.
Test Engineer: DG

2.39.7 INCREASE pressure, using VTPS connected to PT-3125C, until PI-3125C reads 1275 psig at the MCS.

2.39.8 VERIFY at the MCS that PAH-3125C alarms.
Test Engineer: DG

2.39.9 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125A.
Test Engineer: DG

2.39.10 VERIFY DRIVE STOPPED is illuminated on MCS screen PCU-1 for transfer pump.
Test Engineer: DG

2.39.11 DISCONNECT the second VTPS from PT-3125C.

Signatures transferred from Rev. 0 DG 12/16/97

2.39.12 OPEN valve V-3125C.

Test Engineer: DG

D.G 9/1/98 REVERIFIED FOR START ECN W058-3 RETEST

Interlock 15: The booster pump will not be permitted to ~~operate~~ if the associated bypass, vent, and drain valves are not closed.

2.40 TEST Interlock 15 for P-3125A per the following steps:

2.40.1 OPEN SOV-3163.

2.40.2 SELECT booster pump P-3125A START at the MCS.

2.40.3 VERIFY booster pump P-3125A does NOT start. 12/15/97

Test Engineer: DG D.G 2/12/98

2.40.4 CLOSE SOV-3163.

2.40.5 OPEN each P-3125A motor operated drain valve and vent valve one at a time from the MCS, VERIFY STATUS UNKNOWN appears on MCS screen for P-3125A, attempt to START P-3125A from the MCS, VERIFY P-3125A does NOT START, and THEN CLOSE the associated valve.

Valve No.	Description	MCS Position	Pump DID NOT Start
MOV-3125AA	P-3125A Drain Valve	OPEN	DG 12/15/97
MOV-3125AB	P-3125A Drain Valve	OPEN	DG
MOV-3125AC	P-3125A Drain Valve	OPEN	DG
MOV-3125AD	P-3125A Drain Valve	OPEN	DG
MOV-3125AE	P-3125A Drain Valve	OPEN	DG
MOV-3125AF	P-3125A Drain Valve	OPEN	DG
MOV-3125AG	P-3125A Drain Valve	OPEN	DG
MOV-3125AH	P-3125A Drain Valve	OPEN	DG
MOV-3125AJ	P-3125A Drain Valve	OPEN	DG
MOV-3125AK	P-3125A Vent Valve	OPEN	DG

D.G 2/12/98

Test Engineer: DG

P-3125A interlock testing complete

REVERIFIED FOR RETEST D.J. 2/12/98

2.41 TAKE VSD-1 out of NO MOTOR TEST MODE per the following steps.

2.41.1 PRESS the PROGRAM key on VSD-1 keypad.

2.41.2 SELECT PARAM and PRESS the ENTER key.

2.41.3 SCROLL thru the list of drive parameters using the UP and DOWN arrows until NO MOTOR TEST MODE is shown.

2.41.4 PRESS the LINE key.

2.41.5 SELECT NO (under NO MOTOR TEST MODE) and PRESS the ENTER key.
Test Engineer: 12/19

2.41.6 PRESS the MONITOR key on VSD-1 keypad.

2.41.7 VERIFY the MONITOR and DRIVE READY LEDs are illuminated on VSD-1.
Test Engineer: 12/19

2.42 DISCONNECT the VTPS from calibration port near PT-3125A.

2.43 OPEN valve V-3125A.
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Test Engineer: 12/13/97

Transfer Pump P-102-SY-02A Interlock 20

Interlock 20: On high pressure, shutdown P-102-SY-02A.

PAH-3185

NOTE: Transfer Scheme 1 must be selected and initiated to test Interlock 20.

2.44 SELECT the Transfer Sequencing RESET button.
Test Engineer:

2.45 VERIFY Alarm Table on MCS shows no valve positioning failures.
Test Engineer:

2.46 SELECT the Transfer Sequencing INITIATE Button.

2.47 SELECT the Transfer Sequencing TYPE 1 transfer button.
Test Engineer: D.J.

2.48 IF any of the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in RED, DETERMINE the reason why and perform the following:

2.48.1 Disposition the problem by fixing it and clearing alarm, or by overriding the alarm IF the Test Engineer determines that the problem will not affect the performance of this test. RECORD disposition on the Test Log or on a Test Exception Sheet, at the discretion of the Test Engineer. N/A this step if not performed.
Test Engineer: D.J.

2.49 VERIFY the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in GRAY, unless a RED box has been determined to be acceptable per the previous step.
RED PCU-2 OK
Test Engineer: D.J.

~~2.50 SELECT P-102-SY-02A Transfer Pump START on MCS screen PCU-1.~~ D.J

~~2.51 VERIFY DRIVE-RUNNING is illuminated on MCS screen PCU-1.~~ D.J
SEE TEST LOG ENTRY 12/16/98
~~Test Engineer:~~

2.52 CONNECT VTPS to PT-3185 and increase pressure until PI-3185 reads 12 psig at the MCS.

2.53 VERIFY at the MCS that PAH-3185 Alarms.
Test Engineer: D.J.

2.54 VERIFY ~~DRIVE STOPPED is illuminated on MCS screen PCU-1 for transfer pump.~~ P-102-SY-02A SHUTDOWN (0:7/3 AND 0:7/4) PCU-1 D.J.
Test Engineer: D.J.

2.55 DISCONNECT the VTPS from calibration port near PT-3185.

2.56 OPEN valve V-3185.
Test Engineer: D.J.

Signatures transferred from Rev. 0
GAL 12/16/97

3.0 Booster Pump P-3125B Interlock Test - Interlocks 2,6,7,9,10,14,15

> Steps 3.1 through 3.24 must be completed prior to attempting to start the booster pump. THIS IS A SIMULATED START, neither the booster pump shaft nor the transfer pump shaft will rotate because the motor leads have been lifted in Section 1.0.

3.1 **PRESS** the OFF key on VSD-2 keypad. REVERIFIED FOR RETEST

3.2 **VERIFY** the OFF key is illuminated on VSD-2 keypad. 12/12/97
Test Engineer: GAL D.Y. 2/12/98

3.3 **PRESS** the LOCAL key on VSD-2 keypad.

3.4 **PRESS** the MONITOR key on VSD-2 keypad.

3.5 **VERIFY** the MONITOR and DRIVE READY LEDs are illuminated on VSD-2.
Test Engineer: GAL D.Y. 2/12/98

NOTE: The variable speed drive has a minimum frequency output of 2 Hz, corresponding to a minimum motor speed of 120 rpm, which may or may not produce enough torque to cause the pump shaft to rotate. Disconnecting the leads to the motor assures the pump shaft can not rotate. However, the VSD, being a current controlled type, will trip out if it is started without a load unless the NO MOTOR TEST MODE parameter is enabled.

3.6 **PRESS** the Control Speed DOWN arrow until FREQ SET equals 2 Hz.
Test Engineer: GAL D.Y. 2/12/98

3.7 **SET-UP** VSD-2 for simulated motor operation per the following steps.

3.7.1 **PRESS** the PROGRAM key on VSD-2 keypad.

3.7.2 **SELECT** PARAM and **PRESS** the ENTER key.

3.7.3 **SCROLL** thru the list of drive parameters using the UP and DOWN arrows until ACCEL TIME is shown.

3.7.4 **PRESS** the LINE key (moves cursor from upper to lower line).

REVIEWED FOR RETEST

3.7.5 SELECT 20 and PRESS the ENTER key. 12/12/97 D.S.
Test Engineer: GA Lenhart 2/12/98

3.7.6 SCROLL thru the list of drive parameters using the UP and DOWN arrows until DECEL TIME is shown.

3.7.7 PRESS the LINE key.

3.7.8 SELECT ~~20~~ 60 and PRESS the ENTER key. ~~20~~ DS. 2/12/98
Test Engineer: GA Lenhart D.S. 2/12/98

3.7.9 SCROLL thru the list of drive parameters using the UP and DOWN arrows until NO MOTOR TEST MODE is shown.

3.7.10 PRESS the LINE key.

3.7.11 SELECT YES (under NO MOTOR TEST MODE) and PRESS the ENTER key.
Test Engineer: GA Lenhart D.S. 2/12/98

3.8 PRESS the MONITOR key on VSD-2 keypad.

3.9 PRESS the REMOTE key on VSD-2 keypad (enables speed reference from the MCS).
Test Engineer: GA Lenhart D.S. 2/12/98

3.10 PRESS the AUTO key on VSD-2 keypad (enables start/stop control from the MCS).
Test Engineer: GA Lenhart D.S. 2/12/98

3.11 VERIFY P-102-SY-02A Transfer Pump DRIVE STOPPED is illuminated on MCS screen PCU-1.
Test Engineer: GA Lenhart D.S. 2/12/98

3.12 VERIFY ENABLE ENERGIZED, REMOTE, and OFF are illuminated on MCS screen PCU-2 for Booster Pump P-3125B.
Test Engineer: GA Lenhart D.S. 2/12/98

3.13 SELECT the PID Manual Button on MCS screen PCU-2 for Booster Pump P-3125B.

REVERIFIED FOR RETEST 2/12/98 DY

3.14 SET the Fluid FLOW (SP) value to 0 gpm on MCS screen PCU-2 for Booster Pump P-3125B.

Test Engineer: D.Y. 12/12/97

D.Y. 2/11/98 NOTE: FOR RETEST THESE INTERLOCKS WILL BE FORCED IN MCS SOFTWARE TO ALLOW TESTING OF LOW OIL LEVEL SENSOR DY

NOTE: The following two steps are required to override Interlock 7. If steps are completed out of sequence, make sure a VTPS is connected to PT-3125B and set at 20 psig or else the booster pump will not start.

3.15 CONNECT a VTPS to the calibration port next to PT-3125B.

3.16 SET the VTPS to approximately 20 psig.

NOTE: The following two steps are required to override MCS logic (Ref. ES-058-Y74) requiring at least 50 psig discharge pressure, 10 seconds or more after booster pump start or pump FAILURE will appear on MCS screen PCU-2.

3.17 CONNECT the second VTPS to the calibration port next to PT-3125D.

3.18 SET the VTPS to approximately 60 psig.

NOTE: Transfer Scheme 2B must be selected and initiated in order for booster pump P-3125B be started remotely.

3.19 SELECT the Transfer Sequencing RESET button.
Test Engineer: D.Y. D.Y. 2/12/98

3.20 VERIFY Alarm Table on MCS shows no valve positioning failures.
Test Engineer: D.Y. D.Y. 2/12/98

3.21 SELECT the Transfer Sequencing INITIATE Button.

3.22 SELECT the Transfer Sequencing TYPE 2B transfer button.
Test Engineer: D.Y. D.Y. 2/12/98

NOTE: The boxes on the MCS overview screen that denote PCU-1 thru PCU-5 indicate status of the transfer path. All boxes GRAY and paths GREEN indicates that the transfer path is ready for use. Boxes filled in RED indicates that an alarm associated with the transfer is activated (i.e. mispositioned valve, leak detected, etc). The booster pump will not start unless associated alarms are either cleared or over-ridden.

3.23 IF any of the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in RED, DETERMINE the reason why and perform the following: REVERIFIED FOR RETEST

3.23.1 Disposition the problem by fixing it and clearing alarm, or by overriding the alarm IF the Test Engineer determines that the problem will not affect the performance of this test. RECORD disposition on the Test Log or on a Test Exception Sheet, at the discretion of the Test Engineer. N/A this step if not performed. D.Y. 2/12/98

Test Engineer: D.Y.

3.24 VERIFY the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in GRAY, unless a RED box has been determined to be acceptable per the previous step. D.Y. 2/12/98

Test Engineer: D.Y.

SEE TEST LOG ENTRY 2/12/98 D.Y.

Interlock 9: The transfer pump will not be permitted to operate if the operating booster pump is shutdown.

3.25 TEST the Transfer Pump shutoff per the following steps:

3.25.1 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.25.2 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/13/97

Test Engineer: D.Y.

3.25.3 VERIFY the RUN LED is illuminated on VSD-2

Test Engineer: D.Y.

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DG 12/16/97

3.25.4 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data (information only):

3.25.4.1 Motor Freq 0 Hz
3.25.4.2 Motor Speed 0 %
3.25.4.3 Motor RPM 0 RPM

3.25.4a **BYPASS** hi/low level limit alarm on P-102-SY-02A Transfer Pump (resets after 5 minutes).

3.25.5 **SELECT** P-102-SY-02A Transfer Pump START on MCS screen PCU-1.

3.25.6 **VERIFY** DRIVE RUNNING is illuminated on MCS screen PCU-1.
Test Engineer: DG

3.25.7 **PRESS** the STOP key on VSD-2 keypad.
Test Engineer: DG

3.25.8 **VERIFY** the RUN LED is no longer illuminated on VSD-2.
Test Engineer: DG

3.25.8a **LOWER** pressure provided to PT-3125D by the VTPS to approximately 40 psig.

3.25.9 **VERIFY** FAILURE and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: DG

3.25.10 **VERIFY** DRIVE STOPPED is illuminated on MCS screen PCU-1 for transfer pump.
Test Engineer: DG

3.25.11 **VERIFY** locally that the contactor for P-102-SY-02A has OPENED.
Test Engineer: DG

Signatures transferred from Rev. 0
JHR 12/16/97

3.25.11a **RAISE** pressure provided to PT-3125D by the VTPS to approximately 60 psig.

3.25.11b **BYPASS** hi/low level limit alarm on P-102-SY-02A Transfer Pump (resets after 5 minutes).

3.25.12 **SELECT** P-3125B Booster Pump START on MCS screen PCU-2.

3.25.13 **VERIFY** P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: DG

3.25.14 **VERIFY** the RUN LED is illuminated on VSD-2.
Test Engineer: DG

3.25.15 **SELECT** P-102-SY-02A Transfer Pump START on MCS screen PCU-1.

3.25.16 **VERIFY** DRIVE RUNNING is illuminated on MCS screen PCU-1.
Test Engineer: DG

3.25.17 **PRESS** P-3125B Booster Pump STOP on MCS screen PCU-2.

3.25.18 **VERIFY** the RUN LED is no longer illuminated on VSD-2.
Test Engineer: DG

3.25.19 **VERIFY** ENERGIZE ENABLED and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: DG

3.25.20 **VERIFY** DRIVE STOPPED is illuminated on MCS screen PCU-1 for transfer pump.
Test Engineer: DG

3.25.21 **VERIFY** locally that the contactor for P-102-SY-02A has OPENED.
Test Engineer: DG

3.25.22 **DISCONNECT** VTPS's from PT-3125B and PT-3125D.

3.25.23 **INSTALL** software jumper (or "force" bit) to disable Interlocks 7 and 10 (booster pump inlet pressure).

3.25.24 **INSTALL** software jumper (or "force" bit) to disable minimum discharge pressure requirement ("booster pump is running" in MCS logic, Ref. ES-058-Y74).

REVERIFIED FOR RETEST D.J. 2/13/98

Interlock 6: The operating booster pump will shut down on High Bearing Temperature, High Motor Winding Temperature, High Vibration, Pump Seal Failure, and Low Oil Level.

	MCS	PYROMETER
HEAT GUN	195 °F	196 °F
AMBIENT	57 °F	~~56~~ 56 °F
FREEBE	-35 °F	-35°F

High Bearing Temperature TSH-3125B1

3.26 **TEST** TSH-3125B1 per the following steps:

MATE FOR PYROMETER 817-79-09-001 DUE 6/17/98 CAL'D 6/17/97

NOTE: Measuring Device is a three-wire RTD

3.26.1 **CONNECT** the temperature calibrator to ~~PCU-2B-TB2-01, PCU-2B-TB2-I1, and PCU-2B-TB2-R1.~~ RTD AT Pump Skid Had 12/16/97

NOTE: If this test instrument only accepts a two lead RTD connection then PCU-2B-TB2-01 and PCU-2B-TB2-R1 should be connected together as one lead to the instrument.

3.26.2 **SELECT** P-3125B Booster Pump START on MCS screen PCU-2.

3.26.3 **VERIFY** P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.J.

3.26.4 **VERIFY** the RUN LED is illuminated on VSD.
Test Engineer: D.J.

3.26.5 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data (information only):

3.26.5.1 Motor Freq 2 Hz
3.26.5.2 Motor Speed 3.3 %
3.26.5.3 Motor RPM 119 RPM

3.26.6 Step deleted.

3.26.7 Step deleted.

ACTUAL
191°F = (134.45Ω)

3.26.8 SET the temperature (RTD) simulator to 190°F. (133.4Ω)

3.26.9 VERIFY at the MCS that TSH-3125B1 alarms.
Test Engineer: D.H.

202°F = 136.8Ω TRIPPED

3.26.10 SET the temperature (RTD) simulator to 200°F. (136Ω)

3.26.11 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: D.H.

3.26.12 VERIFY the RUN LED is no longer illuminated on VSD-2.
Test Engineer: D.H.

3.26.13 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)
Test Engineer: D.H.

3.26.14 DISCONNECT the temperature calibrator from RTD AT PUMP SKID ~~PCU-2B-TB2-01, PCU-2B-TB2-I1, and PCU-2B-TB2-R1~~. D.H 12/16/97

3.26.15 RECONNECT wires ~~numbers TE3125B1-A, TE3125B1-B, and TE3125B1-C to the correct terminal points~~ TO RTD AT PUMP SKID.

3.26.16 VERIFY the wires are reconnected properly.
Test Engineer: D.H.

REVERIFIED FOR RETEST 2/13/98

note for Pyrometer 817-79-09-001 DCE 6-17-97 2000 6-17-97

	MCS	Pyrometer
HEAT GUN	198 °F	194 °F
AMBIENT	59 °F	61 °F
FREEZE	-10 °F	-8 °F

High Bearing Temperature TSH-3125B2

3.27 TEST TSH-3125B2 per the following steps:

NOTE: Measuring Device is a three-wire RTD ~200°C TO 800°C

3.27.1 CONNECT the temperature calibrator to ~~PCU-2B-TB2-02, PCU-2B-TB2-I2, and PCU-2B-TB2-R2.~~ RTD AT PUMP SKID D.Y 12/16/97

NOTE: If this test instrument only accepts a two lead RTD connection then PCU-2B-TB2-02 and PCU-2B-TB2-R2 should be connected together as one lead to the instrument.

3.27.2 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.27.3 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.Y.

3.27.4 Step deleted.

3.27.5 Step deleted.

3.27.6 SET the temperature (RTD) simulator to 190°F. (133.4 Ω) TRIPPED AT 191°F 134.5 Ω)

3.27.7 VERIFY at the MCS that TSH-3125B2 alarms.

3.27.8 SET the temperature (RTD) simulator to 200°F. (136 Ω) TRIPPED AT 202°F (136.9 Ω)

3.27.9 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: D.Y.

3.27.10 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)

3.27.11 DISCONNECT the temperature calibrator from ~~PCU-2B-TB2-02, PCU-2B-TB2-I2, and PCU-2B-TB2-R2.~~ RTD AT PUMP SKID, D.Y 12/16/97

3.27.12 RECONNECT wires ~~numbers TE3125B2-A, TE3125B2-B, and TE3125B2-C to the correct terminal points.~~ TO RTD AT PUMP SKID

3.27.13 VERIFY the wires are reconnected properly.
Test Engineer: D.Y

High Motor Winding Temperature TSH-3125B.

3.28 TEST TSH-3125B per the following steps:

NOTE: Temperature sensor is a factory set, normally open temperature switch set to close at 175 °F.

3.28.1 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.28.2 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.G.

3.28.3 Step deleted.

3.28.4 Step deleted.

3.28.5 LIFT wire ~~TSH-3125B-~~1 from pump skid junction box. WIRE PUP 232, D.G. 12/16/97

3.28.6 VERIFY at the MCS that TAH-3125B alarms. ALARM COMES IN ON SUMMARY ONLY NOT POP UP ← CORRECTED BY PCS
Test Engineer: D.G.

3.28.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: D.G.

3.28.8 VERIFY P-102-SY-02A shut down. (0:7/3 and 0:7/4, PCU1)
Test Engineer: D.G.

3.28.9 RE-LAND wire ~~TSH-3125B-1~~ on pump skid junction box.
D.G 12/16/97

3.28.10 VERIFY TAH-3125B alarm clears at MCS.
Test Engineer: D.G.

Signatures transferred from Rev. 0
DJL 12/16/97

High Vibration VSH-3125B1

3.29 TEST VSH-3125B1 per the following steps:

3.29.1 ✗ 3/31/98 At the pump skid, in the junction box for the 24 volt signals, DISCONNECT wire PS2(+) and connect it to the positive lead of the PIC.

3.29.2 ✗ At the pump skid, in the junction box for the 24 volt signals, DISCONNECT wire VT-3125B1(-) and connect it to the negative lead of the PIC.

3.29.3 SET the PIC to 4 mA.

3.29.4 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.29.5 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.J. 12/13/97

3.29.6 Step deleted.

3.29.7 Step deleted.

3.29.8 SET the PIC to 8.8 mA corresponding to a vibration of 0.30 in/sec ± 0.05 in/sec.

3.29.9 VERIFY at the MCS that VSH-3125B1 alarms.
Test Engineer: D.J.

3.29.10 SET the PIC to 13.6 mA corresponding to a vibration of 0.60 in/sec ± 0.05 in/sec.

3.29.11 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: D.J.

3.29.12 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)

3.29.13 DISCONNECT the PIC.

3.29.14 X RECONNECT wire numbers PS2(+) and VT-3125B1(-) to the correct terminal points. ✗ 3/31/98

REVERIFIED FOR RETEST DG 2/13/98

3.29.15 RAP on the bearing housing adjacent to VE/VT-3125B1 and VERIFY output fluctuates for VI-3125B1 on MCS screen for booster pump P-3125B.
Test Engineer: 12/19

High Vibration VSH-3125B2

3.30 TEST VSH-3125B2 per the following steps:

3.30.1 ✱ 3/31/98 At the pump skid, in the junction box for the 24 volt signals, DISCONNECT wire PS2(+) and connect it to the positive lead of the PIC.

3.30.2 ✱ At the pump skid, in the junction box for the 24 volt signals, DISCONNECT wire VT-3125B2(-) and connect it to the negative lead of the PIC.

3.30.3 SET the PIC to 4 mA.

3.30.4 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.30.5 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.S.

3.30.6 Step deleted.

3.30.7 Step deleted.

3.30.8 SET the PIC to 8.8 mA corresponding to a vibration of 0.30 in/sec ± 0.05 in/sec.

3.30.9 VERIFY at the MCS that VSH-3125B2 alarms.
Test Engineer: D.S.

3.30.10 SET the PIC to 13.6 mA corresponding to a vibration of 0.60 in/sec ± 0.05 in/sec.

3.30.11 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: D.S.

3.30.12 **VERIFY** P-102-SY-02A shut down. (0:7/3 and 0:7/4, PCU1)
Test Engineer: D.L.

3.30.13 **DISCONNECT** the PIC.

3.30.14 **RECONNECT** wire numbers PS2(+) and VT-3125B2(-) to the correct terminal points. * 3/31/98

3.30.15 **RAP** on the bearing housing adjacent to VE/VT-3125B2 and **VERIFY** output fluctuates for VI-3125B2 on MCS screen for booster pump P-3125B.
Test Engineer: D.L. REVERIFIED FOR RETEST 2/13/98 DL

Low Oil Level LAL-3125B1

3.31 **TEST** LAL-3125B1 per the following steps:

3.31.1 **SELECT** P-3125B Booster Pump START on MCS screen PCU-2. REVERIFIED AND RETESTED

3.31.2 **VERIFY** P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: DAL D.L. 2/13/98

3.31.3 Step deleted.

3.31.4 Step deleted.

3.31.5 **DRAIN** oil from bearing housing B1 into a measurable container until LAL-3125B1 alarms at MCS, **THEN IMMEDIATELY REPLACE** drain plug. FINAL SETTING

3.31.6 **MEASURE and RECORD** the amount of oil drained. ~~155~~ 175 mL 2/13/98 D.L.
~~gallons~~ 245 mL
Test Engineer: D.L. D.L. 2/13/98

3.31.7 **VERIFY** STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: D.L. 2/13/98 D.L.

3.31.7a ~~**DRAIN** remaining oil from bearing housing B1.~~ DAL 12/10/97

3.31.7b ~~MEASURE and RECORD the total amount of oil drained.~~ ~~gallons~~ D.Y. 12/16/97
Test Engineer: _____

3.31.8 VERIFY P-102-SY-02A shut down. (0:7/3 and 0:7/4, PCU1) D.Y 2/13/98
Test Engineer: D.Y

3.31.9 REFILL bearing housing B1 with oil per manufacturer's instructions.
Test Engineer: D.Y. D.Y. 2/13/98

3.31.10 Step deleted.

Low Oil Level LAL-3125B2

3.32 TEST LAL-3125B2 per the following steps:

3.32.1 SELECT P-3125B Booster Pump START on MCS screen PCU-2. REVERIFIED AND RETESTED

3.32.2 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.Y. D.Y. 2/12/98

3.32.3 Step deleted.

3.32.4 Step deleted.

3.32.5 DRAIN oil from bearing housing B2 into a measurable container until LAL-3125B2 alarms at MCS, THEN IMMEDIATELY REPLACE drain plug.

3.32.6 MEASURE and RECORD the amount of oil drained. FINAL VALUE 250 mL
~~230 gallons~~ mL
Test Engineer: D.Y. D.Y. 2/12/98

3.32.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: D.Y. 2/12/98 D.Y.

~~3.32.7a DRAIN remaining oil from bearing housing B2.~~ DY 12/16/97

~~3.32.7b MEASURE and RECORD the total amount of oil drained.~~
~~_____ gallons~~ D.Y. 12/16/97
Test Engineer: _____

3.32.8 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1) D.Y. 2/12/98
Test Engineer: D.Y.

3.32.9 REFILL bearing housing B2 with oil per manufacturer's instructions.
Test Engineer: D.Y.

3.32.10 Step deleted.

PUMP SEAL FAILURE FAH-3125B1

3.33 TEST FAH-3125B1 per the following steps:

3.33.1 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.33.2 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/16/97
Test Engineer: GaL

3.33.3 Step deleted.

3.33.4 Step deleted.

3.33.5 LIFT the lead from PCU-2A-TB-40.
~~PLACE a jumper between PCU-2A-TB3-40 and PCU-2A-TB3-41.~~ GaL 12/16/97

3.33.6 VERIFY at the MCS that FAH-3125B1 alarms.
Test Engineer: GaL

3.33.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: GaL

3.33.8 Step deleted.

3.33.9 Reconnect the lead to PCU-2A-TB-40.
~~REMOVE the jumper from between PCU-2A-TB3-40 and PCU-2A-TB3-41.~~ GaL 12/16/97

3.33.10 VERIFY the jumper is removed.
Test Engineer: GAL

PUMP SEAL FAILURE FAH-3125B2

3.34 TEST FAH-3125B2 per the following steps:

3.34.1 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.34.2 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/16/97
Test Engineer: GAL

3.34.3 Step deleted.

3.34.4 Step deleted.

3.34.5 LIFT the lead from PCU-2A-TB3-42.
~~PLACE a jumper between PCU-2A-TB3-42 and PCU-2A-TB3-43.~~ GAL 12/16/97

3.34.6 VERIFY at the MCS that FAH-3125B2 alarms.
Test Engineer: GAL

3.34.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: GAL

3.34.8 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)
Test Engineer: GAL

3.34.9 Reconnect the lead to PCU-2A-TB3-42.
~~REMOVE the jumper from between PCU-2A-TB3-42 and PCU-2A-TB3-43.~~ GAL 12/16/97

3.34.10 VERIFY the jumper is removed.
Test Engineer: GAL

PUMP SEAL FAILURE PAL-3125B1

3.35 TEST PAL-3125B1 per the following steps:

3.35.1 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.35.2 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/16/97
Test Engineer: GAL

3.35.3 Step deleted.

3.35.4 Step deleted.

3.35.5 LIFT the lead from PCU-2A-TB3-60.

3.35.6 VERIFY at the MCS that PAL-3125B1 alarms.
Test Engineer: GAL

3.35.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: GAL

3.35.8 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)
Test Engineer: GAL

3.35.9 RECONNECT the lead to PCU-2A-TB3-60.

3.35.10 VERIFY the wires are reconnected properly.
Test Engineer: GAL

PUMP SEAL FAILURE PAL-3125B2

3.36 TEST PAL-3125B2 per the following steps:

3.36.1 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.36.2 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/16/97
Test Engineer: GAL

3.36.3 Step deleted.

3.36.4 Step deleted.

3.36.5 LIFT the lead from PCU-2A-TB3-62.

3.36.6 VERIFY at the MCS that PAL-3125B2 alarms.
Test Engineer: GAL

3.36.7 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: GaL 12/16/97

3.36.8 VERIFY P-102-SY-02A shut down. (O:7/3 and O:7/4, PCU1)
Test Engineer: GaL

3.36.9 RECONNECT the lead to PCU-2A-TB3-62.

3.36.10 VERIFY the wires are reconnected properly.
Test Engineer: GaL

Interlock 2: On high pressure, shutdown operating booster pump, P-3125A or P-3125B.

PAH-3168

3.37 TEST Interlock 2 for P-3125B per the following steps:

3.37.1 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.37.2 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.
Test Engineer: D.S.

3.37.3 CLOSE valve V-3168.
Test Engineer: D.S.

3.37.4 CONNECT VTPS to PT-3168 and increase pressure until PI-3168 reads 12 psig at the MCS.

3.37.5 VERIFY at the MCS that PAH-3168 Alarms.
Test Engineer: D.S.

3.37.6 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: D.S.

3.37.7 DISCONNECT the VTPS from PT-3168.

3.37.8 OPEN valve V-3168.
Test Engineer: D.S.

Signatures transferred from Rev. 0 DAF 12/16/97

Interlock 10: Upstream Transfer Pump P-102-SY-02A will be shutdown if inlet pressure reaches 70 psig.

Interlock 7: The booster pump will not be permitted to operate if the inlet pressure is lower than 10 psig.

PAH-3125B

3.38 TEST PAH-3125B per the following steps:

3.38.1 CONNECT VTPS to the calibration port next to PT-3125B and increase pressure until PI-3125B reads 8 psig at the MCS.

3.38.1a CONNECT a VTPS to calibration port near PT-3125D and set pressure to approximately 60 psig.

3.38.1b REMOVE software jumper or forced bit disabling Interlocks 7 and 10 (booster pump inlet pressure).

3.38.1c REMOVE software jumper or forced bit disabling minimum discharge pressure requirement ("booster pump is running" in MCS logic, Ref. ES-058-Y74).

3.38.2 SELECT booster pump P-3125B START at the MCS.

3.38.3 VERIFY booster pump P-3125B STOPS after approximately 5 seconds.

12/13/97
Test Engineer: DG

3.38.4 INCREASE pressure using VTPS until PI-3125B reads 12 psig at the MCS.

3.38.5 SELECT P-3125B Booster Pump START on MCS screen PCU-2.

3.38.6 VERIFY P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2.

Test Engineer: DG

3.38.6b BYPASS hi/low level limit alarm on P-102-SY-02A Transfer Pump (resets after 5 minutes).

Signatures transferred from Rev. 0 DAK 12/16/97

3.38.7 **SELECT** P-102-SY-02A Transfer Pump START on MCS screen PCU-1.

3.38.8 **VERIFY** DRIVE RUNNING is illuminated on MCS screen PCU-1.
Test Engineer: DG 12/15/97

3.38.9 **INCREASE** pressure, using VTPS connected to PT-3125B, until PI-3125B reads 72 psig at the MCS.

3.38.10 **VERIFY** at the MCS that PAH-3125B alarms.
Test Engineer: DG

3.38.11 Step deleted.

3.38.12 **VERIFY** DRIVE STOPPED is illuminated on MCS screen PCU-1 for transfer pump.
Test Engineer: DG

Interlock 14: *On High discharge pressure, shutdown appropriate operating pump.*

PAH-3125D

3.39 **TEST** PAH-3125D per the following steps:

3.39.1 **SET** the VTPS that is currently connected to PT-3125B to a pressure between 12 psig and 68 psig.

3.39.2 Step deleted.

3.39.3 **SELECT** P-3125B Booster Pump START on MCS screen PCU-2.

3.39.4 **VERIFY** P-3125B Booster Pump START ENERGIZED and ON are illuminated on MCS screen PCU-2. 12/15/97
Test Engineer: DG

3.39.4b **BYPASS** hi/low level limit alarm on P-102-SY-02A Transfer Pump (resets after 5 minutes).

3.39.5 **SELECT** P-102-SY-02A Transfer Pump START on MCS screen PCU-1.

Signatures transferred from Rev. 0 DAD 12/16/97

3.39.6 VERIFY DRIVE RUNNING is illuminated on MCS screen PCU-1. 12/13/97
Test Engineer: DG

3.39.7 INCREASE pressure, using VTPS connected to PT-3125D, until PI-3125D reads 1275 psig at the MCS.

3.39.8 VERIFY at the MCS that PAH-3125D alarms.
Test Engineer: DG

3.39.9 VERIFY STATUS UNKNOWN and OFF are illuminated on MCS screen PCU-2 for booster pump P-3125B.
Test Engineer: DG

3.39.10 VERIFY DRIVE STOPPED is illuminated on MCS screen PCU-1 for transfer pump.
Test Engineer: DG

3.39.11 DISCONNECT the second VTPS from PT-3125D.

3.39.12 OPEN valve V-3125D.
Test Engineer: DG

ECN WOSB-395 DG 4/1/98

Interlock 15: The booster pump will not be permitted to ~~operate~~ START if the associated bypass, vent, and drain valves are not closed.

REVERIFIED FOR RETEST

3.40 TEST Interlock 15 for P-3125B per the following steps:

3.40.1 OPEN SOV-3163.

3.40.2 SELECT booster pump P-3125B START at the MCS. D.G.

3.40.3 VERIFY booster pump P-3125B does NOT start. 12/15/97 2/13/98
Test Engineer: DG

3.40.4 CLOSE SOV-3163.

3.40.5 **OPEN** each P-3125B motor operated drain valve and vent valve one at a time from the MCS, **VERIFY** STATUS UNKNOWN appears on MCS screen for P-3125B, attempt to **START** P-3125B from the MCS, **VERIFY** P-3125B does NOT **START**, and **THEN CLOSE** the associated valve.

Signatures transferred from Rev. 0 DJS 12/16/97

REVERIFIED FOR RETEST D.J. 2/13/98

Valve No.	Description	MCS Position	Pump DID NOT Start
MOV-3125BA	P-3125B Drain Valve	OPEN	DG 12/15/97
MOV-3125BB	P-3125B Drain Valve	OPEN	DG
MOV-3125BC	P-3125B Drain Valve	OPEN	DG
MOV-3125BD	P-3125B Drain Valve	OPEN	DG
MOV-3125BE	P-3125B Drain Valve	OPEN	DG
MOV-3125BF	P-3125B Drain Valve	OPEN	DG
MOV-3125BG	P-3125B Drain Valve	OPEN	DG
MOV-3125BH	P-3125B Drain Valve	OPEN	DG
MOV-3125BJ	P-3125B Drain Valve	OPEN	DG
MOV-3125BK	P-3125B Vent Valve	OPEN	DG

Test Engineer: DG

P-3125B interlock testing complete

3.41 **TAKE** VSD-2 out of NO MOTOR TEST MODE per the following steps.

3.41.1 **PRESS** the PROGRAM key on VSD-2 keypad.

3.41.2 **SELECT** PARAM and **PRESS** the ENTER key.

3.41.3 **SCROLL** thru the list of drive parameters using the UP and DOWN arrows until NO MOTOR TEST MODE is shown.

3.41.4 **PRESS** the LINE key.

3.41.5 **SELECT** NO (under NO MOTOR TEST MODE) and **PRESS** the ENTER key.

Test Engineer: DJ, 2/17/98

3.41.6 PRESS the MONITOR key on VSD-2 keypad.

3.41.7 VERIFY the MONITOR and DRIVE READY LEDs are illuminated on VSD-2.

Test Engineer: DJ. 4/23/96

3.42 DISCONNECT the VTPS from calibration port next to PT-3125B.

3.43 OPEN valve V-3125B.

signature transferred from Rev. 0

Test Engineer: DG

4.0 Initial Conditions / Pre-Transfer Loop Fill

Reconnect VSDs to booster pump motors

4.1 **OPEN** VSD-1 Main Disconnect.

4.2 **LOCK & TAG** VSD-1 Main Disconnect OPEN.
Test Engineer: 12/19

4.3 **RECONNECT** Booster Pump (P-3125A) Motor Leads T1, T2, & T3.
Test Engineer: 12/19

REVERSE ORDER OF STEPS CRZ 12-19-97

4.4 **CLOSE** VSD-1 Main Disconnect.
Test Engineer: 12/19

4.5 **REMOVE** Lock & Tag from VSD-1 Main Disconnect.
Test Engineer: 12/19

4.6 **LOCK AND TAG** VSD-2 Main Disconnect OPEN. 12/19

4.7 ~~**REMOVE** Lock & Tag from VSD-2 Main Disconnect.~~ 12/19/97
Test Engineer: N/A

4.8 **RECONNECT** Booster Pump (P-3125B) Motor Leads T1, T2, & T3.
Test Engineer: 12/19

REVERSE ORDER OF STEPS CRZ 12-19-97

4.9 **CLOSE** VSD-2 Main Disconnect.
Test Engineer: D.G. 12/9

4.10 **REMOVE** Lock & Tag from VSD-2 Main Disconnect.
Test Engineer: D.G. 12/9

NOTE: Perform a check of the data logger. This check may be made any time before the start of Section 7.0. STEPS 4.11 THRU 4.15 ARE DELETED AS THIS INFORMATION IS RECORDED AT THE PLC

4.11 **DISCONNECT** the output leads from system flowmeter FE-3125 to PCU-2 and **CONNECT** a PIC to the wires going to PCU-2. D.G. 2/13/98
Test Engineer: N/A

4.12 **SET** the PIC to output a current of 8 mA (nominal).

D.S 4/18/98 N/A

4.13 CHECK datalogger performance with VSD-1:

4.13.1 VERIFY the datalogger for the signal to VSD-1 and the flow signal is installed.
Test Engineer: _____

4.13.2 REMOVE the rate-of-change (ramp) limit(s) from the control signal logic in the PCU for P-3125A.
Test Engineer: _____

4.13.3 SELECT PID MAN on MCS screen PCU-2 for Booster Pump P-3125A.
Test Engineer: _____

NOTE: While in PID MANUAL, setting the Fluid FLOW (SP) to 50% of full scale (0-240 gpm) will actually send a 50% of full scale (0-3600 rpm) control signal to the pump motor via the VSD.

4.13.4 SET Fluid FLOW (SP) to 120 gpm (50% of full scale).
Test Engineer: _____

4.13.5 BEGIN data logging of the flow signal and the signal to VSD-1. AFTER 1 minute STOP the data logger.

4.13.6 VERIFY the recorded signal from VSD-1 is 50% of full scale (nominal) and the flow signal is 25% of full scale (nominal).
Test Engineer: _____

4.14 CHECK datalogger performance with VSD-2:

4.14.1 VERIFY the datalogger for the signal to VSD-2 and the flow signal is installed.
Test Engineer: _____

4.14.2 REMOVE the rate-of-change (ramp) limit(s) from the control signal logic in the PCU for P-3125B.
Test Engineer: _____

4.14.3 SELECT PID MAN on MCS screen PCU-2 for Booster Pump P-3125B.
Test Engineer: _____

D.S 2/13/98 N/A

NOTE: While in PID MANUAL, setting the Fluid FLOW (SP) to 50% of full scale (0-240 gpm) will actually send a 50% of full scale (0-3600 rpm) control signal to the pump motor via the VSD.

4.14.4 **SET** Fluid FLOW (SP) to 120 gpm (50% of full scale).
Test Engineer: _____

4.14.5 **BEGIN** data logging of the flow signal and the signal to VSD-2. **AFTER** 1 minute STOP the data logger.

4.14.6 **VERIFY** the recorded signal from VSD-2 is 50% of full scale (nominal) and the flow signal is 25% of full scale (nominal).
Test Engineer: _____

4.15 **DISCONNECT** the PIC from the wires to PCU-2 and **RECONNECT** flowmeter FE-3125 to the wires to PCU-2.
Test Engineer: _____

NOTE: SOV's that block the flow of liquid to 241-SY valve pits and to 244A lift station that are normally OPEN during Transfer Scheme 2A or 2B, must be physically CLOSED during this test. Forcing the affected SOV's OPEN in the MCS software and jumpering out the valve failure alarm for each will allow the transfer to commence.

4.16 **INSTALL** a normally open software jumper in series with N19:2/13 VALVE FAILURE Alarm for SOV-3183A.
Test Engineer: D.S. 2/13/98

4.17 **INSTALL** a normally open software jumper in series with N19:2/12 VALVE FAILURE Alarm for SOV-3183B.
Test Engineer: D.S. 2/13/98

4.18 **INSTALL** a normally open software jumper in series with B3/92 VALVE FAILURE Alarm for SOV-3166B.
Test Engineer: D.S. 2/13/98

4.19 **FORCE** (in the MCS software) the associated bits for the following valves to the MCS position shown. **VERIFY** position indication given by MCS and actual position (local verification).

Valve No.	Description	MCS Position	Verif. Initials	Local Position	Verif. Initials
SOV-3183A	WT-SLL-3160 at Diversion Box	OPEN	D.D.	CLOSED	2/19
SOV-3183B	WT-SLL-3160 at Diversion Box	OPEN	D.D.	CLOSED	2/19
SOV-3166B	WT-SLL-3160 at Vent Station	OPEN	D.D	CLOSED	2/19
~~SOV-3182A~~	~~WT-SNL-3150 AT DIVERSION BOX~~	~~CLOSED~~		~~CLOSED~~	
~~SOV-3182B~~	~~WT-SNL-3150 AT DIVERSION BOX~~	~~CLOSED~~		~~CLOSED~~	

D.D. 12/19/98

Test Engineer: D.D. 2/13/98

NOTE: Certain SOV's in the 3150 supernate line normally CLOSED by master valve reset when initiating Transfer Scheme 2A or 2B, must be physically OPEN to allow circulation thru the Diversion Box / Vent Station loop. Forcing the affected SOV's CLOSED in the MCS software and jumpering out the valve failure alarm for each will allow the transfer to commence.

4.20 **INSTALL** a normally open software jumper on in series with N19:2/10 VALVE FAILURE Alarm for SOV-3184.

Test Engineer: D.D. 2/13/98

4.21 **INSTALL** a normally open software jumper in series with B3/80 VALVE FAILURE Alarm for SOV-3165A.

Test Engineer: D.D. 2/13/98

4.22 **FORCE** (in the MCS software) the associated bits for the following valves to the MCS position shown. **VERIFY** MCS position indication and actual position (local verification).

REV ERIFID FOR RETEST 2/13/98

Valve No.	Description	MCS Position	Verif. Initials	Local Position	Verif. Initials
SOV-3184	WT-SNL-3150 at Diversion Box	CLOSED	D.D. 2/13/98	OPEN	2/19
SOV-3165A	WT-SNL-3150 at Vent Station	CLOSED	D.D. 2/13/98	OPEN	2/19

Test Engineer: D.D. 2/13/98

NOTE: The pipe jumpers fabricated for the W-058 Project for the 244A pit are not yet installed. Therefore it is necessary to simulate the positions of the motor operated valves on the 244A jumper so that Transfer Schemes 2A and 2B will allow the booster pump to operate. Forcing the affected MOV's to the required position in the MCS software and jumpering out the valve failure alarm for each will allow the transfer to commence.

4.23 **INSTALL** a normally open software jumper in series with N19:4/9 VALVE FAILURE Alarm for MOV-845.
Test Engineer: D.G. 2/13/98

4.24 **FORCE** (in the MCS software) the associated bits for the following valves to the positions shown.

Valve No.	Description	Required Position	Initials
MOV-844	WT-SLL-3160 Motor Operated 3-Way Valve at 244A Lift Station	A ⇒ B	D.G.
MOV-845	WT-SLL-3160 Motor Operated Valve at 244A Lift Station	OPEN	D.G.

Test Engineer: D.G. 2/13/98

4.25 **VERIFY** the SOV's and MOV's are aligned for transfer loop filling in accordance with Appendix E.
REQ EMPTIED FOR RETEST D.G. 2/13/98
Test Engineer: 12/19

4.26 **VERIFY** the purge/flush ball valve is CLOSED on every SOV.
Test Engineer: 12/19

4.27 "BLUE" TAG AND LOCK the manual valve actuators on the following SOV's: CLOSED position
CR 12-19-97 REVERIFIED FOR RETEST D.G. 2/13/98

4.27.1	SOV-3182A	Test Director:
4.27.2	SOV-3182B	Test Director:
4.27.3	SOV-3183A	Test Director: CR
4.27.4	SOV-3183B	Test Director: CR
4.27.5	SOV-3166A	Test Director: CR
4.27.6	SOV-3166B	Test Director: CR

4.28 VERIFY instrument air pressure to the P-3125A seals is greater than 95 psig.

4.28.1 PI-3125A1 124 psig
4.28.2 PI-3125A2 125 psig

Test Engineer: [signature] 12/19

REVERIFIED FOR RETEST DW 2/13/98

4.29 VERIFY instrument air pressure to the P-3125B seals is greater than 95 psig.

4.29.1 PI-3125B1 128 psig
4.29.2 PI-3125B2 128 psig

Test Engineer: [signature] 12/19

4.30 VERIFY test jumper is installed between Transfer Headers 3160 and 3150 at the Vent Station per Appendix A sketch.

Test Engineer: [signature] 12/19

4.31 VERIFY test jumper is installed between water supply outside Diversion Box and Transfer Header 3160 per Appendix A sketch.

Test Engineer: [signature] 12/19

4.32 VERIFY test jumper is installed between Transfer Header 3150 and water supply outside Diversion Box per Appendix A sketch.

Test Engineer: [signature] 12/19

4.33 VERIFY test setup is configured per Appendix A sketch.

Test Engineer: [signature] 12/19

SEE TEST LOG ENTRY ON 2/13/98

5.0 Transfer Loop Fill

NOTE: The following procedure for filling the transfer headers with water before a transfer is tailored to the "loop" test configuration. For an actual waste transfer, the water flush system would be used and the vent valves at the Vent Station would be closed.

5.1 OPEN valve V-temp-1. 12/19

5.2 CRACK OPEN flow control valve V-temp-2. 12/19

5.3 ADJUST pressure control valve on the water tank recirculation bypass on the supply jumper ~~to the CLOSED position~~ as required to facilitate filling.

Test Engineer: _____

5.4 TURN ON supply pump. (@ 0836 12/19/97) 12/19/97

NOTE: Assuming the supply pump fills the line at a rate of 150 gallons per minute, it will take approximately 25 minutes to empty a 4000 gallon tank.

NOTE: The transfer line volume between the Diversion Box and Vent Station is approximately 4000 gallons. The fluid volume from the holding tank may not fill up the line to the system high point before it needs to be refilled, in which case no fluid would be detected on the downstream side.

5.5 IF fluid is detected at the temporary flowmeter, FI-temp, THEN CLOSE flow control valve V-temp-2. ELSE N/A step.

Test Engineer: N/A

5.6 TO REFILL TANKER 2/13/98
~~After supply pump breaks suction (truck emptied of fluid),~~ perform the following:

5.6.1 CLOSE V-temp-1.

Test Engineer: 12/19

5.6.2 TURN OFF supply pump.

5.6.3 RE-FILL truck with water. DISCONNECT/RECONNECT hose, supply pump, and/or fittings as required to refill tank.

Test Engineer: 12/19

5.7 TURN ON supply pump.

5.8 **OPEN** valve V-temp-1.

5.9 **WHEN** fluid is detected at the temporary flowmeter, FI-temp, **THEN CLOSE** flow control valve V-temp-2. **N/A** step if V-temp-2 already closed per earlier step.

Test Engineer: JLB 12/19

NOTE: To completely fill the downhill leg of the loop with water, the rate of fluid addition should be slowed to allow continuous venting of air back up the line to the Vent Station. If the fill rate is too great, spillage will occur out thru vent line SNL-3152. Monitor vent line SNL-3152 for feedback on setting the fill rate.

5.10 **OPEN and ADJUST** pressure control valve on the water tank recirculation bypass as necessary to reduce system filling rate.

5.11 **IF** air can no longer be detected venting thru line SNL-3152 at the Vent Station (i.e. fluid is continuously discharging thru vent line(s)), **THEN:**

5.11.1 **CLOSE** valve V-temp-1.

5.11.2 **OBSERVE** SNL-3152 for a short time to see if any air trapped in line works its way up and vents.

5.11.3 **THROTTLE OPEN** valve V-temp-1 as necessary.

5.11.4 **IF** supply pump breaks suction (holding tank emptied of fluid) before all air is vented from loop, **THEN** refill holding tank. **N/A** step if not performed.

Test Engineer: N/A

5.11.5 **CLOSE** valve V-temp-1 upon continuous fluid discharge thru SNL-3152.

5.11.6 **REPEAT** until loop is entirely filled with liquid.

Test Engineer: JLB 12/19

5.12 **CLOSE** the isolation SOV's on supernate vent line SNL-3152.

5.12.1 SOV-3185A CLOSED Test Engineer: JLB 12/19

5.12.2 SOV-3185B CLOSED Test Engineer: JLB 12/19

5.13 CLOSE the pump bypass SOV.

REVERIFIED FOR RETEST DJ 2/13/98

5.13.1 SOV-3163 CLOSED Test Engineer: JJ 12/19

5.14 OPEN valve V-temp-1.

5.15 OPEN flow control valve V-temp-2.

NOTE: Use supply pump to circulate fluid through the loop and help sweep out any remaining air pockets in the transfer loop.

5.16 CONTINUE supply pump operation for approximately 30 minutes.
Test Engineer: JJ 12/19

5.17 CLOSE flow control valve V-temp-2.
Test Engineer: JJ 12/19

5.18 CLOSE valve V-temp-1.
Test Engineer: JJ 12/19

5.19 TURN OFF supply pump.

6.0 Post-Fill Data Recording

6.1 RECORD static pressures from the temporary pressure indicators:

6.1.1 PI-temp-1 (supply leg) 2 psig
6.1.2 PI-temp-2 (return leg) 10-15 psig
6.1.3 PI-temp-3 (return leg) 15 psig

6.2 RECORD the instrument air flow rate to each pump seal per the flow indicators on the pump seal control panels:

6.2.1 FI-3125A1 0 1.4 scfh 13.1 corrected
6.2.2 FI-3125A2 12 2.3 scfh
6.2.3 FI-3125B1 0 .5 scfh
6.2.4 FI-3125B2 4.4 5 scfh

Test Engineer: JJ 12/19

NOTE: Those parameters with the word "isolated" in parentheses next to them should be indicating a value near zero.

6.3 RECORD initial data from MCS screen PCU-2 for Diversion Box:

6.3.1 P-3125A Inlet pressure	PI-3125A	49	psig
6.3.2 P-3125A Discharge pressure	PI-3125C	50	psig
6.3.3 P-3125B Inlet pressure	PI-3125B	49	psig
6.3.4 P-3125B Discharge pressure	PI-3125D	50	psig
6.3.5 Supernate Line pressure (~~isolated~~)	PI-3182	-1	psig
6.3.6 Supernate Line pressure (~~isolated~~)	PI-3125E	41	psig
6.3.7 Supernate Line temperature	TI-3125B	48	°F
6.3.8 Slurry Line pressure (~~isolated~~)	PI-3183	3	psig
6.3.9 Slurry Line temperature	TI-3125A	61	°F
6.3.10 Sump Line pressure (~~isolated~~)	PI-3173	0	psig

DH 2/13/98

Test Engineer: DH 2/13/98

6.4 RECORD initial data from MCS screen PCU-3 for Vent Station:

6.4.1 Supernate Line pressure (~~isolated~~)	PI-3126A	18	psig
6.4.2 Supernate Line temperature	TI-3126A	52	°F
6.4.3 Slurry Line pressure	PI-3126B	10	psig
6.4.4 Slurry Line temperature	TI-3126B	73	°F
6.4.5 SNL Vent Line pressure (~~isolated~~)	PI-3185	2	psig
6.4.6 SLL Vent Line pressure (~~isolated~~)	PI-3168	0	psig
6.4.7 Sump Line pressure (~~isolated~~)	PI-3167	1	psig

DH 2/13/98

Test Engineer: DH 2/13/98

NOTE: Neglect header pressure and temperature values given on MCS screen PCU-4 for 244A Lift Station. Instrumentation not yet installed, not within scope of this test.

6.5 RECORD initial data from MCS screen PCU-2 for Booster Pump P-3125A (PV = Process Variable):

		PV	
6.5.1 Pump Thrust End Bearing temp	TI-3125A1	57	°F
6.5.2 Pump Drive End Bearing temp	TI-3125A2	58	°F
6.5.3 Motor speed	SI-3125A	-900	RPM
6.5.4 Thrust End vibration	VI-3125A1	0.00 ~~mils~~ IPS	
6.5.5 Drive End vibration	VI-3125A2	0.00 mils IPS	
6.5.6 Fluid flow	FIC-3125	0	0 GPM
6.5.7 Fluid temperature	TI-3125	61	°F
6.5.8 Fluid Inlet pressure	PI-3125A	48	psig

DH 2/13/98

6.5.9 Fluid Outlet pressure PI-3125C 49 psig
Test Engineer: D.D. 2/13/98

6.6 RECORD initial data from MCS screen PCU-2 for Booster Pump P-3125B (PV = Process Variable): (WITH DRIVE ON) D.D 2/13/98

		PV	
6.6.1 Pump Thrust End Bearing temp	TI-3125B1	58	°F
6.6.2 Pump Drive End Bearing temp	TI-3125B1	60	°F
6.6.3 Motor speed	SI-3125B	13	RPM
6.6.4 Thrust End vibration	VI-3125B1	0.00 ~~mils~~ IPS	D.D. 2/13/98
6.6.5 Drive End vibration	VI-3125B2	0.00 ~~mils~~ IPS	
6.6.6 Fluid flow	FIC-3125	0	0 GPM
6.6.7 Fluid temperature	TI-3125	61	°F
6.6.8 Fluid Inlet pressure	PI-3125B	49	psig
6.6.9 Fluid Outlet pressure	PI-3125D	50	psig

Test Engineer: D.D. 2/13/98

7.0 Booster Pump P-3125A Startup Test

This section verifies initial startup and operation of the installed pump. The booster pump will be operated remotely from the MCS in PID MANUAL mode, under control of input motor speed. Operating speeds are selected for purpose of tuning PID (Proportional, Integral, Derivative) flow control.

The presence of a vendor representative from Panametrics Flowmeters is very desirable, but not absolutely required for this portion of the test. Calibration of the ultrasonic flowmeter was performed at the vendor's facility. The flowmeter does not physically contact the fluid in the pipe.

7.1 VERIFY temporary water supply tank is sufficiently full of water to perform this test.
Test Engineer: JJ

7.2 The vendor representative from Sulzer Bingham pump company is present.
INSERT 7.2.1
Test Engineer: JJ D.D. 2/13/98

7.3 ~~PRESS~~ REMOTE and AUTO on VSD-1 keypad.
Test Engineer: JJ

7.14 "BUMP" PUMP FROM VSD CONTROL PANEL TO VERIFY PROPER ROTATION AND TO VALIDATE LOCAL CONTROL ("ON" THEN "OFF")
INSERT 7.14

RP STATUS CHANGED

7.4 VERIFY ~~ENERGIZE ENABLE~~, REMOTE, and OFF are illuminated on MCS screen PCU-2 for Booster Pump P-3125A. REVERIFIED FOR RETEST D.Y. 2/13/98

Test Engineer: _____

Select ~~50%~~ 70 speed as first operating point.

7.5 SELECT PID MAN on MCS screen PCU-2 for Booster Pump P-3125A.

D.Y. 2/18/98 7.5.1 SET VSD RAMP TO 12 (SSECONDS) AT MCS

Test Engineer: _____

7.6 SET Fluid FLOW (SP) to ~~120~~ 168 gpm (~~50%~~ 70% of full scale). (This corresponds to a pump speed of ~~1800~~ 2580 rpm; with the temporary flow control valve V-temp-2 fully open an actual flow of about 110 gpm is expected.) D.Y. 2/13/98 (SEE TEST LOG 2/18/98)

Test Engineer: _____

7.7 ~~SELECT the Transfer Sequencing RESET button.~~ DOT D.Y.

Test Engineer: D.Y.

NOTE: Valves previously "forced" to a position on the MCS for purposes of this test should not be shown as valve positioning failures because the associated valve failure alarms are jumpered out per Section 4.0.

7.8 VERIFY Alarm Table on MCS shows no valve positioning failures.

Test Engineer: _____

7.9 SELECT the Transfer Sequencing INITIATE Button.

NOTE: Transfer Scheme 2A sets up for transfer of slurry from the 241-SY-B valve pit to the 241-A-A valve pit.

7.10 MANUALLY POSITION VALVES PER APPENDIX F-1 12/19/97 ~~SELECT the Transfer Sequencing TYPE 2A transfer button.~~

Test Engineer: _____

7.11 VERIFY proper valve position in accordance with Appendix F-1 Data Sheet.

TE-002 7.11.1 JUMPER A-PUMP VENT VALVE SOV-B12SAK CLOSED AT PCV2A-TBS TERMINALS 39 & 40 FOR RETEST. D.Y. 2/13/98 SEE TEST LOG ENTRY 12/19

Test Engineer: _____

NOTE: The boxes on the MCS overview screen that denote PCU-1 thru PCU-5 indicate status of the transfer path. All boxes GRAY and paths GREEN indicates that the transfer path is ready for use. Boxes filled in RED indicates that an alarm associated with the transfer is activated (i.e. mispositioned valve, leak detected, etc). The booster pump will not start unless associated alarms are either cleared or over-ridden.

7.12 IF any of the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in RED, DETERMINE the reason why and perform the following: RECORD AND FOR RETEST

7.12.1 Disposition the problem by fixing it and clearing alarm, or by overriding the alarm IF the Test Engineer determines that the problem will not affect the performance of this test. RECORD disposition on the Test Log or on a Test Exception Sheet, at the discretion of the Test Engineer. N/A this step if not performed.

Test Engineer: N/A N/A

7.13 VERIFY the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in GRAY, unless a RED box has been determined to be acceptable per the previous step.

Test Engineer: D.D. 2/13/98 D.D. 2/13/98

7.14 OPEN SOV-3125E and SOV-3125C from the MCS. SOV-3125G (SEE TEST LOG ENTRY 2/13/98) V

Test Engineer: D.D. 2/13/98 D.D. 2/13/98

Move to Between 7.2 & 7.3 50 D.D. 2/13/98

Set booster pump inlet pressure control

7.15 ADJUST pressure control valve on the supply jumper assembly to an arbitrary OPEN position.

7.16 TURN ON supply pump.

7.17 VERIFY water is being recirculated to holding tank.

Test Engineer:

7.18 ADJUST pressure control valve on the supply jumper assembly so that the pressure indicator at the supply pump discharge reads approximately 50 psi. LOG D.D. 2/13/98

7.18.1 PI-temp-1 ____ psig

Test Engineer:

7.19 OPEN valve V-temp-1.

Test Engineer:

7.20 ~~FULLY~~ OPEN flow control valve V-temp-2. APPROX 1/8 OPEN. 12/11/97
Test Engineer: 12/19

NOTE: IF the booster pump STOPS during the performance of this test unexpectedly, THEN CLOSE V-temp-1 and V-temp-2 and shut off supply pump. Determine the reason for the problem & record on the Test Log. To RESTART the test, RETURN to step 7.16 and perform steps through step 7.25 (except for step 7.21a).

12/11/97 Prepare to start P-3125A

7.21 NOTIFY Sulzer Bingham representative that the booster pump is to be started.
Test Engineer: 12/19

REVIEWED FOR RELEASE P.G 2/13/98

7.21a "BUMP" the motor to verify proper rotation direction as follows:

7.21.1a PRESS the START button on MCS screen PCU-2 for Booster Pump P-3125A.

7.21.2a PRESS the STOP button on MCS screen PCU-2 for Booster Pump P-3125A.

7.21.3a VERIFY motor shaft rotated in proper direction.
Test Engineer: 12.19

IMPORTANT: Be prepared to immediately shut down booster pump if so requested by Sulzer Bingham representative. To shut down the pump, PRESS the OFF key on VSD-1 keypad OR the STOP button on MCS screen PCU-2 for Booster Pump P-3125A.

7.22 BEGIN data logging of the flow signal and the signal to the VSD.

7.23 PRESS the START button on MCS screen PCU-2 for Booster Pump P-3125A. 12/11/97

7.23.a FULLY OPEN V-temp-2 per direction of Sulzer Bingham Representative (or test engineer)
Test Engineer:

7.24 VERIFY locally that P-3125A is operating.
Test Engineer: KW 12/20/97

SEE TEST LOG ENTRY 3/31/98

N/A P.G 2/13/98 ~~7.25 VERIFY the UP TO SPEED and RUN LEDs are illuminated on VSD-1.~~
Test Engineer:

7.25.1 REDUCE SPEED TO 50% (120GPM) (SEE TEST LOG 2/10/98) P.G. 2/13/98

7.26 RECORD the following data:

7.26.1 Motor speed	SI-3125A	1226	RPM
7.26.2 Flow rate	FI-temp-1	24	GPM
7.26.3 Flow rate	FIC-3125	23	GPM
7.26.4 Pump inlet pressure	PI-3125A	306	psig

7.26.5 Pump discharge pressure PI-3125C 301 psig

Test Engineer: D.J. 2/13/98

7.27 **VERIFY** START ENERGIZED and ON are illuminated on MCS screen PCU-2 for Booster Pump P-3125A.

Test Engineer: D.J. 2/13/98

7.28 After ~~flow rate as read from FIC-3125~~ stabilizes, **STOP** data logging ~~of the~~ flow signal and ~~the signal~~ to the VSD.

Test Engineer: NA D.J. 2/13/98

Record data from VSD-1

7.29 Use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities on VSD-1 keypad. Use the RIGHT arrow as required. **RECORD** the following data:

7.29.1 Motor Freq	29.5 Hz	7.29.9 Load CA Volts	230 V
7.29.2 Motor Speed	49.2 %	7.29.10 Line A Amps	64 A
7.29.3 Motor RPM	1770 RPM	7.29.11 Line B Amps	57 A
7.29.4 Load A Amps	90 Amps	7.29.12 Line C Amps	65 A
7.29.5 Load B Amps	92 Amps	7.29.13 Line AB Volts	486 V
7.29.6 Load C Amps	90 Amps	7.29.14 Line BC Volts	490 V
7.29.7 Load AB Volts	232 Volts	7.29.15 Line CA Volts	482 V
7.29.8 Load BC Volts	230 Volts	7.29.16 Power	25 KWatts

Test Engineer: D.J 2/13/98

7.30 **RECORD** pump and system data on an Appendix G Data Sheet

Test Engineer: D.J 2/13/98

7.31 **IF** during this POTP the audible noise from the motor is excessive (i.e. operating at VSD PWM inverter resonant frequency), adjust the carrier frequency on VSD-1 to minimize audible noise per manufacturer's instructions (VI # 22798, Supplement 40). N/A

Test Engineer: D.J 2/13/98

7.32 **ALLOW** pump P-3125A to run for 10 more minutes, **THEN RECORD** pump and system data on an Appendix G Data Sheet

Test Engineer: D. J. 2/13/98

Increase pump operating speed to 60% of full speed

7.33 DECREASE VSD-1 ramp-up time (to aid in determination of PID values) per the following ~~steps~~. SET RAMP TO 60 (1 SECOND) D.D. 2/18/98

~~7.33.1 PRESS the PROGRAM key on VSD-1 keypad.~~

~~7.33.2 SELECT PARAM and PRESS the ENTER key.~~

~~7.33.3 SCROLL thru the list of drive parameters using the UP and DOWN arrows until ACCEL TIME is shown.~~

~~7.33.4 SELECT 1 (i.e. 1 second) and PRESS the ENTER key.~~

Test Engineer: _____

D.D. 2/18/98 SEE TEST LOG ENTRY

~~7.33.5 PRESS the MONITOR key on VSD-1 keypad.~~

~~Test Engineer: _____~~

7.34 BEGIN data logging of the flow signal and the signal to the VSD.

7.35 SET Fluid FLOW (SP) to 144 gpm (60% of full scale). (This corresponds to a pump speed of 2160 rpm; with the temporary flow control valve V-temp-2 fully open an actual flow of about 130 gpm is expected.)

Test Engineer: D.D. 2/13/98

SEE TEST LOG ENTRY 3/3/98

N/A D.D. 2/13/98 7.36 ~~VERIFY the UP TO SPEED LED on VSD-1 turns off and then illuminates again once the new motor speed is achieved~~.

~~Test Engineer: _____~~

7.37 ~~After flow rate as read from~~ FIC-3125 stabilizes, ~~STOP~~ data logging of the flow signal ~~and the signal to the VSD.~~ N/A D.D.

Test Engineer: _____ 2/13/98

7.38 RECORD the following data:

7.38.1 Motor speed	SI-3125A	2096 RPM
7.38.2 Flow rate	FI-temp-1	113 GPM
7.38.3 Flow rate	FIC-3125	~~0715~~ GPM — 115 D.D 2/13/98
7.38.4 Pump inlet pressure	PI-3125A	53 psig
7.38.5 Pump discharge pressure	PI-3125C	342 psig

Test Engineer: D.D. 2/13/98

7.39 Use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities on VSD-1 keypad. Use the RIGHT arrow as required. **RECORD** the following data:

7.39.1 Motor Freq	35.5	Hz
7.39.2 Motor Speed	59.1	%
7.39.3 Motor RPM	2130	RPM
7.39.4 Load A Amps	105	Amps
7.39.5 Load B Amps	104	Amps
7.39.6 Load C Amps	102	Amps
7.39.7 Load AB Volts	277	Volts
7.39.8 Load BC Volts	280	Volts
7.39.9 Load CA Volts	276	Volts
7.39.10 Line A Amps	65	Amps
7.39.11 Line B Amps	65	Amps
7.39.12 Line C Amps	62	Amps
7.39.13 Line AB Volts	498	Volts
7.39.14 Line BC Volts	506	Volts
7.39.15 Line CA Volts	499	Volts
7.39.16 Power	35	Kilowatts

Test Engineer: D.J 2/13/98

7.40 **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.J. 2/13/98

7.41 **ALLOW** pump P-3125A to run for at least 10 more minutes, **THEN RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.J 2/13/98

Increase pump operating speed to 70% of full speed

7.42 **BEGIN** data logging of the flow signal and the signal to the VSD.

7.43 **SET** Fluid FLOW (SP) to 168 gpm (70% of full scale). (This corresponds to a pump speed of 2520 rpm; with the temporary flow control valve V-temp-2 fully open an actual flow of about 150 gpm is expected.)
Test Engineer: D.J 2/13/98

7.44 ~~After flow rate as read from FIC-3125 stabilizes, STOP data logging of the flow signal and the signal to the VSD.~~ N/A DJ 2/13/98

Test Engineer: _____

7.45 RECORD the following data:

7.45.1 Motor speed	SI-3125A	2475 RPM
7.45.2 Flow rate	FI-temp-1	137 GPM
7.45.3 Flow rate	FIC-3125	144 GPM
7.45.4 Pump inlet pressure	PI-3125A	93 psig
7.45.5 Pump discharge pressure	PI-3125C	410 psig

Test Engineer: D.J 2/13/98

7.46 Use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities on VSD-1 keypad. Use the RIGHT arrow as required. RECORD the following data:

7.46.1 Motor Freq	41.5 Hz
7.46.2 Motor Speed	69.2 %
7.46.3 Motor RPM	2490 RPM
7.46.4 Load A Amps	125 Amps
7.46.5 Load B Amps	122 Amps
7.46.6 Load C Amps	122 Amps
7.46.7 Load AB Volts	322 Volts
7.46.8 Load BC Volts	327 Volts
7.46.9 Load CA Volts	325 Volts
7.46.10 Line A Amps	101 Amps
7.46.11 Line B Amps	102 Amps
7.46.12 Line C Amps	99 Amps
7.46.13 Line AB Volts	497 Volts
7.46.14 Line BC Volts	505 Volts
7.46.15 Line CA Volts	495 Volts
7.46.16 Power	57 Kilowatts

Test Engineer: D.J. 2/13/98

7.47 RECORD pump and system data on an Appendix G Data Sheet.

Test Engineer: D.J. 2/13/98

7.48 ALLOW pump P-3125A to run for at least 10 more minutes, THEN RECORD pump and system data on an Appendix G Data Sheet.

Test Engineer: D.J. 2/13/98

Increase pump operating speed to 80% of full speed

7.49 **BEGIN** data logging of the flow signal and the signal to the VSD.

7.50 **SET** Fluid FLOW (SP) to 192 gpm (80% of full scale). (This corresponds to a pump speed of 2280 rpm; with the temporary flow control valve V-temp-2 fully open an actual flow of about 170 gpm is expected.)

Test Engineer: DD. 2/13/98

7.51 ~~After flow rate as read from FIC-3125 stabilizes,~~ **STOP** data logging of the ~~flow signal and the~~ signal to the VSD. N/A

Test Engineer: _____

7.52 **RECORD** the following data:

7.52.1 Motor speed	SI-3125A	2833	RPM
7.52.2 Flow rate	FI-temp-1	158	GPM
7.52.3 Flow rate	FIC-3125	162	GPM
7.52.4 Pump inlet pressure	PI-3125A	35	psig
7.52.5 Pump discharge pressure	PI-3125C	514	psig

Test Engineer: D.D. 2/13/98

7.53 Use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities on VSD-1 keypad. Use the RIGHT arrow as required. **RECORD** the following data:

7.53.1 Motor Freq	42.5	Hz
7.53.2 Motor Speed	79.1	%
7.53.3 Motor RPM	2850	RPM
7.53.4 Load A Amps	152	Amps
7.53.5 Load B Amps	152	Amps
7.53.6 Load C Amps	152	Amps
7.53.7 Load AB Volts	346	Volts
7.53.8 Load BC Volts	340	Volts
7.53.9 Load CA Volts	340	Volts
7.53.10 Line A Amps	152	Amps
7.53.11 Line B Amps	156	Amps
7.53.12 Line C Amps	151	Amps
7.53.13 Line AB Volts	497	Volts
7.53.14 Line BC Volts	505	Volts

7.53.15 Line CA Volts 495 Volts
7.53.16 Power 82 Kilowatts

Test Engineer: D.D 2/13/98

7.54 RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: D.D 2/13/98

PUMP SHUTDOWN ON LOW SUCTION PRESSURE SO STEP 7.55 WAS SKIPPED DUE TO TIME OF DAY

~~7.55 ALLOW pump P-3125A to run for at least 10 more minutes, THEN RECORD pump and system data on an Appendix G Data Sheet~~
~~Test Engineer~~: D.D. 2/13/98

DATA OBTAINED IN STEP 7.54 IS ADAQUATE FOR THIS PUMP SPEED.

7.56 RECORD the instrument air flow rate to the pump seals per the flow indicators on the pump seal control panels:

7.56.1 FI-3125A1 0 scfh @ 126 PSIG CORRECTION FACTOR 3.0
7.56.2 FI-3125A2 0.1 scfh @ 130 PSIG

Test Engineer: D.D 2/13/98

Stop P-3125A

7.57 PRESS the STOP button on MCS screen PCU-2 for Booster Pump P-3125A.

7.58 VERIFY locally that P-3125A has stopped.
Test Engineer: D.D 2/13/98

7.59 VERIFY ENABLE ENERGIZED and OFF are illuminated on MCS screen PCU-2 for Booster Pump P-3125A.
Test Engineer: D.D. 2/13/98

7.60 VERIFY the UP TO SPEED and RUN LEDs are no longer illuminated on VSD-1.
Test Engineer: D.D 2/13

7.61 CLOSE flow control valve V-temp-2
Test Engineer: D.D 2/13/98

7.62 CLOSE V-temp-1
Test Engineer: D.D. 2/13/98

7.63 TURN OFF supply pump.

8.0 Booster Pump P-3125B Startup Test

This section verifies initial startup and operation of the installed pump. The booster pump will be operated remotely from the MCS in PID MANUAL mode, under control of input motor speed. Operating speeds are selected for the purpose of determining the appropriate PID (Proportional, Integral, Derivative) values for flow control.

The presence of a vendor representative from Panametrics Flowmeters is very desirable, but not absolutely required for this portion of the test.

8.1 **VERIFY** temporary water supply tank is sufficiently full of water to perform this test.

Test Engineer: D.D. 2/17/98

NOTE: If a tee was used on the supply jumper between V-temp-1 and the Hiltaps on SLL-3163 and SLL-3164, then N/A the next two steps (and substeps).

8.2 **MOVE** the water supply feed from P-3125A to P-3125B as follows:

8.2.1 **CLOSE** SOV-3125C.

Test Engineer: D.D 2/17/98

8.2.2 **VERIFY** SOV-3125D is CLOSED.

Test Engineer: D.D. 2/17/98

8.2.3 **REMOVE** supply jumper from Hiltap connector nearest SOV-3125E on transfer line SLL-3163. **ATTEMPT** to keep as little water as possible from leaking out of the supply jumper during the move.

8.2.4 **IMMEDIATELY REINSTALL** Hiltap connector cap securely. N/A

Test Engineer: _____

8.2.5 **REMOVE** cap from Hiltap connector nearest SOV-3125G on SLL-3164. **ATTEMPT** to keep as little water as possible from leaking out of the transfer line during the move. N/A

8.2.6 **IMMEDIATELY CONNECT** supply jumper securely to the Hiltap connector. N/A

Test Engineer: _____

See TEST LOG ENTRY 2/13/98

NOTE: Circulate water thru pump P-3125B vent valve to sweep out any air pockets left inside pump or supply line due to moving the supply jumper.

8.3 CIRCULATE water as follows:

8.3.1 OPEN valve V-temp-1.
Test Engineer: D.H. 2/17/98

8.3.2 CLOSE pressure control valve on the supply jumper assembly.

8.3.3 TURN ON supply pump.

8.3.4 OPEN SOV-3125D from the MCS.
Test Engineer: D.H. 2/17/98

8.3.5 OPEN flow control valve V-temp-2.
Test Engineer: D.H. 2/17/98

8.3.6 After circulating for approximately 10 minutes, ~~CLOSE SOV-3125~~D and THEN OPEN pump vent valve MOV-3125BK.
Test Engineer: D.H. 2/17/98 D.H 2/17/98

8.3.7 After approximately 10 minutes, CLOSE V-temp-2.
Test Engineer: D.H. 2/17/98

8.3.8 CLOSE MOV-3125BK.
Test Engineer: D.H. 2/17/98

8.3.9 CLOSE valve V-temp-1.
Test Engineer: D.H. 2/17/98

8.3.10 TURN OFF supply pump.

8.4 The vendor representative from Sulzer Bingham pump company is present. glo 12/20/97
Test Engineer: D.H 2/18/98 D.H. 2/18/98

8.5 PRESS REMOTE and AUTO on VSD-2 keypad.
Test Engineer: D.H 2/17/98

8.4.1 ~~"BUMP" PUMP FROM VSD CONTROL PANEL TO VERIFY PROPER ROTATION AND TO VALIDATE LOCAL CONTROL ("ON" THEN "OFF")~~ N/A D.H. 2/17/98 D.H. 2/18/98

→ 8.4.6 OPEN SOV 3125G & D

TC-003 FOR RETEST ONLY OPEN SOV-3125D LEAVE VALVE SOV-3125G CLOSED DUE TO ~~85 OF 150~~ D.H 2/19/98

8.6 **VERIFY** ENABLE ENERGIZED, REMOTE, and OFF are illuminated on MCS screen PCU-2 for Booster Pump P-3125B.
Test Engineer: D.H 2/17/98

Select ~~50%~~ 70 speed as first operating point.

8.7 **SELECT** PID MAN on MCS screen PCU-2 for Booster Pump P-3125B.
Test Engineer: D.H. 2/17/98

D.H. 2/14/98 8.7.1 SET USD RAMP TO 12 (55 sec) AT MCS

8.8 **SET** Fluid FLOW (SP) to ~~120~~ 168 gpm (~~50%~~ 70% of full scale). (This corresponds to a pump speed of ~~1800~~ 2500 rpm; with the temporary flow control valve V-temp-2 fully open an actual flow of about 110 gpm is expected.)
Test Engineer: D.H. 2/17/98

SEE test LOG ENTRY 2/13/98

8.9 **SELECT** the Transfer Sequencing **RESET** button.
Test Engineer: D.H. 2/17/98

NOTE: Valves previously "forced" to a position on the MCS for purposes of this test should not be shown as valve positioning failures because the associated valve failure alarms are jumpered out per Section 4.0.

8.10 **VERIFY** Alarm Table on MCS shows no valve positioning failures.
Test Engineer: D.H. 2/17/98

8.11 **SELECT** the Transfer Sequencing **INITIATE** Button.

NOTE: Transfer Scheme 2B sets up for transfer of slurry from the 241-SY-B valve pit to the 241-A-A valve pit.

8.12 **SELECT** the Transfer Sequencing **TYPE 2B** transfer button.
Test Engineer: D.H. 2/17/98

8.13 **VERIFY** proper valve position in accordance with Appendix F-2 Data Sheet.
Test Engineer: D.H. 2/17/98

NOTE: The boxes on the MCS overview screen that denote PCU-1 thru PCU-5 indicate status of the transfer path. All boxes GRAY and paths GREEN indicates that the transfer path is ready for use. Boxes filled in RED indicates that an alarm associated with the transfer is activated (i.e. mispositioned valve, leak detected, etc). The booster pump will not start unless associated alarms are either cleared or over-ridden.

8.14 IF any of the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in RED, DETERMINE the reason why and perform one of the following:

8.14.1 Disposition the problem by fixing it and clearing alarm, or by overriding the alarm IF the Test Engineer determines that the problem will not affect the performance of this test. RECORD disposition on the Test Log or on a Test Exception Sheet, at the discretion of the Test Engineer. N/A this step if not performed. N/A

Test Engineer: _____

8.15 VERIFY the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in GRAY, unless a RED box has been determined to be acceptable per the previous step. N/A

Test Engineer: _____

move 8A D.H. 2/17/98

8.16 OPEN SOV-3125G and SOV-3125D from the MCS.

Test Engineer: _____

Set booster pump inlet pressure control

8.17 ADJUST pressure control valve on the supply jumper assembly to an arbitrary OPEN position.

8.18 TURN ON supply pump.

8.19 VERIFY water is being recirculated to holding tank.

Test Engineer: D.H 2/17/98

8.20 ADJUST pressure control valve on the supply jumper assembly so that the pressure indicator at the supply pump discharge reads approximately ~~50~~ 60 psi D.H 2/17/98

8.20.1 PI-temp-1 62 psig

Test Engineer: D.H 2/17/98

8.21 OPEN valve V-temp-1.

Test Engineer: D.H 2/17/98

8.22 ~~FULLY~~ OPEN flow control valve V-temp-2. Approx 1/8 OPEN. DGL 12/17/97
Test Engineer: D.G. 2/17/98

See NOTE AFTER Step 7.20 (page 77 of 150).

Prepare to start P-3125B

8.23 NOTIFY Sulzer Bingham representative that the booster pump is to be started.
Test Engineer: D.G. 2/17/98

8.23a "BUMP" the motor to verify proper rotation direction as follows:

8.23.1a PRESS the START button on MCS screen PCU-2 for Booster Pump P-3125B.

8.23.2a PRESS the STOP button on MCS screen PCU-2 for Booster Pump P-3125B.

8.23.3a VERIFY motor shaft rotated in proper direction.
Test Engineer: D.G. 2/17/98

IMPORTANT: Be prepared to immediately shut down booster pump if so requested by Sulzer Bingham representative. To shut down the pump, PRESS the OFF key on VSD-2 keypad OR the STOP button on MCS screen PCU-2 for Booster Pump P-3125B.

8.24 BEGIN datalogging of the flow signal and the signal to the VSD.

8.25 PRESS the START button on MCS screen PCU-2 for Booster Pump P-3125B. DGL 12/17/97

8.25.a FULLY OPEN V-temp-2 per direction of Sulzer Bingham representative (or test engineer).
Test Engineer: D.G. 2/17/98

8.26 VERIFY locally that P-3125B is operating.
Test Engineer: D.G. 2/17/98

N/A 2/17/98 SEE TEST LOG ENTRY 3/31/98

~~8.27 VERIFY the UP TO SPEED and RUN LEDs are illuminated on VSD-2.~~
Test Engineer: ~~D.G. 2/17/98~~

8.27.1 REDUCE SPEED TO 50% (120 GPM)

8.28 RECORD the following data:

8.28.1 Motor speed	SI-3125B	1830	RPM
8.28.2 Flow rate	FI-temp-1	80	GPM
8.28.3 Flow rate	FIC-3125	81	GPM
8.28.4 Pump inlet pressure	PI-3125B	69	psig

8.28.5 Pump discharge pressure PI-3125D 300 psig

Test Engineer: D.J. 2/19/98

8.29 VERIFY START ENERGIZED and ON are illuminated on MCS screen PCU-2 for Booster Pump P-3125B.

Test Engineer: D.J. 2/19/98

8.30 After flow rate as read from FIC-3125 stabilizes, STOP datalogging of the flow signal and the signal to the VSD.

Test Engineer: D.J 2/19/98

Record data from VSD-2

8.31 Use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities on VSD-2 keypad. Use the RIGHT arrow as required. RECORD the following data:

8.31.1 Motor Freq	30 Hz	7.29.9 Load CA Volts	235 V
8.31.2 Motor Speed	50 %	7.29.10 Line A Amps	30 A
8.31.3 Motor RPM	1802 RPM	7.29.11 Line B Amps	35 A
8.31.4 Load A Amps	90 Amps	7.29.12 Line C Amps	35 A
8.31.5 Load B Amps	90 Amps	7.29.13 Line AB Volts	492 V
8.31.6 Load C Amps	90 Amps	7.29.14 Line BC Volts	496 V
8.31.7 Load AB Volts	243 Volts	7.29.15 Line CA Volts	487 V
8.31.8 Load BC Volts	240 Volts	7.29.16 Power	24 KWatts

Test Engineer: D.J 2/19/98

8.32 RECORD pump and system data on an Appendix G Data Sheet

Test Engineer: D.J. 2/19/98

8.33 ALLOW pump P-3125B to run for 10 more minutes, THEN RECORD pump and system data on an Appendix G Data Sheet

Test Engineer: D.J 2/19/98

Increase pump operating speed to 60% of full speed

8.34 DECREASE VSD-2 ramp-up time (to aid in determination of PID values) per the following ~~steps~~. SET RAMP TO 60 (1 SECOND) AT PLC

D.J. 2/18/97 SEE TEST LOG ENTRY

~~8.34.1 PRESS the PROGRAM key on VSD-2 keypad.~~

~~8.34.2 SELECT PARAM and PRESS the ENTER key.~~

D.J. 2/18/98

~~8.34.3 SCROLL thru the list of drive parameters using the UP and DOWN arrows until ACCEL TIME is shown.~~

~~8.34.4 SELECT 1 (i.e. 1 second) and PRESS the ENTER key.~~

Test Engineer: _____

~~8.35 PRESS the MONITOR key on VSD-2 keypad.~~

Test Engineer: _____

8.36 BEGIN datalogging of the flow signal and the signal to the VSD.

8.37 SET Fluid FLOW (SP) to 144 gpm (60% of full scale). (This corresponds to a pump speed of 2160 rpm; with the temporary flow control valve V-temp-2 fully open an actual flow of about 130 gpm is expected.)

Test Engineer: D.J. 2/19/98

N/A SEE TEST LOG ENTRY 3/31/98

D.J. 2/19/98 ~~8.38 VERIFY the UP TO SPEED LED on VSD-2 turns off and then illuminates again once the new motor speed is achieved.~~

Test Engineer: D.J 2/19/98

8.39 After flow rate as read from FIC-3125 stabilizes, STOP datalogging of the flow signal and the signal to the VSD.

Test Engineer: D.J. 2/19/98

8.40 RECORD the following data:

8.40.1 Motor speed	SI-3125B	2209 RPM
8.40.2 Flow rate	FI-temp-1	94 GPM
8.40.3 Flow rate	FIC-3125	93 GPM
8.40.4 Pump inlet pressure	PI-3125B	61 psig
8.40.5 Pump discharge pressure	PI-3125D	401 psig

Test Engineer: D.J 2/19/98

8.41 Use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities on VSD-2 keypad. Use the RIGHT arrow as required. RECORD the following data:

8.41.1 Motor Freq	36	Hz
8.41.2 Motor Speed	59.9	%
8.41.3 Motor RPM	2157	RPM
8.41.4 Load A Amps	102	Amps
8.41.5 Load B Amps	103	Amps
8.41.6 Load C Amps	102	Amps
8.41.7 Load AB Volts	290	Volts
8.41.8 Load BC Volts	280	Volts
8.41.9 Load CA Volts	281	Volts
8.41.10 Line A Amps	48	Amps
8.41.11 Line B Amps	55	Amps
8.41.12 Line C Amps	54	Amps
8.41.13 Line AB Volts	494	Volts
8.41.14 Line BC Volts	496	Volts
8.41.15 Line CA Volts	488	Volts
8.41.16 Power	40	Kilowatts

DUPLICATE

Test Engineer: D.H. 2/19/98

8.42 RECORD pump and system data on an Appendix G Data Sheet

Test Engineer: D.H. 2/19/98

8.43 ALLOW pump P-3125B to run for at least 10 more minutes, THEN RECORD pump and system data on an Appendix G Data Sheet.

Test Engineer: D.H 2/19/98

Increase pump operating speed to 70% of full speed

8.44 BEGIN datalogging of the flow signal and the signal to the VSD.

8.45 SET Fluid FLOW (SP) to 168 gpm (70% of full scale). (This corresponds to a pump speed of 2520 rpm; with the temporary flow control valve V-temp-2 fully open an actual flow of about 150 gpm is expected.)

Test Engineer: D.H 2/19/98

8.46 After flow rate as read from FIC-3125 stabilizes, STOP datalogging of the flow signal and the signal to the VSD.
Test Engineer: D.J. 2/19/98

8.47 RECORD the following data:

8.47.1 Motor speed	SI-3125B	2560 RPM
8.47.2 Flow rate	FI-temp-1	110 GPM
8.47.3 Flow rate	FIC-3125	110 GPM
8.47.4 Pump inlet pressure	PI-3125B	56 psig
8.47.5 Pump discharge pressure	PI-3125D	522 psig

Test Engineer: D.J. 2/19/98

8.48 Use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities on VSD-2 keypad. Use the RIGHT arrow as required. RECORD the following data:

8.48.1 Motor Freq	42 Hz
8.48.2 Motor Speed	70 %
8.48.3 Motor RPM	2520 RPM
8.48.4 Load A Amps	118 Amps
8.48.5 Load B Amps	120 Amps
8.48.6 Load C Amps	117 Amps
8.48.7 Load AB Volts	335 Volts
8.48.8 Load BC Volts	328 Volts
8.48.9 Load CA Volts	327 Volts
8.48.10 Line A Amps	76 Amps
8.48.11 Line B Amps	82 Amps
8.48.12 Line C Amps	80 Amps
8.48.13 Line AB Volts	493 Volts
8.48.14 Line BC Volts	495 Volts
8.48.15 Line CA Volts	488 Volts
8.48.16 Power	62 Kilowatts

Dupes

Test Engineer: _____

8.49 RECORD pump and system data on an Appendix G Data Sheet.
Test Engineer: D.J. 2/19/98

8.50 ALLOW pump P-3125B to run for at least 10 more minutes, THEN RECORD pump and system data on an Appendix G Data Sheet.
Test Engineer: D.J. 2/19/98

Increase pump operating speed to 80% of full speed

8.51 **BEGIN** datalogging of the flow signal and the signal to the VSD.

8.52 **SET** Fluid FLOW (SP) to 192 gpm (80% of full scale). (This corresponds to a pump speed of 2280 rpm; with the temporary flow control valve V-temp-2 fully open an actual flow of about 170 gpm is expected.)

Test Engineer: D.D 2/19/98

8.53 After flow rate as read from FIC-3125 stabilizes, **STOP** datalogging of the flow signal and the signal to the VSD.

Test Engineer: D.D. 2/19/98

8.54 **RECORD** the following data:

8.54.1 Motor speed	SI-3125B	2915 RPM
8.54.2 Flow rate	FI-temp-1	120 GPM
8.54.3 Flow rate	FIC-3125	123 GPM
8.54.4 Pump inlet pressure	PI-3125B	51 psig
8.54.5 Pump discharge pressure	PI-3125D	623 psig

Test Engineer: D.D. 2/19/98

8.55 Use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities on VSD-2 keypad. Use the RIGHT arrow as required. **RECORD** the following data:

8.55.1 Motor Freq	48 Hz
8.55.2 Motor Speed	79.9 %
8.55.3 Motor RPM	2880 RPM
8.55.4 Load A Amps	140 Amps
8.55.5 Load B Amps	140 Amps
8.55.6 Load C Amps	139 Amps
8.55.7 Load AB Volts	384 Volts
8.55.8 Load BC Volts	323 Volts
8.55.9 Load CA Volts	323 Volts
8.55.10 Line A Amps	110 Amps
8.55.11 Line B Amps	119 Amps
8.55.12 Line C Amps	115 Amps
8.55.13 Line AB Volts	493 Volts
8.55.14 Line BC Volts	496 Volts

pulses

8.55.15 Line CA Volts 488 Volts DOWLES
8.55.16 Power 86 Kilowatts

Test Engineer: D.G 2/19/98

8.56 RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: D.G 2/19/98

8.57 ALLOW pump P-3125B to run for at least 10 more minutes, THEN RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: D.G.

8.58 RECORD the instrument air flow rate to the pump seals per the flow indicators on the pump seal control panels:

8.58.1 FI-3125B1 .2 scfh @ 125 PSIG DOWLES 3 CONNECTION FACTOR 3.0
8.58.2 FI-3125B2 0 scfh @ 124 PSIG 3
Test Engineer: D.G

Stop P-3125B

8.59 PRESS the STOP button on MCS screen PCU-2 for Booster Pump P-3125B.

8.60 VERIFY locally that P-3125B has stopped.
Test Engineer: D.G. 2/19/98

8.61 VERIFY ENABLE ENERGIZED and OFF are illuminated on MCS screen PCU-2 for Booster Pump P-3125B.
Test Engineer: D.G. 2/19/98

8.62 VERIFY the UP TO SPEED and RUN LEDs are no longer illuminated on VSD-2.
Test Engineer: D.G. 2/19/98

8.63 CLOSE flow control valve V-temp-2
Test Engineer: DG 2/19/98

8.64 CLOSE V-temp-1
Test Engineer: D.G 2/19/98

8.65 TURN OFF supply pump.

9.0 Booster Pump P-3125A Testing Using Flow Control

This section tests remote operation of P-3125A with pump speed control via the system flowmeter. Operation will be tested at three flows and three back pressures for a total of nine operating points.

NOTE: If a tee was used on the supply jumper between V-temp-1 and the Hiltaps on SLL-3163 and SLL-3164, then N/A the following two steps (and substeps).

N/A

9.1 **MOVE** the water supply feed from P-3125B to P-3125A as follows:

9.1.1 **CLOSE** SOV-3125D.

Test Engineer: _____

9.1.2 **VERIFY** SOV-3125C is CLOSED.

Test Engineer: _____

9.1.3 **REMOVE** supply jumper from Hiltap connector nearest SOV-3125G on transfer line SLL-3164. **ATTEMPT** to keep as little water as possible from leaking out of the supply jumper during the move.

9.1.4 **IMMEDIATELY REINSTALL** Hiltap connector cap securely.

Test Engineer: _____

9.1.5 **REMOVE** cap from Hiltap connector nearest SOV-3125E on SLL-3163. **ATTEMPT** to keep as little water as possible from leaking out of the transfer line during the move.

9.1.6 **IMMEDIATELY CONNECT** supply jumper securely to the Hiltap connector.

Test Engineer: _____

See TEST LOG ENTRY 2/13/98 DJ 2/26/98

NOTE: Circulate water thru pump P-3125A vent valve to sweep out any air pockets left inside pump or supply line due to moving the supply jumper.

9.2 **CIRCULATE** water as follows:

9.2.1 **OPEN** valve V-temp-1.

Test Engineer: DJ 2/26/98

9.2.2 **CLOSE** pressure control valve on the supply jumper assembly.

9.2.3 **TURN ON** supply pump.

9.2.4 **OPEN** SOV-3125C from the MCS.
Test Engineer: D.D. 2/26/98

9.2.5 **OPEN** flow control valve V-temp-2.
Test Engineer: D.D 2/26/98

9.2.6 After circulating for approximately 5 minutes, **CLOSE** SOV-3125C and **THEN OPEN** pump vent valve MOV-3125AK.
Test Engineer: D.D 2/26/98

9.2.7 After approximately 5 minutes, **CLOSE** V-temp-2.
Test Engineer: D.D. 2/26/98

9.2.8 **CLOSE** MOV-3125AK.
Test Engineer: D.D. 2/26/98

9.2.9 **CLOSE** valve V-temp-1.
Test Engineer: D.D. 2/26/98

9.2.10 **TURN OFF** supply pump.

9.3 **VERIFY** ENABLE ENERGIZED, REMOTE, and OFF are illuminated on MCS screen PCU-2 for Booster Pump P-3125A.
Test Engineer: D.D 2/26/98

9.4 **SELECT** PID AUTO on MCS screen PCU-2 for Booster Pump P-3125A.
Test Engineer: D.D 2/26/98

NOTE: Test Engineer will determine optimum PID settings by analyzing the contents of the datalogger from the PID MAN testing. TEST ENGINEER MAY RETUNE PID SETTINGS AS REQUIRED DURING THIS TEST.

9.5 **SET** PID-flow parameters for Booster Pump P-3125A to the values determined by the Test Engineer:

P = 0.8
I = .06 1/sec
D = 0 sec

Test Engineer: D.D 2/26/98

9.6 SET Fluid Flow Set Point value to 104 gpm.
Test Engineer: D.Y 2/26/98

NOTE: Test Engineer will supply rate of acceleration and deceleration that the variable speed drive VSD-1 will implement for all increases/decreases in speed setpoint, and rate-of-change (ramp) limit(s) for the control signal logic in the PCU.

9.7 SET the rate-of-change (ramp) limit(s) in the control signal logic in the PCU for P-3125A, per Test Engineer's direction. RECORD value below. N/A if not performed.

PCU ramp limit = 60
Test Engineer: D.Y 2/26/98

9.8 SET ACCEL TIME and DECEL TIME parameters on VSD-1 per direction of the Test Engineer and to the values determined by the Test Engineer. RECORD values below. N/A if not performed.

ACCEL TIME = 10
DECEL TIME = ~~20~~ 60 D.Y 2/26/98
Test Engineer: D.Y 2/26/98

9.9 SELECT the Transfer Sequencing RESET button.
Test Engineer: D.Y. 2/26/98

NOTE: Valves previously "forced" to a position on the MCS for purposes of this test should not be shown as valve positioning failures because the associated valve failure alarms are jumpered out per Section 4.0.

9.10 VERIFY Alarm Table on MCS shows no valve positioning failures.
Test Engineer: D.Y 2/26/98

9.11 SELECT the Transfer Sequencing INITIATE Button.

NOTE: Transfer Scheme 2A sets up for transfer of slurry from the 241-SY-B valve pit to the 241-A-A valve pit.

9.12 SELECT the Transfer Sequencing TYPE 2A transfer button.
Test Engineer: D.Y 2/26/98

9.13 **VERIFY** proper valve position in accordance with Appendix F-3 Data Sheet.

Test Engineer: D. J. 2/26/98

NOTE: The boxes on the MCS overview screen that denote PCU-1 thru PCU-5 indicate status of the transfer path. All boxes GRAY and paths GREEN indicates that the transfer path is ready for use. Boxes filled in RED indicates that an alarm associated with the transfer is activated (i.e. mispositioned valve, leak detected, etc). The booster pump will not start unless associated alarms are either cleared or over-ridden.

9.14 **IF** any of the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in RED, **DETERMINE** the reason why and perform one of the following:

9.14.1 Disposition the problem by fixing it and clearing alarm, or by overriding the alarm **IF** the Test Engineer determines that the problem will not affect the performance of this test. **RECORD** disposition on the Test Log or on a Test Exception Sheet, at the discretion of the Test Engineer. N/A this step if not performed.

Test Engineer: N/A

9.15 **VERIFY** the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in GRAY, unless a RED box has been determined to be acceptable per the previous step.

Test Engineer: D. J. 2/26/98

9.16 **OPEN** SOV-3125E and SOV-3125C from the MCS.

Test Engineer: D. J 2/26/98

& SOV-3125G D.J 2/26/98

SEE TEST LOG ENTRY 2/13/98

9.17 **ADJUST** pressure control valve on the supply jumper assembly to an arbitrary **OPEN** position.

9.18 **TURN ON** supply pump.

9.19 **ADJUST** pressure control valve on the supply jumper assembly so that the pressure indicator at the supply pump discharge reads approximately ~~50~~ 60 psi. DJ 2/26/98

9.19.1 PI-temp-1 63 psig

Test Engineer: D. J 2/26/98

9.20 OPEN valve V-temp-1.

Test Engineer: D.J. 2/26/98

9.21 ~~FULLY~~ OPEN flow control valve V-temp-2. approx 1/8 open. dat 12/17/97

Test Engineer: D.J 2/26/98

Prepare to start P-3125A

IMPORTANT: Be prepared to immediately shut down booster pump if so requested. To shut down the pump, PRESS either the OFF key on VSD-1 keypad or STOP button on PCU-2 for Booster Pump P-3125A.

9.22 BEGIN datalogging of the flow signal and the signal to the VSD.

9.23 PRESS the START button on MCS screen PCU-2 for Booster Pump P-3125A.

9.23.a FULLY OPEN V-temp-2 per direction of Test Engineer, (local) dat 12/17/97

Test Engineer: D.J 2/26/98

9.24 VERIFY locally that P-3125A is operating.

Test Engineer: D.J 2/26/98

9.25 VERIFY START ENERGIZED and ON are illuminated on MCS screen PCU-2 for Booster Pump P-3125A.

Test Engineer: D.J 2/26/98

NOTE: If P-3125A does not keep a steady flow, perform the following step.

9.26 IF flow as read from FIC-3125 is oscillating more than 8 gpm, THEN exit PID AUTO and enter PID MAN. Re-tune PID per Test Engineer's instructions and record the new PID-flow settings below. N/A step if not performed.

P = _____
I = _____ 1/sec N/A
D = _____ Sec

Test Engineer: D.J 2/26/98

Point #1, ~~104~~ 110 gpm, flow control valve full open D.J 2/26/98

9.27 RECORD the following data. VERIFY FIC-3125 reads ~~104~~ 110 ± ~~8~~ 7 D.A. D.J 2/26/98

9.27.1 Motor speed	SI-3125A	1875	RPM
9.27.2 Flow rate	FI-temp-1	104	GPM

9.27.3 Flow rate	FIC-3125	110	GPM
9.27.4 Pump inlet pressure	PI-3125A	58	psig
9.27.5 Pump discharge pressure	PI-3125C	273	psig

Test Engineer: D. Y 2/26/98

9.28 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data:

9.28.1 Motor Freq	30.6	Hz
9.28.2 Motor Speed	51%	%
9.28.3 Motor RPM	1841	RPM
9.28.4 Load A Amps	93	Amps
9.28.5 Load B Amps	91	Amps
9.28.6 Load C Amps	92	Amps
9.28.7 Load AB Volts	240	Volts
9.28.8 Load BC Volts	243	Volts
9.28.9 Load CA Volts	244	Volts
9.28.10 Power	27	Kilowatts

Test Engineer: D. Y 2/26/98

9.29 **RECORD** pump and system data on an Appendix G Data Sheet.
Test Engineer: D. Y 2/26/98

9.30 **ALLOW** pump P-3125A to run for at least 30 minutes. At 10 minute intervals, **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D. Y 2/26/98

CAUTION: Flow Control Valve V-temp-2 should never be fully closed while the booster pump is operating, to prevent "deadheading" of the booster pump. Deadheading (no flow) for a significant time could result in damage to the booster pump. Constant surveillance during this test is required.

110 D.Y. 2/26/98
Point #2, ~~104~~ gpm, increase back pressure on pump to verify flow control feedback increases pump motor speed and horsepower to meet the required flow.

9.31 **THROTTLE** flow control valve V-temp-2 to increase motor speed approximately 100 rpm per SI-3125A.
Test Engineer: D Y 2/26/98

9.32 **RECORD** the following data. **VERIFY** FIC-3125 reads ~~104~~ 110 ± 5 gpm D.Y. 2/26/98 T D.Y.

9.32.1 Motor speed	SI-3125A	1926	RPM
9.32.2 Flow rate	FI-temp-1	105	GPM
9.32.3 Flow rate	FIC-3125	110	GPM
9.32.4 Pump inlet pressure	PI-3125A	58	psig
9.32.5 Pump discharge pressure	PI-3125C	308	psig

Test Engineer: D.Y. 2/26/98

9.33 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data:

9.33.1 Motor Freq	32.9	Hz
9.33.2 Motor Speed	54	%
9.33.3 Motor RPM	1945	RPM
9.33.4 Load A Amps	94	Amps
9.33.5 Load B Amps	93.8	Amps
9.33.6 Load C Amps	94	Amps
9.33.7 Load AB Volts	250	Volts
9.33.8 Load BC Volts	252	Volts
9.33.9 Load CA Volts	252	Volts
9.33.10 Power	30	Kilowatts

Test Engineer: D.Y. 2/26/98

9.34 **RECORD** pump and system data on an Appendix G Data Sheet.
Test Engineer: D.Y. 2/26/98

9.35 **ALLOW** pump P-3125A to run for at least 30 minutes. At 10 minute intervals, **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.Y. 2/26/98

110 D.Y. 2/26/98
Point #3, ~~104~~ gpm, further increase in back pressure

9.36 **THROTTLE** flow control valve V-temp-2 to increase motor speed approximately 200 rpm per SI-3125A. (Back off rpm if cavitation is found to occur at the flow control valve)
Test Engineer: D.Y. 3/2/98

9.37 RECORD the following data. VERIFY FIC-3125 reads ~~104~~ 110 ± 5 gpm 2/26/98 D.J 7 DJ

9.37.1 Motor speed	SI-3125A	2110	RPM
9.37.2 Flow rate	FI-temp-1	101	GPM
9.37.3 Flow rate	FIC-3125	11	GPM
9.37.4 Pump inlet pressure	PI-3125A	59	psig
9.37.5 Pump discharge pressure	PI-3125C	365	psig

Test Engineer: D.J 3/2/98

9.38 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data:

9.38.1 Motor Freq	35.5	Hz
9.38.2 Motor Speed	56.9	%
9.38.3 Motor RPM	2130	RPM
9.38.4 Load A Amps	100	Amps
9.38.5 Load B Amps	97	Amps
9.38.6 Load C Amps	96	Amps
9.38.7 Load AB Volts	275	Volts
9.38.8 Load BC Volts	272	Volts
9.38.9 Load CA Volts	273	Volts
9.38.10 Power	36	Kilowatts

Test Engineer: D.J 3/2/98

9.39 RECORD pump and system data on an Appendix G Data Sheet. 3/2/98
Test Engineer: D.J

9.40 ALLOW pump P-3125A to run for at least 30 minutes. At 10 minute intervals, RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: D.J 3/2/98

Point #4, 140 gpm, flow control valve full open

9.41 FULLY OPEN flow control valve V-temp-2.
Test Engineer: D.J 3/2/98

9.42 SET Fluid Flow Set Point value to 140 gpm.
Test Engineer: D.J 3/2/98

9.43 **RECORD** the following data. **VERIFY** FIC-3125 reads 140 ± 7 gpm.

9.43.1 Motor speed	SI-3125A	2424	RPM
9.43.2 Flow rate	FI-temp-1	131	GPM
9.43.3 Flow rate	FIC-3125	140	GPM
9.43.4 Pump inlet pressure	PI-3125A	42	psig
9.43.5 Pump discharge pressure	PI-3125C	415	psig

Test Engineer: D.H 3/2/98

9.44 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data:

9.44.1 Motor Freq	40.4	Hz
9.44.2 Motor Speed	67.2	%
9.44.3 Motor RPM	2422	RPM
9.44.4 Load A Amps	118	Amps
9.44.5 Load B Amps	116	Amps
9.44.6 Load C Amps	115	Amps
9.44.7 Load AB Volts	319	Volts
9.44.8 Load BC Volts	314	Volts
9.44.9 Load CA Volts	315	Volts
9.44.10 Power	54	Kilowatts

Test Engineer: D.H. 3/2/98

9.45 **RECORD** pump and system data on an Appendix G Data Sheet.
Test Engineer: D.H. 3/2/98

9.46 **ALLOW** pump P-3125A to run for at least 30 minutes. At 10 minute intervals, **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.H. 3/2/98

Point #5, 140 gpm, increase back pressure on pump to verify flow control feedback increases pump motor speed and horsepower to meet the required flow.

9.47 **THROTTLE** flow control valve V-temp-2 to increase motor speed approximately 100 rpm per SI-3125A.
Test Engineer: D.H 3/2/98

9.48 **RECORD** the following data. **VERIFY** FIC-3125 reads 140 ± 7 gpm

9.48.1 Motor speed	SI-3125A	2529	RPM
9.48.2 Flow rate	FI-temp-1	131	GPM
9.48.3 Flow rate	FIC-3125	140	GPM
9.48.4 Pump inlet pressure	PI-3125A	42	psig
9.48.5 Pump discharge pressure	PI-3125C	458	psig

Test Engineer: D.J 3/2/98

9.49 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data:

9.49.1 Motor Freq	41.8	Hz
9.49.2 Motor Speed	69.7	%
9.49.3 Motor RPM	2501	RPM
9.49.4 Load A Amps	123	Amps
9.49.5 Load B Amps	120	Amps
9.49.6 Load C Amps	121	Amps
9.49.7 Load AB Volts	330	Volts
9.49.8 Load BC Volts	320	Volts
9.49.9 Load CA Volts	326	Volts
9.49.10 Power	58	Kilowatts

Test Engineer: D.J 3/2/98

9.50 **RECORD** pump and system data on an Appendix G Data Sheet.
Test Engineer: D.J 3/2/98

9.51 **ALLOW** pump P-3125A to run for at least 30 minutes. At 10 minute intervals, **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.J 3/2/98

Point #6, 140 gpm, further increase in back pressure

9.52 **THROTTLE** flow control valve V-temp-2 to increase motor speed approximately 200 rpm per SI-3125A. (Back off rpm if cavitation is found to occur at the flow control valve)
Test Engineer: D.J 3/2/98

9.53 **RECORD** the following data. **VERIFY** FIC-3125 reads 140 ± 7 gpm

9.53.1 Motor speed	SI-3125A	2730	RPM
9.53.2 Flow rate	FI-temp-1	114	GPM – Bounce in G/transducer
9.53.3 Flow rate	FIC-3125	140	GPM
9.53.4 Pump inlet pressure	PI-3125A	42	psig
9.53.5 Pump discharge pressure	PI-3125C	550	psig

Test Engineer: D.Y. 3/2/98

9.54 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data:

9.54.1 Motor Freq	45.1	Hz
9.54.2 Motor Speed	75.2	%
9.54.3 Motor RPM	2700	RPM
9.54.4 Load A Amps	135	Amps
9.54.5 Load B Amps	133	Amps
9.54.6 Load C Amps	133	Amps
9.54.7 Load AB Volts	345	Volts
9.54.8 Load BC Volts	345	Volts
9.54.9 Load CA Volts	348	Volts
9.54.10 Power	70	Kilowatts

Test Engineer: D.Y. 3/2/98

9.55 **RECORD** pump and system data on an Appendix G Data Sheet.
Test Engineer: D.Y. 3/2/98

9.56 **ALLOW** pump P-3125A to run for at least 30 minutes. At 10 minute intervals, **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.Y. 3/2/98

155 D.Y. 3/2/98

Point #7, ~~160~~ gpm, flow control valve full open

9.57 **FULLY OPEN** flow control valve V-temp-2.
Test Engineer: D.Y. 3/2/98

155 D.Y. 3/2/98

9.58 **SET** Fluid Flow Set Point value to ~~160~~ gpm.
Test Engineer: D.Y. 3/2/98

DJ 3/2/98

9.59 RECORD the following data. VERIFY FIC-3125 reads ~~160~~ 155 ± 8 gpm. T.D.

9.59.1 Motor speed	SI-3125A	2688	RPM
9.59.2 Flow rate	FI-temp-1	195	GPM
9.59.3 Flow rate	FIC-3125	155	GPM
9.59.4 Pump inlet pressure	PI-3125A	42	psig
9.59.5 Pump discharge pressure	PI-3125C	490	psig

Test Engineer: D.J. 3/2/98

9.60 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data:

9.60.1 Motor Freq	99.6	Hz
9.60.2 Motor Speed	74.4	%
9.60.3 Motor RPM	2674	RPM
9.60.4 Load A Amps	135	Amps
9.60.5 Load B Amps	133	Amps
9.60.6 Load C Amps	135	Amps
9.60.7 Load AB Volts	350	Volts
9.60.8 Load BC Volts	348	Volts
9.60.9 Load CA Volts	342	Volts
9.60.10 Power	72	Kilowatts

Test Engineer: D.J 3/2/98

9.61 RECORD pump and system data on an Appendix G Data Sheet.
Test Engineer: D.J 3/2/98

9.62 ALLOW pump P-3125A to run for at least 30 minutes. At 10 minute intervals, RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: DJ 3/2/98

155 DJ 3/2/98
Point #8, ~~160~~ gpm, increase back pressure on pump to verify flow control feedback increases pump motor speed and horsepower to meet the required flow.

9.63 THROTTLE flow control valve V-temp-2 to increase motor speed approximately 100 rpm per SI-3125A.
Test Engineer: DJ 3/2/98

9.64 RECORD the following data. VERIFY FIC-3125 reads ~~160~~ 155 ± 8 gpm D.J. 3/2/98 T.D.J.

9.64.1 Motor speed	SI-3125A	2152	RPM
9.64.2 Flow rate	FI-temp-1	148	GPM
9.64.3 Flow rate	FIC-3125	155	GPM
9.64.4 Pump inlet pressure	PI-3125A	42	psig
9.64.5 Pump discharge pressure	PI-3125C	522	psig

Test Engineer: D.J. 3/2/98

9.65 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data:

9.65.1 Motor Freq	45.5	Hz
9.65.2 Motor Speed	75.8	%
9.65.3 Motor RPM	2731	RPM
9.65.4 Load A Amps	138	Amps
9.65.5 Load B Amps	135	Amps
9.65.6 Load C Amps	136	Amps
9.65.7 Load AB Volts	350	Volts
9.65.8 Load BC Volts	348	Volts
9.65.9 Load CA Volts	349	Volts
9.65.10 Power	75	Kilowatts

Test Engineer: D.J. 3/2/98

9.66 RECORD pump and system data on an Appendix G Data Sheet.
Test Engineer: D.J. 3/2/98

9.67 ALLOW pump P-3125A to run for at least 30 minutes. At 10 minute intervals, RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: D.J. 3/2/98

Point #9, ~~160~~ 155 D.J. 3/2/98 gpm, further increase in back pressure

9.68 THROTTLE flow control valve V-temp-2 to increase motor speed approximately ~~200~~ 180 D.J. 3/2/98 rpm per SI-3125A. (Back off rpm if cavitation is found to occur at the flow control valve)
Test Engineer: D.J. 3/2/98

200 RPM WOULD CAUSE PUMP TO OPERATE AT RESONANT FREQUENCY (SEE TE-005)

9.69 RECORD the following data. VERIFY FIC-3125 reads ~~160~~ ± ~~8~~ gpm 155 DJ 3/2/98 T.D.J.

9.69.1 Motor speed	SI-3125A	2845	RPM
9.69.2 Flow rate	FI-temp-1	142	GPM
9.69.3 Flow rate	FIC-3125	155	GPM
9.69.4 Pump inlet pressure	PI-3125A	42	psig
9.69.5 Pump discharge pressure	PI-3125C	523	psig

Test Engineer: D.J 3/2/98

9.70 After flow rate as read from FIC-3125 stabilizes, STOP datalogging of the flow signal and the signal to the VSD.
Test Engineer: D.J 3/2/98

9.71 On VSD-1 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data:

9.71.1 Motor Freq	47.1	Hz
9.71.2 Motor Speed	78.5	%
9.71.3 Motor RPM	2828	RPM
9.71.4 Load A Amps	147	Amps
9.71.5 Load B Amps	146	Amps
9.71.6 Load C Amps	147	Amps
9.71.7 Load AB Volts	345	Volts
9.71.8 Load BC Volts	343	Volts
9.71.9 Load CA Volts	342	Volts
9.71.10 Power	29	Kilowatts

Test Engineer: D.J 3/2/98

9.72 RECORD pump and system data on an Appendix G Data Sheet.
Test Engineer: D.J 3/2/98

9.73 ALLOW pump P-3125A to run for at least 30 minutes. At 10 minute intervals, RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: DJ 3/2/98

Stop P-3125A

9.74 RECORD final PID-flow parameters for Booster Pump P-3125A.

P = .80
I = .008 1/sec
D = 0 sec

Test Engineer: D.H 3/2/98

9.75 PRESS the STOP button on MCS screen PCU-2 for Booster Pump P-3125A.

9.76 VERIFY locally that P-3125A has stopped.

Test Engineer: D.H 3/2/98

9.77 VERIFY ENABLE ENERGIZED and OFF are illuminated on MCS screen PCU-2 for Booster Pump P-3125A.

Test Engineer: D.H. 3/2/98

9.78 CLOSE flow control valve V-temp-2

Test Engineer: D.H 3/2/98

9.79 CLOSE V-temp-1

Test Engineer: D.H. 3/2/98

9.80 TURN OFF supply pump.

10.0 Booster Pump P-3125B Testing Using Flow Control

This section tests remote operation of P-3125B with pump speed control via the system flowmeter. Operation will be tested at three flows and three back pressures for a total of nine operating points.

NOTE: If a tee was used on the supply jumper between V-temp-1 and the Hiltaps on SLL-3163 and SLL-3164, then N/A the following two steps (and substeps).

10.1 **MOVE** the water supply feed from P-3125A to P-3125B as follows:

10.1.1 **CLOSE** SOV-3125C.
Test Engineer: D.D / 3/24/98

10.1.2 **VERIFY** SOV-3125D is CLOSED.
Test Engineer: D.D / 3-24-98

10.1.3 **REMOVE** supply jumper from Hiltap connector nearest SOV-3125E on transfer line SLL-3163. **ATTEMPT** to keep as little water as possible from leaking out of the supply jumper during the move.

10.1.4 **IMMEDIATELY REINSTALL** Hiltap connector cap securely.
Test Engineer: D.D / 3-24-98

10.1.5 **REMOVE** cap from Hiltap connector nearest SOV-3125G on SLL-3164. **ATTEMPT** to keep as little water as possible from leaking out of the transfer line during the move.

10.1.6 **IMMEDIATELY CONNECT** supply jumper securely to the Hiltap connector.
Test Engineer: D.D. / 3-24-98

NOTE: Circulate water thru pump P-3125B vent valve to sweep out any air pockets left inside pump or supply line due to moving the supply jumper.

10.2 **CIRCULATE** water as follows:

10.2.1 **OPEN** valve V-temp-1.
Test Engineer: D.D / 3-24-98

10.2.2 CLOSE pressure control valve on the supply jumper assembly.

10.2.3 TURN ON supply pump.

D.Y. 3/24/98

10.2.4 OPEN SOV-3125D from the MCS.
Test Engineer: D.Y. / 3-24-98

10.2.5 OPEN flow control valve V-temp-2.
Test Engineer: D.Y. / 3-24-98

10.2.6 After circulating for approximately 5 minutes, ~~CLOSE SOV-3125D and THEN~~ OPEN pump vent valve MOV-3125BK. D.Y. 3/24/98
Test Engineer: D.Y. / 3-24-98

10.2.7 After approximately 5 minutes, CLOSE V-temp-2.
Test Engineer: D.Y. / 3-24-98

10.2.8 CLOSE MOV-3125BK.
Test Engineer: D.Y. / 3-24-98

10.2.9 CLOSE valve V-temp-1.
Test Engineer: D.Y. / 3-24-98

10.2.10 TURN OFF supply pump.

10.3 VERIFY ENABLE ENERGIZED, REMOTE, and OFF are illuminated on MCS screen PCU-2 for Booster Pump P-3125B.
Test Engineer: D.Y. / 3-24-98

10.4 SELECT PID AUTO on MCS screen PCU-2 for Booster Pump P-3125B.
Test Engineer: D.Y. / 3-24-98

NOTE: Test Engineer will determine optimum PID settings by analyzing the contents of the datalogger from the PID MAN testing. Test Engineer may retune PID settings as required during this test.

10.5 SET PID-flow parameters for Booster Pump P-3125B to the values determined by the Test Engineer:

P = 0.80
I = 0.06 1/sec
D = 0 sec

Test Engineer: D. G. 3-24-98

10.6 SET Fluid Flow Set Point value to ~~104~~ 110 gpm. D.G. 3/23/98

Test Engineer: D. G. 3-24-98

NOTE: Test Engineer will supply rate of acceleration and deceleration that the variable speed drive VSD-2 will implement for all increases/decreases in speed setpoint, and rate-of-change (ramp) limit(s) for the control signal logic in the PCU.

10.7 SET the rate-of-change (ramp) limit(s) in the control signal logic in the PCU for P-3125B, per Test Engineer's direction. RECORD value below. N/A if not performed.

PCU ramp limit = 60

Test Engineer: D. G. 3-24-98

10.8 SET ACCEL TIME and DECEL TIME parameters on VSD-2 per direction of the Test Engineer and to the values determined by the Test Engineer. RECORD values below. N/A if not performed.

ACCEL TIME = 20
DECEL TIME = 60

Test Engineer: D. G. 3-24-98

10.9 SELECT the Transfer Sequencing RESET button.

Test Engineer: D. G. 3-24-98

NOTE: Valves previously "forced" to a position on the MCS for purposes of this test should not be shown as valve positioning failures because the associated valve failure alarms are jumpered out per Section 3.0.

10.10 VERIFY Alarm Table on MCS shows no valve positioning failures.

Test Engineer: D. G. 3-24-98

10.11 SELECT the Transfer Sequencing INITIATE Button.

NOTE: Transfer Scheme 2B sets up for transfer of slurry from the 241-SY-B valve pit to the 241-A-A valve pit.

10.12 **SELECT** the Transfer Sequencing **TYPE 2B** transfer button.
Test Engineer: D.D 3/24-98

10.13 **VERIFY** proper valve position in accordance with Appendix F-4 Data Sheet.
Test Engineer: D.D 3/24-98

NOTE: The boxes on the MCS overview screen that denote PCU-1 thru PCU-5 indicate status of the transfer path. All boxes GRAY and paths GREEN indicates that the transfer path is ready for use. Boxes filled in RED indicates that an alarm associated with the transfer is activated (i.e. mispositioned valve, leak detected, etc). The booster pump will not start unless associated alarms are either cleared or over-ridden.

10.14 **IF** any of the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in RED, **DETERMINE** the reason why and perform the following:

10.14.1 Disposition the problem by fixing it and clearing alarm, or by overriding the alarm **IF** the Test Engineer determines that the problem will not affect the performance of this test. **RECORD** disposition on the Test Log or on a Test Exception Sheet, at the discretion of the Test Engineer. N/A this step if not performed.
Test Engineer: N/A D.D 3/24/98

10.15 **VERIFY** the boxes on the MCS overview screen which denote PCU-1 thru PCU-5 are highlighted in GRAY, unless a RED box has been determined to be acceptable per the previous step.
Test Engineer: D.D 3-24-98

10.16 **OPEN** SOV-3125G and SOV-3125D from the MCS.
Test Engineer: D.D 3-24-98

10.17 **ADJUST** pressure control valve on the supply jumper assembly to an arbitrary **OPEN** position.

10.18 **TURN ON** supply pump.

10.19 **ADJUST** pressure control valve on the supply jumper assembly so that the pressure indicator at the supply pump discharge reads approximately ~~50~~ 60 psi D.Y 3/24/98

10.19.1 PI-temp-1 60 psig
Test Engineer: D.Y. / 3-24-98

10.20 **OPEN** valve V-temp-1.
Test Engineer: D.Y. / 3-24-98

10.21 ~~FULLY~~ **OPEN** flow control valve V-temp-2. Approx 1/8 OPEN. Kal 12/17/97
Test Engineer: D.Y. / 3-24-98

Prepare to start P-3125B

IMPORTANT: Be prepared to immediately shut down booster pump if so requested. To shut down the pump, **PRESS** either the **OFF** key on VSD-2 keypad or **STOP** button on PCU-2 for Booster Pump P-3125B.

10.22 **BEGIN** datalogging of the flow signal and the signal to the VSD.

10.23 **PRESS** the START button on MCS screen PCU-2 for Booster Pump P-3125B.
Kal 1/4/97
10.23.a FULLY OPEN V-temp-2 per direction of Test Engineer. (local)
Test Engineer: D.Y. / 3-24-98

10.24 **VERIFY** locally that P-3125B is operating.
Test Engineer: D.Y. / 3/24/98

10.25 **VERIFY** START ENERGIZED and ON are illuminated on MCS screen PCU-2 for Booster Pump P-3125B.
Test Engineer: D.Y. / 3-24-98

NOTE: If P-3125B does not keep a steady flow, perform the following step.

10.26 IF flow as read from FIC-3125 is oscillating more than 8 gpm, **THEN** exit PID AUTO and enter PID MAN. Re-tune PID per Test Engineer's instructions and record the new PID-flow settings below. N/A step if not performed.

P = 0.90
I = 0.06 1/sec
D = 0 Sec

Test Engineer: D.Y. / 3-24-98

Point #1, ~~104~~ 110 3/23/98 gpm, flow control valve full open

10.27 RECORD the following data. VERIFY FIC-3125 reads ~~104~~ 110 DD 3/23/98 ± 7 gpm

10.27.1 Motor speed	SI-3125B	1980 RPM
10.27.2 Flow rate	FI-temp-1	107 GPM
10.27.3 Flow rate	FIC-3125	110 GPM
10.27.4 Pump inlet pressure	PI-3125B	58 psig
10.27.5 Pump discharge pressure	PI-3125D	288 psig

Test Engineer: DD 3/24/98

10.28 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data:

10.28.1 Motor Freq	32.5 Hz
10.28.2 Motor Speed	54 %
10.28.3 Motor RPM	1950 RPM
10.28.4 Load A Amps	100 Amps
10.28.5 Load B Amps	100 Amps
10.28.6 Load C Amps	97 Amps
10.28.7 Load AB Volts	263 Volts
10.28.8 Load BC Volts	256 Volts
10.28.9 Load CA Volts	254 Volts
10.28.10 Power	26 Kilowatts

Test Engineer: DD 3/24/98

10.29 RECORD pump and system data on an Appendix G Data Sheet.
Test Engineer: DD 3-24-98

10.30 ALLOW pump P-3125B to run for at least 30 minutes. At 10 minute intervals, RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: DD 3-24-98

CAUTION: Flow Control Valve V-temp-2 should never be fully closed while the booster pump is operating, to prevent "deadheading" of the booster pump. Deadheading (no flow) for a significant time could result in damage to the booster pump. Constant surveillance during this test is required.

Point #2, ~~104~~ 110 D.H. 3/23/98 gpm, increase back pressure on pump to verify flow control feedback increases pump motor speed and horsepower to meet the required flow.

10.31 THROTTLE flow control valve to increase motor speed approximately 100 rpm per SI-3125B.

Test Engineer: D.H / 3-24-98

10.32 RECORD the following data. VERIFY FIC-3125 reads ~~104~~ 110 D.H. 3/23/98 ± 7 gpm

10.32.1 Motor speed	SI-3125B	2110 RPM
10.32.2 Flow rate	FI-temp-1	109 GPM
10.32.3 Flow rate	FIC-3125	110 GPM
10.32.4 Pump inlet pressure	PI-3125B	57 psig
10.32.5 Pump discharge pressure	PI-3125D	331 psig

Test Engineer: D.H / 3-24-98

10.33 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data:

10.33.1 Motor Freq	34.5 Hz
10.33.2 Motor Speed	57.5 %
10:33.3 Motor RPM	2074 RPM
10.33.4 Load A Amps	100 Amps
10.33.5 Load B Amps	100 Amps
10.33.6 Load C Amps	100 Amps
10.33.7 Load AB Volts	284 Volts
10.33.8 Load BC Volts	279 Volts
10.33.9 Load CA Volts	275 Volts
10.33.10 Power	49 Kilowatts

Test Engineer: D.H / 3-24-98

10.34 RECORD pump and system data on an Appendix G Data Sheet.

Test Engineer: D.H 3/24/98

10.35 **ALLOW** pump P-3125B to run for at least 30 minutes. At 10 minute intervals, **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D. J. 3-24-98

110 D.J 3/23/98
Point #3, ~~104~~ gpm, further increase in back pressure

10.36 **THROTTLE** flow control valve to increase motor speed approximately 200 rpm per SI-3125B. (Back off rpm if cavitation is found to occur at the flow control valve)
Test Engineer: D.J 3-24-98

10.37 **RECORD** the following data. **VERIFY** FIC-3125 reads ~~104~~ 110 D.J 3/23/98 ± ~~5~~ 7 gpm

10.37.1 Motor speed	SI-3125B	2300 RPM
10.37.2 Flow rate	FI-temp-1	104 GPM
10.37.3 Flow rate	FIC-3125	110 GPM
10.37.4 Pump inlet pressure	PI-3125B	57 psig
10.37.5 Pump discharge pressure	PI-3125D	409 psig

Test Engineer: D.J 3/24/98

10.38 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data:

10.38.1 Motor Freq	32.7	Hz
10.38.2 Motor Speed	62.9	%
10.38.3 Motor RPM	2265	RPM
10.38.4 Load A Amps	110	Amps
10.38.5 Load B Amps	110	Amps
10.38.6 Load C Amps	109	Amps
10.38.7 Load AB Volts	300	Volts
10.38.8 Load BC Volts	300	Volts
10.38.9 Load CA Volts	300	Volts
10.38.10 Power	50	Kilowatts

Test Engineer: D.J. 3-24-98

10.39 **RECORD** pump and system data on an Appendix G Data Sheet.
Test Engineer: D.J 3/24/98

10.40 ALLOW pump P-3125B to run for at least 30 minutes. At 10 minute intervals, RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: D.Y / 3-24-98

Point #4, 140 gpm, flow control valve full open

10.41 FULLY OPEN flow control valve V-temp-2.
Test Engineer: D.Y / 3-24-98

10.42 SET Fluid Flow Set Point value to 140 gpm.
Test Engineer: D.Y. / 3-24-98

10.43 RECORD the following data. VERIFY FIC-3125 reads 140 ± 7 gpm.

10.43.1 Motor speed	SI-3125B	2620	RPM
10.43.2 Flow rate	FI-temp-1	140	GPM
10.43.3 Flow rate	FIC-3125	140	GPM
10.43.4 Pump inlet pressure	PI-3125B	46	psig
10.43.5 Pump discharge pressure	PI-3125D	454	psig

Test Engineer: D.Y. 3/24/98

10.44 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data:

10.44.1 Motor Freq	43	Hz
10.44.2 Motor Speed	71.5	%
10.44.3 Motor RPM	2525	RPM
10.44.4 Load A Amps	127	Amps
10.44.5 Load B Amps	127	Amps
10.44.6 Load C Amps	127	Amps
10.44.7 Load AB Volts	354	Volts
10.44.8 Load BC Volts	350	Volts
10.44.9 Load CA Volts	390	Volts
10.44.10 Power	65	Kilowatts

Test Engineer: D.Y. / 3-24-98

10.45 RECORD pump and system data on an Appendix G Data Sheet.
Test Engineer: D.Y / 3-24-98

10.46 ALLOW pump P-3125B to run for at least 30 minutes. At 10 minute intervals, RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: D.G / 3-24-98

Point #5, 140 gpm, increase back pressure on pump to verify flow control feedback increases pump motor speed and horsepower to meet the required flow.

10.47 THROTTLE flow control valve to increase motor speed approximately 100 rpm per SI-3125B.
Test Engineer: D.G / 3-24-98

10.48 RECORD the following data. VERIFY FIC-3125 reads 140 ± 7 gpm

10.48.1 Motor speed	SI-3125B	2720	RPM
10.48.2 Flow rate	FI-temp-1	138	GPM
10.48.3 Flow rate	FIC-3125	140	GPM
10.48.4 Pump inlet pressure	PI-3125B	46	psig
10.48.5 Pump discharge pressure	PI-3125D	505	psig

Test Engineer: D.G / 3-24-98

10.49 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. RECORD the following data:

10.49.1 Motor Freq	49.9	Hz
10.49.2 Motor Speed	74.5	%
10.49.3 Motor RPM	2673	RPM
10.49.4 Load A Amps	133	Amps
10.49.5 Load B Amps	133	Amps
10.49.6 Load C Amps	133	Amps
10.49.7 Load AB Volts	365	Volts
10.49.8 Load BC Volts	350	Volts
10.49.9 Load CA Volts	350	Volts
10.49.10 Power	76	Kilowatts

Test Engineer: D.G / 3-24-98

10.50 RECORD pump and system data on an Appendix G Data Sheet.
Test Engineer: D.G / 3-24-98

10.51 **ALLOW** pump P-3125B to run for at least 30 minutes. At 10 minute intervals, **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.G 3/24/98

Point #6, 140 gpm, further increase in back pressure

10.52 **THROTTLE** flow control valve to increase motor speed approximately 200 rpm per SI-3125B. (Back off rpm if cavitation is found to occur at the flow control valve)
Test Engineer: D.G. 3/24/98

10.53 **RECORD** the following data. **VERIFY** FIC-3125 reads 140 ± 7 gpm

10.53.1 Motor speed	SI-3125B	2900	RPM
10.53.2 Flow rate	FI-temp-1	122	GPM
10.53.3 Flow rate	FIC-3125	140	GPM
10.53.4 Pump inlet pressure	PI-3125B	46	psig
10.53.5 Pump discharge pressure	PI-3125D	610	psig

Test Engineer: D.G. / 3-24-98

10.54 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data:

10.54.1 Motor Freq	48.1	Hz
10.54.2 Motor Speed	80	%
10.54.3 Motor RPM	2883	RPM
10.54.4 Load A Amps	146	Amps
10.54.5 Load B Amps	144	Amps
10.54.6 Load C Amps	145	Amps
10.54.7 Load AB Volts	388	Volts
10.54.8 Load BC Volts	374	Volts
10.54.9 Load CA Volts	374	Volts
10.54.10 Power	88	Kilowatts

Test Engineer: D.G / 3-24-98

10.55 **RECORD** pump and system data on an Appendix G Data Sheet.
Test Engineer: D.G. / 3-24-98

10.56 **ALLOW** pump P-3125B to run for at least 30 minutes. At 10 minute intervals, **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.Y / 3-24-98

155 D.Y 3/24/98
Point #7, ~~160~~ gpm, flow control valve full open

10.57 **FULLY OPEN** flow control valve V-temp-2.
Test Engineer: D.Y. / 3-24-98

10.58 **SET** Fluid Flow Set Point value to ~~160~~ 155 D.Y 3/24/98 gpm.
Test Engineer: D.Y. / 3-24-98

10.59 **RECORD** the following data. **VERIFY** FIC-3125 reads ~~160~~ 155 D.Y 3/23/98 ± 7 gpm.

10.59.1 Motor speed	SI-3125B	2830	RPM
10.59.2 Flow rate	FI-temp-1	151	GPM
10.59.3 Flow rate	FIC-3125	155	GPM
10.59.4 Pump inlet pressure	PI-3125B	41	psig
10.59.5 Pump discharge pressure	PI-3125D	522	psig

Test Engineer: D.Y / 3-24-98

10.60 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data:

10.60.1 Motor Freq	46.6	Hz
10.60.2 Motor Speed	~~81.2~~	% 81.7 D.Y / 3-24-98
10.60.3 Motor RPM	2799	RPM
10.60.4 Load A Amps	140	Amps
10.60.5 Load B Amps	141	Amps
10.60.6 Load C Amps	142	Amps
10.60.7 Load AB Volts	380	Volts
10.60.8 Load BC Volts	320	Volts
10.60.9 Load CA Volts	369	Volts
10.60.10 Power	48	Kilowatts

Test Engineer: D.Y / 3-24-98

10.61 **RECORD** pump and system data on an Appendix G Data Sheet.
Test Engineer: D.Y 3/24/98

10.62 **ALLOW** pump P-3125B to run for at least 30 minutes. At 10 minute intervals, **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.G 3/24/98

155 D.G 3/23/98
Point #8, ~~160~~ gpm, increase back pressure on pump to verify flow control feedback increases pump motor speed and horsepower to meet the required flow.

10.63 **THROTTLE** flow control valve to increase motor speed approximately 100 rpm per SI-3125B.
Test Engineer: D.G / 3-24-98

10.64 **RECORD** the following data. **VERIFY** FIC-3125 reads ~~160~~ 155 D.G. 3/23/98 ± 8 7 gpm

10.64.1 Motor speed	SI-3125B	2930 RPM
10.64.2 Flow rate	FI-temp-1	151 GPM
10.64.3 Flow rate	FIC-3125	155 GPM
10.64.4 Pump inlet pressure	PI-3125B	40 psig
10.64.5 Pump discharge pressure	PI-3125D	570 psig

Test Engineer: D.G / 3-24-98

10.65 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data:

10.65.1 Motor Freq	48.1 Hz
10.65.2 Motor Speed	80.1 %
10.65.3 Motor RPM	2885 RPM
10.65.4 Load A Amps	146 Amps
10.65.5 Load B Amps	146 Amps
10.65.6 Load C Amps	146 Amps
10.65.7 Load AB Volts	386 Volts
10.65.8 Load BC Volts	381 Volts
10.65.9 Load CA Volts	376 Volts
10.65.10 Power	93 Kilowatts

Test Engineer: D.G / 3-24-98

10.66 **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.G. / 3-24-98

10.67 **ALLOW** pump P-3125B to run for at least 30 minutes. At 10 minute intervals, **RECORD** pump and system data on an Appendix G Data Sheet
Test Engineer: D.Y. 3/24/98

Point #9, ~~160~~ 155 D.Y 3/23/98 gpm, further increase in back pressure

10.68 **THROTTLE** flow control valve to increase motor speed approximately 200 rpm per SI-3125B. (Back off rpm if cavitation is found to occur at the flow control valve)
Test Engineer: D.Y. 3/24/98

10.69 **RECORD** the following data. **VERIFY** FIC-3125 reads ~~160~~ 155 D.Y 3/23/98 ± ~~8~~ 7 gpm

10.69.1 Motor speed	SI-3125B	3130	RPM
10.69.2 Flow rate	FI-temp-1	145	GPM
10.69.3 Flow rate	FIC-3125	155	GPM
10.69.4 Pump inlet pressure	PI-3125B	40	psig
10.69.5 Pump discharge pressure	PI-3125D	685	psig

Test Engineer: D.G. 3/24/98

10.70 After flow rate as read from FIC-3125 stabilizes, **STOP** datalogging of the flow signal and the signal to the VSD.
Test Engineer: D.Y. 3/24/98

10.71 On VSD-2 keypad, use the LINE key and Programming and Monitoring UP and DOWN arrows to toggle thru the displayable quantities. Use the RIGHT arrow as required. **RECORD** the following data:

10.71.1 Motor Freq	51.5	Hz
10.71.2 Motor Speed	85.9	%
10.71.3 Motor RPM	3095	RPM
10.71.4 Load A Amps	163	Amps
10.71.5 Load B Amps	164	Amps
10.71.6 Load C Amps	163	Amps
10.71.7 Load AB Volts	410	Volts
10.71.8 Load BC Volts	409	Volts
10.71.9 Load CA Volts	401	Volts
10.71.10 Power	100	Kilowatts

Test Engineer: D.G. 3/24/98

10.72 RECORD pump and system data on an Appendix G Data Sheet.
Test Engineer: D.H. 3/24/98

10.73 ALLOW pump P-3125B to run for at least 30 minutes. At 10 minute intervals, RECORD pump and system data on an Appendix G Data Sheet
Test Engineer: D.H. 3/24/98

Stop P-3125B

10.74 RECORD final PID-flow parameters for Booster Pump P-3125B.

P = 0.80
I = 0.06 1/sec
D = 0 sec

Test Engineer: D.H. 3/24/98

10.75 PRESS the STOP button on MCS screen PCU-2 for Booster Pump P-3125B.

10.76 VERIFY locally that P-3125B has stopped.
Test Engineer: D.H. 3/24/98

10.77 VERIFY ENABLE ENERGIZED and OFF are illuminated on MCS screen PCU-2 for Booster Pump P-3125B.
Test Engineer: D.H 3/24/98

10.78 CLOSE flow control valve V-temp-2
Test Engineer: D.H. 3/24/98

10.79 CLOSE V-temp-1
Test Engineer: D.H. 3/24/98

10.80 TURN OFF supply pump.

11.0 Transfer Loop Vent and Drain

The transfer loop will be vented and the water will be allowed to drain back to the temporary water reservoir. The water that remains in the piping at a lower elevation than the water reservoir will be drained to the Diversion Box sump by removing the temporary jumpers and pumping out.

11.1 **RECORD** the line pressures at each vent line:

11.1.1 PI-3126A 44 psig
11.1.2 PI-3126B 36 psig

NOTE: Sulzer Bingham has recommended the booster pumps remain filled with water. Therefore the pump isolation SOV's will be closed and the pump bypass SOV opened to allow drainage.

11.2 **POSITION** the following SOV's as indicated.

11.2.1	SOV-3125E	CLOSED	Test Engineer: D.H	3/27/98
11.2.2	SOV-3125C	CLOSED	Test Engineer: D.H	3/27/98
11.2.3	SOV-3125G	CLOSED	Test Engineer: D.H	3/27/98
11.2.4	SOV-3125D	CLOSED	Test Engineer: D.H	3/27/98
11.2.5	SOV-3163	OPEN	Test Engineer: D.H	3/27/98

11.3 **POSITION** the following SOV's to manual mode by turning the lever at each valve actuator to **ENGAGE**.

11.3.1	SOV-3125E	ENGAGE	Test Engineer: D.H	3/27/98
11.3.2	SOV-3125C	ENGAGE	Test Engineer: D.H	3/27/98
11.3.3	SOV-3125G	ENGAGE	Test Engineer: D.H	3/27/98
11.3.4	SOV-3125D	ENGAGE	Test Engineer: D.H	3/27/98
11.3.5	SOV-3163	ENGAGE	Test Engineer: D.H	3/27/98

11.4 **CREATE** a clear flow path for water to drain back thru the supply jumper by either disconnecting or bypassing supply pump, or removing pressure control valve.
Test Engineer: D.H 3/27/98

11.5 **REMOVE** the submerged end of the discharge jumper from the water reservoir.
Test Engineer: D.H 3/27/98

11.6 OPEN the temporary supply valve and flow control valve.

11.6.1	V-temp-1	OPEN	Test Engineer:	D.G 3/27/98
11.6.2	V-temp-2	OPEN	Test Engineer:	D.G. 3/27/98

11.7 VERIFY the line pressures at each vent line are 0 psig or less:

11.7.1 PI-3126A ~12 psig 2 psig } during draining E.P.
11.7.2 PI-3126B ~21 psig ~7 psig }

NOTE: If the pressures recorded in the previous step are greater than 0 psig, an interlock will prevent the transfer line vent valves from opening.

11.8 OPEN the vent valves for both the slurry line and supernate line:

11.8.1	SOV-3185A	OPEN	Test Engineer:	D.G 3/27/98
11.8.2	SOV-3185B	OPEN	Test Engineer:	D.G. 3/27/98
11.8.3	SOV-3168A	OPEN	Test Engineer:	D.G 3/27/98
11.8.4	SOV-3168B	OPEN	Test Engineer:	D.G 3/27/98

13:32 @ 35 GPM (*)

NOTE: Assuming each line drains at a rate of 35 gallons per minute, it will take approximately 2 hours to drain the transfer loop. (Record time) 13:32 3/27/98
D.G 3/26/98

11.9 ALLOW the lines to drain until flow stops. (RECORD TIME 15:52

11.10 DRAIN water remaining in the piping to the Diversion Box sump by removing the supply and discharge jumpers from the Hiltap connectors.
Test Engineer: D.G 3/30/98

11.11 PUMP residual water out of the transfer lines.
Test Engineer: D.G 3/30/98

11.12 PUMP OUT any water standing in the Diversion Box sump.
Test Engineer: D.G 3/30/98

11.13 Remove temporary filter assemblies AND VISUALLY INSPECT FOR ANY SIGN OF HUMIDITY D.G 3/26/98

(*) Note: measured at FI-Temp 1 E.P

	Observation
SNL FILTER	DRY
SLL FILTER	DRY

12.0 Post-Test Conditions

12.1 **REINSTALL** Hiltap connector caps in accordance with manufacturer's instructions. **TIGHTEN** set screws on those with that feature.
Test Engineer: Doug Hall

12.2 **REMOVE** the "blue tags" from the manual valve actuators on the following SOV's:

12.2.1	SOV-3182A	Test Director: E.P 3/30/98
12.2.2	SOV-3182B	Test Director: E.P
12.2.3	SOV-3183A	Test Director: E.P
12.2.4	SOV-3183B	Test Director: E.P
12.2.5	SOV-3166A	Test Director: E.P
12.2.6	SOV-3166B	Test Director: E.P

12.3 **RE-CONNECT** the air supply hose to the following SOV's. AIR LINES WERE NOT DISCONNECTED D.H. 3/27/98

12.3.1	SOV-3182A	Test Engineer:
12.3.2	SOV-3182B	Test Engineer:
12.3.3	SOV-3183A	Test Engineer:
12.3.4	SOV-3183B	Test Engineer:
12.3.5	SOV-3166A	Test Engineer:
12.3.6	SOV-3166B	Test Engineer:

12.4 IF directed by Test Director, reattach P-102-SY-02A motor leads per normal plant procedure.
Test Director: [signature]

12.5 **REMOVE** the normally open software jumper in series with N19:2/13 VALVE FAILURE Alarm for SOV-3183A.
Test Engineer: D.H 3/27/98

12.6 **REMOVE** the normally open software jumper in series with N19:2/12 VALVE FAILURE Alarm for SOV-3183B.
Test Engineer: D.H. 3/27/98

12.7 **REMOVE** the normally open software jumper in series with B3/92 VALVE FAILURE Alarm for SOV-3166B.
Test Engineer: D.H 3/27/98

12.8 **REMOVE** the FORCE (in the MCS software) of the associated bits for the following valves.

Valve No.	Description	Forced Position	Initial (Verify Removed)
SOV-3183A	WT-SLL-3160 at Diversion Box	OPEN	D.G. 3/27/98
SOV-3183B	WT-SLL-3160 at Diversion Box	OPEN	D.G.
SOV-3166B	WT-SLL-3160 at Vent Station	OPEN	D.G

Test Engineer: D.G. 3/27/98

12.9 **REMOVE** the normally open software jumper on in series with N19:2/10 VALVE FAILURE Alarm for SOV-3184.
Test Engineer: D.G. 3/27/98

12.10 **REMOVE** the normally open software jumper in series with B3/80 VALVE FAILURE Alarm for SOV-3165A.
Test Engineer: D.G. 3/27/98

12.11 **REMOVE** the FORCE (in the MCS software) of the associated bits for the following valves.

Valve No.	Description	Forced Position	Initial (Verify Removed)
SOV-3184	WT-SNL-3150 at Diversion Box	CLOSED	D.G.
SOV-3165A	WT-SNL-3150 at Vent Station	CLOSED	D.G

Test Engineer: D.G 3/27/98

12.12 **REMOVE** the normally open software jumper in series with N19:4/9 VALVE FAILURE Alarm for MOV-845.
Test Engineer: D.G. 3/27/98

12.13 **REMOVE** the FORCE (in the MCS software) of the associated bits for the following valves.

Valve No.	Description	Forced Position	Initial (Verify Removed)
MOV-844	WT-SLL-3160 Motor Operated 3-Way Valve at 244A Lift Station	A ⇨ B	D.G.
MOV-845	WT-SLL-3160 Motor Operated Valve at 244A Lift Station	OPEN	D.G.

Test Engineer: D.G. 3/27/98

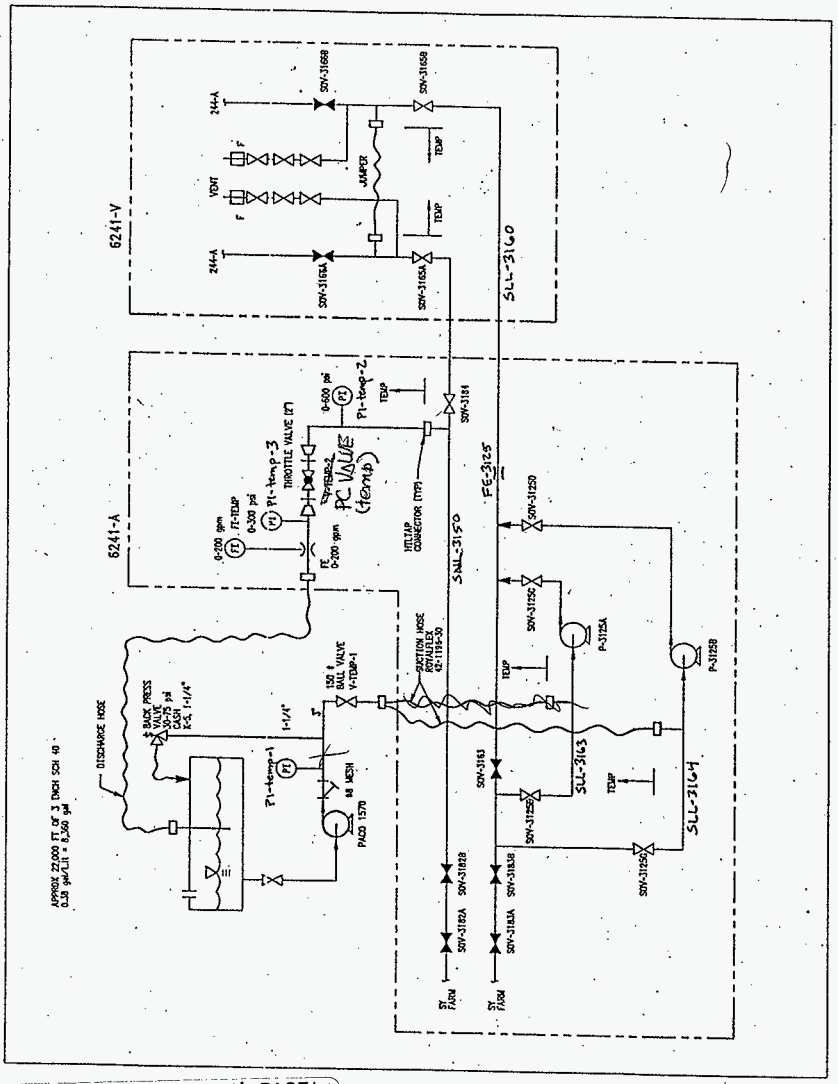
12.14 **REMOVE** any software jumpers or forced bits in the MCS software placed into service as a result of a RED box when initiating a Transfer Scheme. **RECORD** in Test Log.

Test Engineer: D.G. 3/27/98

12.15 REMOVE THE TWO JUMPERS IN J8-1 AT 244A WHICH SIMULATE ~~AD~~ RUPTURE DISCS PSE-841 & PSE-842 ARE INSTALLED. D.G. 3/27/98 D.G. 2/2/98

12.16 REMOVE ALL FORCES FROM MCS SOFTWARE (2006 MASTER SHUTDOWN) D.G. 3/27/98

APPENDIX A - TEST SETUP



APPENDIX B - Instrumentation Requiring Calibration Verification*				
Equipment Number	Functional Description	Calibration Date	Calibration Due Date	Signature & Date
FE-3125	Slurry Line 3160 Flow Element (comprised of FE-3125R receiver and FE-3125T transmitter)	11/17/97	None *1	YAL
FI-3125A1	Booster pump P-3125A outboard seal supply flow indicator	8-12-97	8-12-98	Ronald Arnold 12-12-97
FI-3125A2	Booster pump P-3125A inboard seal supply flow indicator	8-12-97	8-12-98	Ronald Arnold 12-12-97
FI-3125B1	Booster pump P-3125B outboard seal supply flow indicator	8-12-97	8-12-98	Ronald Arnold 12-12-97
FI-3125B2	Booster pump P-3125B inboard seal supply flow indicator	8-12-97	8-12-98	Ronald Arnold 12-12-97

*see continuation page for list of instruments whose calibration has been previously verified.

*1 Per ultrasonic flowmeter vendor, PANAmetrics, FE-3125 requires no future calibration.

THE FOLLOWING VIBRATION TRANSMITTERS WERE CALIBRATED ON 1/16/98 AT THE MANUFACTURER'S FACILITY METRIX INSTRUMENT CO.

VT-3125A1 SERIAL # 15192
VT-3125A2 SERIAL # 17398
VT-3125B1 SERIAL # 15191
VT-3125B2 SERIAL # 15193

APPENDIX B (CONTINUED)

All remaining instrumentation requiring calibration for the performance of this test have been previously verified in earlier pre-operational test procedures. The instrument and the test where verification occurred is listed below.

EQUIPMENT NUMBER	TEST WHERE VERIFICATION OCCURRED	ALTERNATE REFERENCE
PI-3108A	HNF-1553	POTP-002
PI-3125A1	HNF-1553	POTP-002
PI-3125A2	HNF-1553	POTP-002
PI-3125B1	HNF-1553	POTP-002
PI-3125B2	HNF-1553	POTP-002
PI-3108B	HNF-1554	POTP-003
PT-3125A	HNF-1555	POTP-004
PT-3125B	HNF-1555	POTP-004
PT-3125C	HNF-1555	POTP-004
PT-3125D	HNF-1555	POTP-004
PT-3126B	HNF-1555	POTP-004
PT-3168	HNF-1555	POTP-004
PT-3125E	HNF-1556	POTP-005
PT-3126A	HNF-1556	POTP-005
PT-3173	HNF-1556	POTP-005
PT-3167	HNF-1556	POTP-005
PT-3185	HNF-1556	POTP-005

2/11/98 REVERIFIED

APPENDIX C - Loop Test Initial Instrument Air and Manual Valve Alignment

VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	INITIALS
Diversion Box Instrument Air System Valves			
IA-V-3101A	SOV air supply isolation valve	OPEN	GaL
IA-V-3102A	Booster pump seal air supply isolation valve	CLOSED	GaL
IA-V-3103A	Future supply isolation valve	CLOSED	GaL
IA-V-3104A	PI-3104A instrument isolation valve	OPEN	GaL
IA-V-3105A	PCV-3100A inlet isolation valve	CLOSED	GaL
IA-V-3106A	PCV-3100A outlet isolation valve	OPEN	GaL
IA-V-3108A	PI-3108A instrument isolation valve	OPEN	GaL
IA-V-3113A	Pump seal control panel WT-PNL-3125A1 inlet isolation	OPEN	GaL
IA-V-3107A	Pump seal control panel WT-PNL-3125A2 inlet isolation	OPEN	GaL
IA-V-3114A	Pump seal control panel WT-PNL-3125B1 inlet isolation	OPEN	GaL
IA-V-3109A	Pump seal control panel WT-PNL-3125B2 inlet isolation	OPEN	GaL
IA-V-3115A	Pump seal control panel WT-PNL-3125A1 exit valve	OPEN	GaL
IA-V-3116A	Pump seal control panel WT-PNL-3125A2 exit valve	OPEN	GaL
IA-V-3117A	Pump seal control panel WT-PNL-3125B1 exit valve	OPEN	GaL
IA-V-3118A	Pump seal control panel WT-PNL-3125B2 exit valve	OPEN	GaL
DR-3100A	Air Receiver drain valve	CLOSED	GaL
Vent Station Instrument Air System Valves			
IA-V-3101B	SOV air supply isolation valve	OPEN	GaL
IA-V-3102B	Future supply isolation valve	CLOSED	GaL
IA-V-3103B	Future supply isolation valve	CLOSED	GaL
IA-V-3104B	PI-3104B instrument isolation valve	OPEN	GaL
IA-V-3105B	PCV-3100B inlet isolation valve	CLOSED	GaL
IA-V-3106B	PCV-3100B outlet isolation valve	OPEN	GaL
IA-V-3107B	PI-3108B instrument isolation valve	OPEN	GaL
DR-3100B	Air receiver drain valve	CLOSED	GaL
		VERIFIED OPEN AT MCS	D.B 2/11/98
Slurry Line Manual Valves		VALVES ARE ALL OPEN FOR RETEST AS INTERLOCKS ARE ALREADY TESTED	
V-3183	PT-3183 isolation valve, SLL-3160, Diversion Box	OPEN	GaL
V-3125A	PT-3125A isolation valve, Pump P-3125A intake, SLL-3163, Diversion Box	CLOSED	GaL

APPENDIX C - Loop Test Initial Instrument Air and Manual Valve Alignment			
VALVE NUMBER	DESCRIPTION	REQUIRED POSITION	INITIALS
V-3125B	PT-3125B isolation valve, Pump P-3125B intake, SLL-3164, Diversion Box	CLOSED	GaL
V-3125C	PT-3125C isolation valve, Pump P-3125A discharge, SLL-3163, Diversion Box 6421-A	CLOSED	GaL
V-3125D	PT-3125D isolation valve, Pump P-3125B discharge, SLL-3164, Diversion Box 6241-A	CLOSED	GaL
V-3126B	PT-3126B isolation valve, SLL-3160, Vent Station	OPEN	GaL
V-3168	PT-3168 isolation valve, Vent Line SLL-3160, Vent Station	OPEN	GaL
V-3157G	HEPA filter isolation valve, Vent Line VTL-3160, Vent Station	OPEN	GaL
			GaL 12/11/97
Supernate Line Manual Valves – SEE NOTE ON SLURRY LINE VALVES			
V-3182	PT-3182 isolation valve, SNL-3150, Diversion Box	OPEN	GaL
V-3125E	PT-3125E isolation valve, SNL-3150, Diversion Box	CLOSED	GaL
V-3173	PT-3173 isolation valve, Sump Line SNL-3151, Diversion Box	OPEN	GaL
V-3126A	PT-3126A isolation valve, SNL-3150, Vent Station	CLOSED	GaL
V-3185	PT-3185 isolation valve, Vent Line SNL-3152, Vent Station	CLOSED	GaL
V-3167	PT-3167 isolation valve, Sump Line SNL-3153, Vent Station	OPEN	GaL
V-3157H	HEPA filter isolation valve, Vent Line VTL-3152, Vent Station	OPEN	GaL

Performed by: Sandra Smith / Lonnie J Steadman — PRINT NAME — SS / LJS — INITIALS — 12/12/97 / 12/12/97 — DATE

Verified by: GA Leshikar — PRINT NAME — GaL — INITIALS — 12/12/97 — DATE

QC. Ronald ARNDT — RA — 12-12-97

APPENDIX D - Electrical Alignment			
BREAKER NUMBER	BREAKER NAME AND LOCATION	REQUIRED POSITION	INITIALS
~~CB-6~~ IS CB2-10 DG	Diversion Box Panelboard PP-3 supply breaker in Switchboard SB-1	CLOSED	PLP WAJ
~~CB-7~~ IS CB2-5	Diversion Box Air Compressor supply breaker in Switchboard SB-1	CLOSED	PLP WAJ
CB-2 ~~CB-3~~	Vent Station Panelboard PP-3 supply breaker in Distribution Panelboard DP-1	CLOSED	WAJ PLD
CB-3 ~~CB-2~~	Vent Station Air Compressor supply breaker in Distribution Panelboard DP-1	CLOSED	WAJ PLD
~~CB-4~~ CB 1-3	Diversion Box Switchboard breaker in SB-1 for VSD-1.	CLOSED	WAJ PLD
~~CB-5~~ CB 1-2	Diversion Box Switchboard breaker in SB-1 for VSD-2.	CLOSED	PLD WAJ
CB-2-6	Diversion Box Switchboard breaker in SB-1 for Sump Pump P-3115	CLOSED	PLP WAJ
~~CB-7~~ CB-4 IS ON 4	Vent Station Distribution Panel breaker in DP-1 for Sump Pump P-3116	CLOSED	WAJ PLD
N/A	Vent Station Disconnect for Sump Pump P-3116.	CLOSED	PLD WAJ
N/A	Diversion Box Disconnect for Sump Pump P-3115.	CLOSED	WAJ PLD

RECORDED BY Performed by: William Johnson WAJ 2-11-98 12/12/97
PRINT NAME INITIALS DATE

REVERIFIED BY Verified by: Paul L Rathbusta PLP 02/22/98 12/12/97
PRINT NAME INITIALS DATE

SEE ECN-058-093

APPENDIX E - Loop Fill SOV and MOV Alignment

VALVE NO.	DESCRIPTION	MCS POSITION	INITIALS	SOV LEVER POSITION	LOCAL POSITION	INITIALS
NOTE: On MCS, valve position is given by color and fill of valve on computer screen. White, designates CLOSED; Green, designates OPEN, Red, designates FAILED. Local indication (OPEN/CLOSED) is given by valve cap position indicator on SOV's. Lever position ENGAGE places valve in manual mode, DISENGAGE allows MCS control.						
Solenoid Operated Valves in Diversion Box — REVERIFIED FOR RETEST						
SOV-3182A	SNL-3150	CLOSED	D.G. DG	ENGAGE-MAN	CLOSED	GE
SOV-3182B	SNL-3150	CLOSED	D.G. DG	ENGAGE-MAN	CLOSED	GE
SOV-3184	SNL-3150	CLOSED	D.G. DG	* DISENGAGE	OPEN	GE
SOV-3173A	Sump Line SNL-3151	CLOSED	D.G. DG	DISENGAGE	CLOSED	GE
SOV-3173B	Sump Line SNL-3151	CLOSED	D.G. DG	DISENGAGE	CLOSED	GE
SOV-3183A	SLL-3160	OPEN	D.G. DG	ENGAGE-MAN	CLOSED	GE
SOV-3183B	SLL-3160	OPEN	DG	ENGAGE-MAN	CLOSED	GE
SOV-3163	Pump Bypass SLL-3160	OPEN	D.G. DG	DISENGAGE	OPEN	GE
SOV-3125E	P-3125A Intake SLL-3163	OPEN	D.G. DG	DISENGAGE	OPEN	GE
SOV-3125C	P-3125A Discharge SLL-3163	OPEN	D.G. DG	DISENGAGE	OPEN	GE
SOV-3125G	P-3125B Intake SLL-3164	OPEN	D.G. DG	DISENGAGE	OPEN	GE
SOV-3125D	P-3125B Discharge SLL-3164	OPEN	D.G. DG	DISENGAGE	OPEN	GE
Solenoid Operated Valves in Vent Station — REVERIFIED FOR RETEST 2/13/98						
SOV-3165A	SNL-3150	CLOSED	D.G. DG	~~DISENGAGE~~ ENGAGE	OPEN	DG
SOV-3166A	SNL-3150	CLOSED	D.G. DG	ENGAGE-MAN	CLOSED	D.G.
SOV-3185A	Vent Line SNL-3152	OPEN	D.G. DG	~~DISENGAGE~~ D.G. 2/13/98 ENGAGE	OPEN	D.G.
SOV-3185B	Vent Line SNL-3152	OPEN	D.G. DG	~~DISENGAGE~~ ENGAGE	OPEN	DG
SOV-3167A	Sump Line SNL-3153	CLOSED	D.G. DG	DISENGAGE	CLOSED	DG
SOV-3167B	Sump Line SNL-3153	CLOSED	D.G. DG	DISENGAGE	CLOSED	DG
SOV-3165B	SLL-3160	OPEN	D.G. DG	DISENGAGE	OPEN	DG
SOV-3166B	SLL-3160	OPEN	D.G. DG	ENGAGE-MAN	CLOSED	DG
SOV-3168A	Vent Line SLL-3160	CLOSED	D.G. DG	DISENGAGE	CLOSED	DG

* SOV-3184 & 3165A had to be Engaged & opened MANUALLY because the MCS could not do it. D.G. 2/13/98 MCS CONTROL OF VALVES removed

D.G. 2/13/98
REVERIFIED FOR RETEST

APPENDIX E - Loop Fill SOV and MOV Alignment

VALVE NO.	DESCRIPTION	MCS POSITION	INITIALS	SOV LEVER POSITION	LOCAL POSITION	INITIALS
SOV-3168B	Vent Line SLL-3160	CLOSED	D.G.	DISENGAGE	CLOSED	N/A
	Pump P-3125A Motor Operated Valves					
MOV-3125AA	P-3125A Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125AB	P-3125A Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125AC	P-3125A Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125AD	P-3125A Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125AE	P-3125A Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125AF	P-3125A Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125AG	P-3125A Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125AH	P-3125A Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125AJ	P-3125A Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125AK	P-3125A Vent Valve	OPEN	D.G.	N/A	OPEN	
	P-3125B Motor Operated Valves					
MOV-3125BA	P-3125B Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125BB	P-3125B Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125BC	P-3125B Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125BD	P-3125B Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125BE	P-3125B Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125BF	P-3125B Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125BG	P-3125B Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125BH	P-3125B Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125BJ	P-3125B Drain Valve	OPEN	D.G.	N/A	OPEN	
MOV-3125BK	P-3125B Vent Valve	OPEN	D.G.	N/A	OPEN	

Local Verifications by: M.C. Wingfield M.C.W. 12/17/97
PRINT NAME INITIALS DATE

MCS Verifications by: Doug Graham D.G. 12/18/97
PRINT NAME INITIALS DATE

APPENDIX F-1 - Transfer Scheme 2A Valve Alignment

VALVE NO.	DESCRIPTION	MCS POSITION	INITIALS	LOCAL POSITION	INITIALS
NOTE: On MCS, valve position is given by color and fill of valve on computer screen. White, designates CLOSED; Green, designates OPEN, Red, designates FAILED. Local indication (OPEN/CLOSED) is given by valve cap position indicator on SOV's.					
Solenoid Operated Valves in Diversion Box					
SOV-3182A	SNL-3150	CLOSED	DD.	CLOSED ✓	12/19
SOV-3182B	SNL-3150	CLOSED	D.D.	CLOSED ✓	
SOV-3184	SNL-3150	CLOSED	D.D.	OPEN ✓	
SOV-3173A	Sump Line SNL-3151	CLOSED	D.D.	CLOSED ✓	
SOV-3173B	Sump Line SNL-3151	CLOSED	D.D.	CLOSED ✓	
SOV-3183A	SLL-3160	OPEN	D.D.	CLOSED ✓	
SOV-3183B	SLL-3160	OPEN	D.D.	CLOSED ✓	
SOV-3163	Pump Bypass SLL-3160	CLOSED	D.D.	CLOSED ✓	
SOV-3125E	P-3125A Intake SLL-3163	~~CLOSED~~ OPEN	D.D.	~~CLOSED~~ OPEN OPEN	
SOV-3125C	P-3125A Discharge SLL-3163	~~CLOSED~~ OPEN	D.D.	~~CLOSED~~ OPEN OPEN	
SOV-3125G	P-3125B Intake SLL-3164	~~CLOSED~~ OPEN	D.D.	~~CLOSED~~ OPEN ✓	
SOV-3125D	P-3125B Discharge SLL-3164	CLOSED	D.D.	CLOSED ✓	
		CHANGED PER STEP 7.14			
Solenoid Operated Valves in Vent Station					
SOV-3165A	SNL-3150	CLOSED	D.D.	OPEN ✓	12/18
SOV-3166A	SNL-3150	CLOSED	D.D.	CLOSED ✓	
SOV-3185A	Vent Line SNL-3152	CLOSED	D.D.	CLOSED ✓	
SOV-3185B	Vent Line SNL-3152	CLOSED	D.D.	CLOSED ✓	
SOV-3167A	Sump Line SNL-3153	CLOSED	D.D.	CLOSED ✓	
SOV-3167B	Sump Line SNL-3153	CLOSED	D.D.	CLOSED ✓	
SOV-3165B	SLL-3160	OPEN	D.D.	OPEN ✓	
SOV-3166B	SLL-3160	OPEN	D.D.	CLOSED ✓	
SOV-3168A	Vent Line SLL-3160	CLOSED	D.D.	CLOSED ✓	
SOV-3168B	Vent Line SLL-3160	CLOSED	D.D.	CLOSED ✓	

APPENDIX F-1 - Transfer Scheme 2A Valve Alignment					
VALVE NO.	DESCRIPTION	MCS POSITION	INITIALS	LOCAL POSITION	INITIALS
Pump P-3125A Motor Operated Valves					
MOV-3125AA	P-3125A Drain Valve	CLOSED	D.H.	CLOSED ✓	12/19
MOV-3125AB	P-3125A Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125AC	P-3125A Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125AD	P-3125A Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125AE	P-3125A Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125AF	P-3125A Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125AG	P-3125A Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125AH	P-3125A Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125AJ	P-3125A Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125AK	P-3125A Vent Valve	CLOSED	D.H.	CLOSED ✓	
P-3125B Motor Operated Valves					
MOV-3125BA	P-3125B Drain Valve	CLOSED	D.H.	CLOSED ✓	12/19
MOV-3125BB	P-3125B Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125BC	P-3125B Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125BD	P-3125B Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125BE	P-3125B Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125BF	P-3125B Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125BG	P-3125B Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125BH	P-3125B Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125BJ	P-3125B Drain Valve	CLOSED	D.H.	CLOSED ✓	
MOV-3125BK	P-3125B Vent Valve	CLOSED	D.H.	CLOSED ✓	

Local Verifications by: J.E. DUNKS (PRINT NAME) — (INITIALS) — 12/19/97 (DATE) — 12/20/97
REVENTE 180 FOR RETEST D.H 2/13/98

Verifications by: P.J. ELMENDORF (PRINT NAME) — P/E (INITIALS) — 12.19.97 (DATE) — KW 12/20/97

APPENDIX F-2 - Transfer Scheme 2B Valve Alignment					
VALVE NO.	DESCRIPTION	MCS POSITION	INITIALS	LOCAL POSITION	INITIALS
NOTE: On MCS, valve position is given by color and fill of valve on computer screen. White, designates CLOSED; Green, designates OPEN, Red, designates FAILED. Local indication (OPEN/CLOSED) is given by valve cap position indicator on SOV's.					
Solenoid Operated Valves in Diversion Box					
SOV-3182A	SNL-3150	CLOSED	D.G 2/17/96	CLOSED	D.G 2/17/96
SOV-3182B	SNL-3150	CLOSED	D.G	CLOSED	
SOV-3184	SNL-3150	CLOSED	D.G	OPEN	
SOV-3173A	Sump Line SNL-3151	CLOSED	D.G.	CLOSED	
SOV-3173B	Sump Line SNL-3151	CLOSED	D.G.	CLOSED	
SOV-3183A	SLL-3160	OPEN	D.G.	CLOSED	
SOV-3183B	SLL-3160	OPEN	D.G.	CLOSED	
SOV-3163	Pump Bypass SLL-3160	CLOSED	D.G.	CLOSED	
SOV-3125E	P-3125A Intake SLL-3163	CLOSED	D.G.	CLOSED	
SOV-3125C	P-3125A Discharge SLL-3163	CLOSED	D.G.	CLOSED	
SOV-3125G	P-3125B Intake SLL-3164	~~CLOSED~~ OPEN	D.G.	~~CLOSED~~ OPEN	
SOV-3125D	P-3125B Discharge SLL-3164	~~CLOSED~~ OPEN	D.G.	~~CLOSED~~ OPEN	
		CHANGED PER STOP	8.16		
Solenoid Operated Valves in Vent Station					
SOV-3165A	SNL-3150	CLOSED	D.G.	OPEN	D.G 2/17/96
SOV-3166A	SNL-3150	CLOSED	D.G.	CLOSED	
SOV-3185A	Vent Line SNL-3152	CLOSED	D.G.	CLOSED	
SOV-3185B	Vent Line SNL-3152	CLOSED	D.G.	CLOSED	
SOV-3167A	Sump Line SNL-3153	CLOSED	D.G.	CLOSED	
SOV-3167B	Sump Line SNL-3153	CLOSED	D.G.	CLOSED	
SOV-3165B	SLL-3160	OPEN	D.G.	OPEN	
SOV-3166B	SLL-3160	OPEN	D.G.	CLOSED	
SOV-3168A	Vent Line SLL-3160	CLOSED	D.G.	CLOSED	
SOV-3168B	Vent Line SLL-3160	CLOSED	D.G.	CLOSED	

APPENDIX F-2 - Transfer Scheme 2B Valve Alignment					
VALVE NO.	DESCRIPTION	MCS POSITION	INITIALS	LOCAL POSITION	INITIALS
Pump P-3125A Motor Operated Valves					
MOV-3125AA	P-3125A Drain Valve	CLOSED	D.G. 2/17/98	CLOSED	D.G. 2/17/98
MOV-3125AB	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AC	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AD	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AE	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AF	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AG	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AH	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AJ	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AK	P-3125A Vent Valve	CLOSED		CLOSED	
P-3125B Motor Operated Valves					
MOV-3125BA	P-3125B Drain Valve	CLOSED	D.G. 2/17/98	CLOSED	D.G. 2/17/98
MOV-3125BB	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BC	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BD	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BE	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BF	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BG	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BH	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BJ	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BK	P-3125B Vent Valve	CLOSED		CLOSED	

Local Verifications by: Doug Geracie D.G. 2/17/98
PRINT NAME INITIALS DATE

Verifications by: Ken Willoughby KW 2/17/98
PRINT NAME INITIALS DATE

APPENDIX F-3 - Transfer Scheme 2A Valve Alignment					
VALVE NO.	DESCRIPTION	MCS POSITION	INITIALS	LOCAL POSITION	INITIALS
NOTE: On MCS, valve position is given by color and fill of valve on computer screen. White, designates CLOSED; Green, designates OPEN, Red, designates FAILED. Local indication (OPEN/CLOSED) is given by valve cap position indicator on SOV's.					
Solenoid Operated Valves in Diversion Box					
SOV-3182A	SNL-3150	CLOSED	D.G 2/26/98	CLOSED	D.G 2/26/98
SOV-3182B	SNL-3150	CLOSED		CLOSED	
SOV-3184	SNL-3150	CLOSED		OPEN	
SOV-3173A	Sump Line SNL-3151	CLOSED		CLOSED	
SOV-3173B	Sump Line SNL-3151	CLOSED		CLOSED	
SOV-3183A	SLL-3160	OPEN		CLOSED	
SOV-3183B	SLL-3160	OPEN		CLOSED	
SOV-3163	Pump Bypass SLL-3160	CLOSED		CLOSED	
SOV-3125E	P-3125A Intake SLL-3163	CLOSED		CLOSED	
SOV-3125C	P-3125A Discharge SLL-3163	CLOSED		CLOSED	
SOV-3125G	P-3125B Intake SLL-3164	CLOSED		CLOSED	
SOV-3125D	P-3125B Discharge SLL-3164	CLOSED		CLOSED	
Solenoid Operated Valves in Vent Station					
SOV-3165A	SNL-3150	CLOSED	D.G 2/26/98	OPEN	D.G 2/26/98
SOV-3166A	SNL-3150	CLOSED		CLOSED	
SOV-3185A	Vent Line SNL-3152	CLOSED		CLOSED	
SOV-3185B	Vent Line SNL-3152	CLOSED		CLOSED	
SOV-3167A	Sump Line SNL-3153	CLOSED		CLOSED	
SOV-3167B	Sump Line SNL-3153	CLOSED		CLOSED	
SOV-3165B	SLL-3160	OPEN		OPEN	
SOV-3166B	SLL-3160	OPEN		CLOSED	
SOV-3168A	Vent Line SLL-3160	CLOSED		CLOSED	
SOV-3168B	Vent Line SLL-3160	CLOSED		CLOSED	

APPENDIX F-3 - Transfer Scheme 2A Valve Alignment					
VALVE NO.	DESCRIPTION	MCS POSITION	INITIALS	LOCAL POSITION	INITIALS
Pump P-3125A Motor Operated Valves					
MOV-3125AA	P-3125A Drain Valve	CLOSED	D.D 2/26/98	CLOSED	D.D 2/26/98
MOV-3125AB	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AC	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AD	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AE	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AF	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AG	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AH	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AJ	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AK	P-3125A Vent Valve	CLOSED		CLOSED	
P-3125B Motor Operated Valves					
MOV-3125BA	P-3125B Drain Valve	CLOSED	D.D 2/26/98	CLOSED	D.D 2/26/98
MOV-3125BB	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BC	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BD	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BE	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BF	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BG	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BH	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BJ	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BK	P-3125B Vent Valve	CLOSED		CLOSED	

Local Verifications by: Doug Grenker (PRINT NAME) D.D. 2/26/98 (INITIALS) 2/26/98 (DATE)

Verifications by: Doug Grenker (PRINT NAME) D.D (INITIALS) 2/26/98 (DATE)

APPENDIX F-4 - Transfer Scheme 2B Valve Alignment

VALVE NO.	DESCRIPTION	MCS POSITION	INITIALS	LOCAL POSITION	INITIALS
NOTE: On MCS, valve position is given by color and fill of valve on computer screen. White, designates CLOSED; Green, designates OPEN, Red, designates FAILED. Local indication (OPEN/CLOSED) is given by valve cap position indicator on SOV's.					
Solenoid Operated Valves in Diversion Box					
SOV-3182A	SNL-3150	D.J.P. 3/24/98 ~~CLOSED~~ FORCED OPEN	D.J.P. 3/24/98	CLOSED	J.E. 3/24/98
SOV-3182B	SNL-3150	~~CLOSED~~ FORCED OPEN		CLOSED	
SOV-3184	SNL-3150	~~CLOSED~~ OPEN		OPEN	
SOV-3173A	Sump Line SNL-3151	CLOSED		CLOSED	
SOV-3173B	Sump Line SNL-3151	CLOSED		CLOSED	
SOV-3183A	SLL-3160	FORCED OPEN		CLOSED	
SOV-3183B	SLL-3160	D.J.P. 3/24/98 FORCED OPEN		CLOSED	
SOV-3163	Pump Bypass SLL-3160	CLOSED		CLOSED	
SOV-3125E	P-3125A Intake SLL-3163	CLOSED		CLOSED	
SOV-3125C	P-3125A Discharge SLL-3163	CLOSED		CLOSED	
SOV-3125G	P-3125B Intake SLL-3164	CLOSED		CLOSED	
SOV-3125D	P-3125B Discharge SLL-3164	CLOSED		CLOSED	
Solenoid Operated Valves in Vent Station					
SOV-3165A	SNL-3150	D.J.P. 3/24/98 OPEN ~~CLOSED~~	D.A. 3/24/98	OPEN	J.E. 3/24/98
SOV-3166A	SNL-3150	~~CLOSED~~ FORCED OPEN		CLOSED	J.E.
SOV-3185A	Vent Line SNL-3152	CLOSED		CLOSED	J.E.
SOV-3185B	Vent Line SNL-3152	CLOSED		CLOSED	J.E.
SOV-3167A	Sump Line SNL-3153	CLOSED		CLOSED	J.E.
SOV-3167B	Sump Line SNL-3153	CLOSED		CLOSED	J.E.
SOV-3165B	SLL-3160	OPEN		OPEN	J.E.
SOV-3166B	SLL-3160	D.J.P. 3/24/98 FORCED OPEN		CLOSED	J.E.
SOV-3168A	Vent Line SLL-3160	CLOSED		CLOSED	J.E.
SOV-3168B	Vent Line SLL-3160	CLOSED		CLOSED	J.E.

APPENDIX F-4 - Transfer Scheme 2B Valve Alignment					
VALVE NO.	DESCRIPTION	MCS POSITION	INITIALS	LOCAL POSITION	INITIALS
Pump P-3125A Motor Operated Valves					
MOV-3125AA	P-3125A Drain Valve	CLOSED	D.G. 3/24/98	CLOSED	GE 3/24/98
MOV-3125AB	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AC	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AD	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AE	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AF	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AG	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AH	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AJ	P-3125A Drain Valve	CLOSED		CLOSED	
MOV-3125AK	P-3125A Vent Valve	CLOSED		CLOSED	
P-3125B Motor Operated Valves					
MOV-3125BA	P-3125B Drain Valve	CLOSED	D.G. 3/24/98	CLOSED	GE 3/24/98
MOV-3125BB	P-3125B Drain Valve	CLOSED		CLOSED	GE 3/24/98
MOV-3125BC	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BD	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BE	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BF	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BG	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BH	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BJ	P-3125B Drain Valve	CLOSED		CLOSED	
MOV-3125BK	P-3125B Vent Valve	CLOSED		CLOSED	

Local Verifications by: Gene Erlandson (PRINT NAME) GE (INITIALS) 3/24/98 (DATE)

Verifications by: Doug Cenkowski (PRINT NAME) D.G. (INITIALS) 3/24/98 (DATE)

SOFTO SPEER

Appendix G - System Data Sheet

Item	Description					
Pump ID	P-3125A or B	P-3125A	P-3125A			
Proc. Step No.	Procedure Step Number	7.30	7.32			
Date	Date	2/13/98	2/13/98			
Time	Time, hr:min	19:05	19:15			
Test Instrumentation						
FI-temp	System Flow, gpm	98	105			
PI-temp-1	Supply Pressure, psig	55	55			
PI-temp-2	Press. upstream V-temp-2, psig	68	65			
PI-temp-3	Return Pressure, psig	1→5	3to9			
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	64	65			
3125A2, B2	Drive End Bearing Temp, °F	66	71			
SI-3125A, B	Motor Speed, rpm	1715	1726			
VI-3125A1, B1	Thrust End Vibration, mils	0.01	0.01			
VI-3125A2, B2	Drive End Vibration, mils	0.01	0.01			
FIC-3125 PV	Fluid Flow Present Value, gpm	101	99			
FIC-3125 SP	Fluid Flow Set Point, gpm	120	120			
TI-3125A	Fluid Temp, °F	62	62			
PI-3125A, B	Fluid Inlet Pressure, psig	58	59			
PI-3125C, D	Fluid Outlet Pressure, psig	260	262			
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	125	128			
TI-3126B	SLL-3160 Temp, Vent Sta, °F	64	52			
TI-3126A (*)	SNL-3150 Temp, Vent Sta, °F	52	62			
TI-3125B	SNL-3150 Temp, Div Box, °F	59	68			

LOCAL TANK TEMP 62 °F

(Make copies of this sheet as required)

(*) Note: TI-3126A located in dead leg of SNL; not representative of circuit temperature. E.A

Data Recorder: DOUG GERKER (PRINT NAME) DJG (INITIALS) 2/13/98 (DATE)

60% SPEED

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125A	P-3125A			
Proc. Step No.	Procedure Step Number	7.40	7.41			
Date	Date	2/13/98	2/13/98			
Time	Time, hr:min	19:45	19:55			
Test Instrumentation						
FI-temp	System Flow, gpm	119	121			
PI-temp-1	Supply Pressure, psig	48	48			
PI-temp-2	Press. upstream V-temp-2, psig	0	0			
PI-temp-3	Return Pressure, psig	0	0			
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	67	68			
3125A2, B2	Drive End Bearing Temp, °F	75	76			
SI-3125A, B	Motor Speed, rpm	2094	2082			
VI-3125A1, B1	Thrust End Vibration, mils	0.02	0.02			
VI-3125A2, B2	Drive End Vibration, mils	0.02	0.02			
FIC-3125 PV	Fluid Flow Present Value, gpm	125	124			
FIC-3125 SP	Fluid Flow Set Point, gpm	144	144			
TI-3125A	Fluid Temp, °F	64	65			
PI-3125A, B	Fluid Inlet Pressure, psig	50	49			
PI-3125C, D	Fluid Outlet Pressure, psig	315	316			
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	128	128			
TI-3126B	SLL-3160 Temp, Vent Sta, °F	62	62			
TI-3126A	SNL-3150 Temp, Vent Sta, °F	52	52			
TI-3125B	SNL-3150 Temp, Div Box, °F	~~68~~ 64	64			

DD 2/13/98

(Make copies of this sheet as required)

Data Recorder: DOUG GERLEP (PRINT NAME) DD (INITIALS) 2/13/98 (DATE)

20% SPEED

Appendix G - System Data Sheet

Item	Description					
Pump ID	P-3125A or B	P-3125A	P-3125A			
Proc. Step No.	Procedure Step Number	7.47	7.48			
Date	Date	2/13/98	2/13/98			
Time	Time, hr:min	20:10	20:20			
Test Instrumentation						
FI-temp	System Flow, gpm	139	140			
PI-temp-1	Supply Pressure, psig	99	99			
PI-temp-2	Press. upstream V-temp-2, psig	<1	<1			
PI-temp-3	Return Pressure, psig	<1	<1			
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	68	69			
3125A2, B2	Drive End Bearing Temp, °F	78	79			
SI-3125A, B	Motor Speed, rpm	2470	2460			
VI-3125A1, B1	Thrust End Vibration, mils	0.03	0.03			
VI-3125A2, B2	Drive End Vibration, mils	0.02	0.02			
FIC-3125 PV	Fluid Flow Present Value, gpm	145	145			
FIC-3125 SP	Fluid Flow Set Point, gpm	168	168			
TI-3125A	Fluid Temp, °F	65	65			
PI-3125A, B	Fluid Inlet Pressure, psig	43	43			
PI-3125C, D	Fluid Outlet Pressure, psig	407	410			
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	178	178			
TI-3126B	SLL-3160 Temp, Vent Sta, °F	52	63			
TI-3126A	SNL-3150 Temp, Vent Sta, °F	52	52			
TI-3125B	SNL-3150 Temp, Div Box, °F	64	62			

(Make copies of this sheet as required)

Data Recorder: DOUG GERKEN (PRINT NAME) D.J. (INITIALS) 2/13/98 (DATE)

80% SPEED

Appendix G - System Data Sheet							
Item	Description						
Pump ID	P-3125A or B	P-3125A	P-3125A				
Proc. Step No.	Procedure Step Number	7.54	7.55				
Date	Date	2/13/98	N/A				
Time	Time, hr:min	20:20					
Test Instrumentation							
FI-temp	System Flow, gpm	158					
PI-temp-1	Supply Pressure, psig	38					
PI-temp-2	Press. upstream V-temp-2, psig	11					
PI-temp-3	Return Pressure, psig	3					
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)							
TI-3125A1, B1	Thrust End Bearing Temp, °F	71					
TI-3125A2, B2	Drive End Bearing Temp, °F	81					
SI-3125A, B	Motor Speed, rpm	2845					
VI-3125A1, B1	Thrust End Vibration, mils	0.07					
VI-3125A2, B2	Drive End Vibration, mils	0.05					
FIC-3125 PV	Fluid Flow Present Value, gpm	165					
FIC-3125 SP	Fluid Flow Set Point, gpm	192					
TI-3125A	Fluid Temp, °F	65					
PI-3125A, B	Fluid Inlet Pressure, psig	35					
PI-3125C, D	Fluid Outlet Pressure, psig	514					
Header Data (from PCU-2 and PCU-3 screens on MCS)							
PI-3126B	SLL-3160 Press, Vent Sta, psig	231					
TI-3126B	SLL-3160 Temp, Vent Sta, °F	64					
TI-3126A	SNL-3150 Temp, Vent Sta, °F	52					
TI-3125B	SNL-3150 Temp, Div Box, °F	62					

(Make copies of this sheet as required)

Data Recorder: Doug Garker (PRINT NAME) D.G. (INITIALS) 2/13/98 (DATE)

REVISION NO. 0 ATTACHMENT A ~~50GP~~ 50% SPEED WITH VALVE THROTTLED TO 70 GPM PER PUMP CURVE

Appendix G - System Data Sheet

Item	Description					
Pump ID	P-3125A or B					
Proc. Step No.	Procedure Step Number	PER SBI REQUEST				
Date	Date	2/12/98				
Time	Time, hr:min	0925				
Test Instrumentation						
FI-temp	System Flow, gpm	70				
PI-temp-1	Supply Pressure, psig	62				
PI-temp-2	Press. upstream V-temp-2, psig	155				
PI-temp-3	Return Pressure, psig	0				
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1/B1	Thrust End Bearing Temp, °F	61				
TI-3125A2/B2	Drive End Bearing Temp, °F	61				
SI-3125A/B	Motor Speed, rpm	1650				
VI-3125A1/B1	Thrust End Vibration, mils	0.01				
VI-3125A2/B2	Drive End Vibration, mils	0.01				
FIC-3125 PV	Fluid Flow Present Value, gpm	76				
FIC-3125 SP	Fluid Flow Set Point, gpm	120				
TI-3125A	Fluid Temp, °F	50				
PI-3125A/B	Fluid Inlet Pressure, psig	66				
PI-3125C/D	Fluid Outlet Pressure, psig	287				
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	184				
TI-3126B	SLL-3160 Temp, Vent Sta, °F	49				
TI-3126A	SNL-3150 Temp, Vent Sta, °F	52				
TI-3125B	SNL-3150 Temp, Div Box, °F	50				

(Make copies of this sheet as required)

Data Recorder: Doug Geaker (PRINT NAME) D.G. (INITIALS) 2/12/98 (DATE)

75% SPEED WITH VALVE THROTTLED TO 105 GPM PER PUMP CURVE

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B		(SOI)			
Proc. Step No.	Procedure Step Number	PER SUZZEA REQUEST				
Date	Date	2/17/98				
Time	Time, hr:min	09:35				
Test Instrumentation						
FI-temp	System Flow, gpm	105				
PI-temp-1	Supply Pressure, psig	55				
PI-temp-2	Press. upstream V-temp-2, psig	310				
PI-temp-3	Return Pressure, psig	0				
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	65				
TI-3125A2, B2	Drive End Bearing Temp, °F	65				
SI-3125A, B	Motor Speed, rpm	2608				
VI-3125A1, B1	Thrust End Vibration, mils	0.07				
VI-3125A2, B2	Drive End Vibration, mils	0.04				
FIC-3125 PV	Fluid Flow Present Value, gpm	~~141~~ 180				
FIC-3125 SP	Fluid Flow Set Point, gpm	51				
TI-3125A	Fluid Temp, °F	51				
PI-3125A, B	Fluid Inlet Pressure, psig	57				
PI-3125C, D	Fluid Outlet Pressure, psig	570				
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	404				
TI-3126B	SLL-3160 Temp, Vent Sta, °F	49				
TI-3126A	SNL-3150 Temp, Vent Sta, °F	52				
TI-3125B	SNL-3150 Temp, Div Box, °F	50				

(Make copies of this sheet as required)

Data Recorder: DOUG GERKEN (PRINT NAME) DG (INITIALS) 2/17/98 (DATE)

100% SPEED WITH VALVE THROTTLED TO 140 GPM

THROTTLED TO 170 GPM

Appendix G - System Data Sheet

Item	Description					
Pump ID	P-3125A or B					
Proc. Step No.	Procedure Step Number	PER SOLZER (SGT) REQUEST				
Date	Date	2/11/98	2/11/98			
Time	Time, hr:min	09:45	09:55			
Test Instrumentation						
FI-temp	System Flow, gpm	~~135~~ 132	37			
PI-temp-1	Supply Pressure, psig	45	161			
PI-temp-2	Press. upstream V-temp-2, psig	543	310			
PI-temp-3	Return Pressure, psig	0	9			
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	69	75			
TI-3125A2, B2	Drive End Bearing Temp, °F	68	72			
SI-3125A, B	Motor Speed, rpm	3529	3522			
VI-3125A1, B1	Thrust End Vibration, mils	JUMPED TO 0.07 @ 2950 RPM 0.07	0.07			
VI-3125A2, B2	Drive End Vibration, mils	0.06	0.06			
FIC-3125 PV	Fluid Flow Present Value, gpm	148	173			
FIC-3125 SP	Fluid Flow Set Point, gpm	290	240			
TI-3125A	Fluid Temp, °F	53	53			
PI-3125A, B	Fluid Inlet Pressure, psig	52	53			
PI-3125C, D	Fluid Outlet Pressure, psig	931	871			
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	624	557			
TI-3126B	SLL-3160 Temp. Vent Sta, °F	49	50			
TI-3126A	SNL-3150 Temp. Vent Sta, °F	52	52			
TI-3125B	SNL-3150 Temp. Div Box, °F	51	51			

(Make copies of this sheet as required)

Data Recorder: Doug Genson (PRINT NAME) D.G. (INITIALS) 2/11/98 (DATE)

A Pump AT 25 %

Appendix G - System Data Sheet

Item	Description					
Pump ID	P-3125A or B					
Proc. Step No.	Procedure Step Number	per screen REQUEST				
Date	Date	2/20/98				
Time	Time, hr:min	10:53				
Test Instrumentation						
FI-temp	System Flow, gpm	102				
PI-temp-1	Supply Pressure, psig	58				
PI-temp-2	Press. upstream V-temp-2, psig	410				
PI-temp-3	Return Pressure, psig	1				
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	67				
TI-3125A2, B2	Drive End Bearing Temp, °F	69				
SI-3125A, B	Motor Speed, rpm	2701				
VI-3125A1, B1	Thrust End Vibration, mils	0.07				
VI-3125A2, B2	Drive End Vibration, mils	0.04				
FIC-3125 PV	Fluid Flow Present Value, gpm	107				
FIC-3125 SP	Fluid Flow Set Point, gpm	180				
TI-3125A	Fluid Temp, °F	52				
PI-3125A, B	Fluid Inlet Pressure, psig	58				
PI-3125C, D	Fluid Outlet Pressure, psig	647				
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	491				
TI-3126B	SLL-3160 Temp. Vent Sta, °F	51				
TI-3126A	SNL-3150 Temp. Vent Sta, °F	53				
TI-3125B	SNL-3150 Temp. Div Box, °F	51				

(Make copies of this sheet as required)

Data Recorder: DOUG GERKEN (PRINT NAME) D.G. (INITIALS) 2/20/98 (DATE)

A Pump @ 100 % — FCOW SET TO 157 GPM

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B					
Proc. Step No.	Procedure Step Number	PER SULZER REQUEST (SOI)				
Date	Date	2/20/98	2/20/98	2/20/98		
Time	Time, hr:min	11:30	11:35	12:10		
Test Instrumentation						
FI-temp	System Flow, gpm	143	145	143		
PI-temp-1	Supply Pressure, psig	44	39	40		
PI-temp-2	Press. upstream V-temp-2, psig	550	440	592		
PI-temp-3	Return Pressure, psig	3	1	3		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	74	78	79		
TI-3125A2, B2	Drive End Bearing Temp, °F	72	76	77		
SI-3125A, B	Motor Speed, rpm	3608	3611	3610		
VI-3125A1, B1	Thrust End Vibration, mils	0.08	0.08	0.08		
VI-3125A2, B2	Drive End Vibration, mils	0.06	0.06	0.05		
FIC-3125 PV	Fluid Flow Present Value, gpm	157	169	152		
FIC-3125 SP	Fluid Flow Set Point, gpm	240	240	240		
TI-3125A	Fluid Temp, °F	54	54	55		
PI-3125A, B	Fluid Inlet Pressure, psig	41	36	43		
PI-3125C, D	Fluid Outlet Pressure, psig	1026	974	1039		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	758	678	781		
TI-3126B	SLL-3160 Temp, Vent Sta, °F	51	52	54		
TI-3126A	SNL-3150 Temp, Vent Sta, °F	54	54	54		
TI-3125B	SNL-3150 Temp, Div Box, °F	51	52	52		

(Make copies of this sheet as required)

Data Recorder: DOUG GERKER (PRINT NAME) D.G. (INITIALS) 2/20/98 (DATE)

B-Pump 50% Speed

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125B	P-3125D			
Proc. Step No.	Procedure Step Number	8.32	8.33			
Date	Date	2/19/98	2/19/98			
Time	Time, hr:min	12:50	13:00			
Test Instrumentation						
FI-temp	System Flow, gpm	80	80			
PI-temp-1	Supply Pressure, psig	58	58			
PI-temp-2	Press. upstream V-temp-2, psig	130	120-130			
PI-temp-3	Return Pressure, psig	0	0			
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	64	64			
125A2, B2	Drive End Bearing Temp, °F	73	73			
SI-3125A, B	Motor Speed, rpm	1821	1826			
VI-3125A1, B1	Thrust End Vibration, mils	0.01	0.01			
VI-3125A2, B2	Drive End Vibration, mils	0.01	0.01			
FIC-3125 PV	Fluid Flow Present Value, gpm	84	83			
FIC-3125 SP	Fluid Flow Set Point, gpm	120	120			
TI-3125A	Fluid Temp, °F	51	51			
PI-3125A, B	Fluid Inlet Pressure, psig	64	65			
PI-3125C, D	Fluid Outlet Pressure, psig	301	30			
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	181	180			
TI-3126B	SLL-3160 Temp, Vent Sta, °F	50	50			
TI-3126A	SNL-3150 Temp, Vent Sta, °F	53	53			
TI-3125B	SNL-3150 Temp, Div Box, °F	50	50			

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Data Recorder: DOUG GENTLER D.J. 2/19/98
PRINT NAME INITIALS DATE

B-Pump 60% SPEED

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125B	P-3125B			
Proc. Step No.	Procedure Step Number	8.42	8.43			
Date	Date	2/19/98	2/19/98			
Time	Time, hr:min	13:05	13:15			
Test Instrumentation						
FI-temp	System Flow, gpm	99	99			
PI-temp-1	Supply Pressure, psig	56	56			
PI-temp-2	Press. upstream V-temp-2, psig	180	180			
PI-temp-3	Return Pressure, psig	2	1			
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp. °F	65	65			
125A2, B2	Drive End Bearing Temp. °F	74	75			
SI-3125A, B	Motor Speed, rpm	2200	2195			
VI-3125A1, B1	Thrust End Vibration, mils	0.03	0.03			
VI-3125A2, B2	Drive End Vibration, mils	0.02	0.02			
FIC-3125 PV	Fluid Flow Present Value, gpm	97	97			
FIC-3125 SP	Fluid Flow Set Point, gpm	144	144			
TI-3125A	Fluid Temp. °F	51	51			
PI-3125A, B	Fluid Inlet Pressure, psig	60	61			
PI-3125C, D	Fluid Outlet Pressure, psig	403	402			
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	260	257			
TI-3126B	SLL-3160 Temp, Vent Sta, °F	50	50			
TI-3126A	SNL-3150 Temp, Vent Sta, °F	53	53			
TI-3125B	SNL-3150 Temp, Div Box, °F	50	50			

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Data Recorder: DOUG GERICKE (PRINT NAME) D.G (INITIALS) 2/19/98 (DATE)

B-Pump 70 6/0

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125B	P-3125B			
Proc. Step No.	Procedure Step Number	8.49	8.50			
Date	Date	2/19/98	2/19/98			
Time	Time, hr:min	13:20	13:30			
Test Instrumentation						
FI-temp	System Flow, gpm	110	110			
PI-temp-1	Supply Pressure, psig	53	53			
PI-temp-2	Press. upstream V-temp-2, psig	240	240			
PI-temp-3	Return Pressure, psig	0	03			
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	68	70			
125A2, B2	Drive End Bearing Temp, °F	75	77			
SI-3125A, B	Motor Speed, rpm	2560	2564			
VI-3125A1, B1	Thrust End Vibration, mils	0.03	0.03			
VI-3125A2, B2	Drive End Vibration, mils	0.03	0.03			
FIC-3125 PV	Fluid Flow Present Value, gpm	110	107			
FIC-3125 SP	Fluid Flow Set Point, gpm	168	168			
TI-3125A	Fluid Temp, °F	52	52			
PI-3125A, B	Fluid Inlet Pressure, psig	56	53			
PI-3125C, D	Fluid Outlet Pressure, psig	522	500			
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	398	352			
TI-3126B	SLL-3160 Temp, Vent Sta, °F	50	53			
TI-3126A	SNL-3150 Temp, Vent Sta, °F	53	50			
TI-3125B	SNL-3150 Temp, Div Box, °F	50	51			

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Data Recorder: DOUG GERKEN (PRINT NAME) D.G. (INITIALS) 2/19/98 (DATE)

B-Pump 80%

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125A	P-3125B			
Proc. Step No.	Procedure Step Number	8.5.6	8.5.7			
Date	Date	2/19/98	2/19/98			
Time	Time, hr:min	14:05	14:15			
Test Instrumentation						
FI-temp	System Flow, gpm	120	123			
PI-temp-1	Supply Pressure, psig	49	49			
PI-temp-2	Press. upstream V-temp-2, psig	310	310			
PI-temp-3	Return Pressure, psig	3	3			
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	70	72			
125A2, B2	Drive End Bearing Temp, °F	76	77			
SI-3125A, B	Motor Speed, rpm	2912	2916			
VI-3125A1, B1	Thrust End Vibration, mils	0.21	0.22			
VI-3125A2, B2	Drive End Vibration, mils	0.19	0.14			
FIC-3125 PV	Fluid Flow Present Value, gpm	123	123			
FIC-3125 SP	Fluid Flow Set Point, gpm	192	192			
TI-3125A	Fluid Temp, °F	53	53			
PI-3125A, B	Fluid Inlet Pressure, psig	51	51			
PI-3125C, D	Fluid Outlet Pressure, psig	663	660			
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	460	455			
TI-3126B	SLL-3160 Temp, Vent Sta, °F	51	51			
TI-3126A	SNL-3150 Temp, Vent Sta, °F	53	53			
TI-3125B	SNL-3150 Temp, Div Box, °F	51	51			

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Data Recorder: DOUG GERKEN (PRINT NAME) D.G (INITIALS) 2/19/98 (DATE)

per solicitor request
100% WITH VALVE THROTTLED TO 1406pm

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or (B)	P-3125B	P-3125B			
Proc. Step No.	Procedure Step Number					
Date	Date	2/19/98	2/19/98			
Time	Time, hr:min	~~1405~~ 1430	1940			
Test Instrumentation						
FI-temp	System Flow, gpm	141	161			
PI-temp-1	Supply Pressure, psig	43	38			
PI-temp-2	Press. upstream V-temp-2, psig	570	400			
PI-temp-3	Return Pressure, psig	3	4			
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	76	78			
3125A2, B2	Drive End Bearing Temp, °F	79	81			
SI-3125A, B	Motor Speed, rpm	3650	3660			
VI-3125A1, B1	Thrust End Vibration, mils	0.06	0.06			
VI-3125A2, B2	Drive End Vibration, mils	0.03	0.04			
FIC-3125 PV	Fluid Flow Present Value, gpm	147	164			
FIC-3125 SP	Fluid Flow Set Point, gpm	240	240			
TI-3125A	Fluid Temp, °F	54	54			
PI-3125A, B	Fluid Inlet Pressure, psig	92	35			
PI-3125C, D	Fluid Outlet Pressure, psig	1027	970			
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	763	660			
TI-3126B	SLL-3160 Temp, Vent Sta, °F	51	52			
TI-3126A	SNL-3150 Temp, Vent Sta, °F	83	53			
TI-3125B	SNL-3150 Temp, Div Box, °F	51	51			

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Data Recorder: Doug Genlcen (PRINT NAME) D.G. (INITIALS) 2/19/98 (DATE)

A-P

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125A →				
Proc. Step No.	Procedure Step Number	9.29	9.29	9.29		
Date	Date	2/26/98	2/26/98	2/26/98		
Time	Time, hr:min	14:30	14:40	14:50		
Test Instrumentation						
FI-temp	System Flow, gpm	104	104	103.8		
PI-temp-1	Supply Pressure, psig	56	56	56		
PI-temp-2	Press. upstream V-temp-2, psig	13	13	13		
PI-temp-3	Return Pressure, psig	0	0	0		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	67	67	67		
[illegible]125A2, B2	Drive End Bearing Temp, °F	70	71	71		
SI-3125A, B	Motor Speed, rpm	1874	1873	1877		
VI-3125A1, B1	Thrust End Vibration, mils	0.01	0.01	0.01		
VI-3125A2, B2	Drive End Vibration, mils	0.01	0.01	0.01		
FIC-3125 PV	Fluid Flow Present Value, gpm	110	110	110		
FIC-3125 SP	Fluid Flow Set Point, gpm	110	110	110		
TI-3125A	Fluid Temp, °F	51	52	52		
PI-3125A, B	Fluid Inlet Pressure, psig	59	58	58		
PI-3125C, D	Fluid Outlet Pressure, psig	272	273	274		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	108	109	109		
TI-3126B	SLL-3160 Temp, Vent Sta, °F	51	51	51		
TI-3126A	SNL-3150 Temp, Vent Sta, °F	55	55	55		
TI-3125B	SNL-3150 Temp, Div Box, °F	50	50	50		

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Data Recorder: DOUG GERICKEN (PRINT NAME) D.J. (INITIALS) 2/26/98 (DATE)

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Appendix G - System Data Sheet						
Item	Description					
Pump ID	(P-3125A) or B	P-3125A →				
Proc. Step No.	Procedure Step Number	9.35	9.35	9.35		
Date	Date	2/26/98	2/26/98	2/26/98		
Time	Time, hr:min	15:10	15:20	15:30		
Test Instrumentation		← 104 D.J 2/26/98				
FI-temp	System Flow, gpm	~~104~~	107	108		
PI-temp-1	Supply Pressure, psig	56	56	56		
PI-temp-2	Press. upstream V-temp-2, psig	45	45	45		
PI-temp-3	Return Pressure, psig	3	4	4		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	67	67	68		
125A2, B2	Drive End Bearing Temp, °F	73	73	73		
SI-3125A, B	Motor Speed, rpm	1958	1965	1971		
VI-3125A1, B1	Thrust End Vibration, mils	0.01	0.01	0.01		
VI-3125A2, B2	Drive End Vibration, mils	0.01	0.01	0.01		
FIC-3125 PV	Fluid Flow Present Value, gpm	110	110	110		
FIC-3125 SP	Fluid Flow Set Point, gpm	110	110	110		
TI-3125A	Fluid Temp, °F	52	52	52		
PI-3125A, B	Fluid Inlet Pressure, psig	58	58	58		
PI-3125C, D	Fluid Outlet Pressure, psig	301	302	303		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	139	136	137		
TI-3126B	SLL-3160 Temp. Vent Sta, °F	51	51	51		
TI-3126A	SNL-3150 Temp. Vent Sta, °F	55	55	55		
TI-3125B	SNL-3150 Temp, Div Box, °F	51	51	51		

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Data Recorder: Doug Gerber D.J 2/26/98
PRINT NAME INITIALS DATE

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125A	→	→		
Proc. Step No.	Procedure Step Number	9.40	9.40	9.40		
Date	Date	3/2/98	3/2/98	3/2/98		
Time	Time, hr:min	10:45	10:55	11:05		
Test Instrumentation						
FI-temp	System Flow, gpm	104	102	102		
PI-temp-1	Supply Pressure, psig	56	56	56		
PI-temp-2	Press. upstream V-temp-2, psig	120	125	115		
PI-temp-3	Return Pressure, psig	0	0	0		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	63	64	64		
125A2, B2	Drive End Bearing Temp, °F	60	62	64		
SI-3125A, B	Motor Speed, rpm	2150	2150	2105		
VI-3125A1, B1	Thrust End Vibration, mils	0.02	0.02	0.02		
VI-3125A2, B2	Drive End Vibration, mils	0.02	0.02	0.01		
FIC-3125 PV	Fluid Flow Present Value, gpm	110	110	110		
FIC-3125 SP	Fluid Flow Set Point, gpm	110	110	110		
TI-3125A	Fluid Temp, °F	48	48	49		
PI-3125A, B	Fluid Inlet Pressure, psig	59	59	59		
PI-3125C, D	Fluid Outlet Pressure, psig	373	378	364		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	212	214	208		
TI-3126B	SLL-3160 Temp. Vent Sta, °F	47	48	51		
TI-3126A	SNL-3150 Temp. Vent Sta, °F	55	55	55		
TI-3125B	SNL-3150 Temp. Div Box, °F	48	48	48		

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Data Recorder: Doug Genger (PRINT NAME) D.J. (INITIALS) 3/2/98 (DATE)

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125A	→	→		
Proc. Step No.	Procedure Step Number	9.46	9.46	9.46		
Date	Date	3/2/98	3/2/98	3/2/98		
Time	Time, hr:min	11:45	11:55	12:05		
Test Instrumentation						
FI-temp	System Flow, gpm	130	130	131		
PI-temp-1	Supply Pressure, psig	46	46	46		
PI-temp-2	Press. upstream V-temp-2, psig	15	25	18		
PI-temp-3	Return Pressure, psig	2	2	1		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	68	68	68		
,125A2, B2	Drive End Bearing Temp, °F	68	69	70		
SI-3125A, B	Motor Speed, rpm	2430	2424	2429		
VI-3125A1, B1	Thrust End Vibration, mils	0.03	0.03	0.03		
VI-3125A2, B2	Drive End Vibration, mils	0.02	0.02	0.02		
FIC-3125 PV	Fluid Flow Present Value, gpm	140	140	140		
FIC-3125 SP	Fluid Flow Set Point, gpm	140	140	140		
TI-3125A	Fluid Temp, °F	50	50	50		
PI-3125A, B	Fluid Inlet Pressure, psig	47	47	47		
PI-3125C, D	Fluid Outlet Pressure, psig	416	413	414		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	182	183	182		
TI-3126B	SLL-3160 Temp, Vent Sta, °F	49	49	50		
TI-3126A	SNL-3150 Temp, Vent Sta, °F	55	55	55		
TI-3125B	SNL-3150 Temp, Div Box, °F	50	48	49		

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Appendix G - System Data Sheet						
Item	Description					
Pump ID	(P-3125A) or B	P-3125B →				
Proc. Step No.	Procedure Step Number	9.5.1	9.5.1	9.5.1		
Date	Date	3/2/98	3/2/98	3/2/98		
Time	Time, hr:min	12:25	12:35	12:45		
Test Instrumentation						
FI-temp	System Flow, gpm	132	131	131		
PI-temp-1	Supply Pressure, psig	48	48	48		
PI-temp-2	Press. upstream V-temp-2, psig	68	68	68		
PI-temp-3	Return Pressure, psig	1	1	1		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	69	69	70		
125A2, B2	Drive End Bearing Temp, °F	71	71	72		
SI-3125A, B	Motor Speed, rpm	2528	2530	2523		
VI-3125A1, B1	Thrust End Vibration, mils	0.04	0.04	0.04		
VI-3125A2, B2	Drive End Vibration, mils	0.03	0.03	0.03		
FIC-3125 PV	Fluid Flow Present Value, gpm	140	140	140		
FIC-3125 SP	Fluid Flow Set Point, gpm	140	140	140		
TI-3125A	Fluid Temp, °F	51	51	51		
PI-3125A, B	Fluid Inlet Pressure, psig	47	47	47		
PI-3125C, D	Fluid Outlet Pressure, psig	459	463	460		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	227	227	227		
TI-3126B	SLL-3160 Temp. Vent Sta, °F	50	50	50		
TI-3126A	SNL-3150 Temp. Vent Sta, °F	55	55	55		
TI-3125B	SNL-3150 Temp. Div Box, °F	49	49	51		

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Data Recorder: Doug Genter (PRINT NAME) DG (INITIALS) 3/2/98 (DATE)

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125A →				
Proc. Step No.	Procedure Step Number	9.56	9.56	9.56		
Date	Date	3/2/98	3/2/98	3/2/98		
Time	Time, hr:min	13:00	13:10	13:20		
Test Instrumentation						
FI-temp	System Flow, gpm	116	117	118		
PI-temp-1	Supply Pressure, psig	48	48	46		
PI-temp-2	Press. upstream V-temp-2, psig	162	163	164		
PI-temp-3	Return Pressure, psig	1	1	2		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	71	72	72		
,125A2, B2	Drive End Bearing Temp, °F	73	73	74		
SI-3125A, B	Motor Speed, rpm	2719	2736	2721		
VI-3125A1, B1	Thrust End Vibration, mils	0.05	0.05	0.05		
VI-3125A2, B2	Drive End Vibration, mils	0.04	0.04	0.04		
FIC-3125 PV	Fluid Flow Present Value, gpm	140	140	140		
FIC-3125 SP	Fluid Flow Set Point, gpm	140	140	140		
TI-3125A	Fluid Temp, °F	52	52	52		
PI-3125A, B	Fluid Inlet Pressure, psig	47	47	47		
PI-3125C, D	Fluid Outlet Pressure, psig	554	555	555		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	321	324	325		
TI-3126B	SLL-3160 Temp. Vent Sta, °F	50	50	51		
TI-3126A	SNL-3150 Temp. Vent Sta, °F	55	55	55		
TI-3125B	SNL-3150 Temp. Div Box, °F	51	51	51		

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Data Recorder: DOUG GERKER (PRINT NAME) DG (INITIALS) 3/2/98 (DATE)

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125A	→	→		
Proc. Step No.	Procedure Step Number	9.62	9.62	9.62		
Date	Date	3/2/98	3/2/98	3/2/98		
Time	Time, hr:min	13:30	13:40	13:50		
Test Instrumentation						
FI-temp	System Flow, gpm	145	144	145		
PI-temp-1	Supply Pressure, psig	44	44	44		
PI-temp-2	Press. upstream V-temp-2, psig	30	30	25		
PI-temp-3	Return Pressure, psig	5	5	3		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	72	72	72		
-125A2, B2	Drive End Bearing Temp, °F	74	74	75		
SI-3125A, B	Motor Speed, rpm	2708	2680	2693		
VI-3125A1, B1	Thrust End Vibration, mils	0.07	0.09	0.09		
VI-3125A2, B2	Drive End Vibration, mils	0.05	0.06	0.05		
FIC-3125 PV	Fluid Flow Present Value, gpm	155	155	155		
FIC-3125 SP	Fluid Flow Set Point, gpm	155	155	155		
TI-3125A	Fluid Temp, °F	52	53	53		
PI-3125A, B	Fluid Inlet Pressure, psig	42	42	42		
PI-3125C, D	Fluid Outlet Pressure, psig	499	489	489		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	227	224	223		
TI-3126B	SLL-3160 Temp, Vent Sta, °F	51	52	52		
TI-3126A	SNL-3150 Temp, Vent Sta, °F	55	55	55		
TI-3125B	SNL-3150 Temp, Div Box, °F	51	51	51		

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Data Recorder: DOUG GERKEN (PRINT NAME) DJV (INITIALS) 3/2/98 (DATE)

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125A →				
Proc. Step No.	Procedure Step Number	9.67	9.67	9.67		
Date	Date	3/2/98	3/2/98	3/2/98		
Time	Time, hr:min	14:40	14:50	15:00		
Test Instrumentation						
FI-temp	System Flow, gpm	148	144	146		
PI-temp-1	Supply Pressure, psig	60	42	42		
PI-temp-2	Press. upstream V-temp-2, psig	42	60	60		
PI-temp-3	Return Pressure, psig	2	3	3		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	73	73	73		
,125A2, B2	Drive End Bearing Temp, °F	76	76	76		
SI-3125A, B	Motor Speed, rpm	2736	2747	2743		
VI-3125A1, B1	Thrust End Vibration, mils	0.06	0.07	0.08		
VI-3125A2, B2	Drive End Vibration, mils	0.04	0.05	0.05		
FIC-3125 PV	Fluid Flow Present Value, gpm	155	155	155		
FIC-3125 SP	Fluid Flow Set Point, gpm	155	155	155		
TI-3125A	Fluid Temp, °F	54	54	54		
PI-3125A, B	Fluid Inlet Pressure, psig	42	42	42		
PI-3125C, D	Fluid Outlet Pressure, psig	519	520	524		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	255	254	254		
TI-3126B	SLL-3160 Temp, Vent Sta, °F	53	53	53		
TI-3126A	SNL-3150 Temp, Vent Sta, °F	55	55	55		
TI-3125B	SNL-3150 Temp, Div Box, °F	53	53	53		

(Make copies of this sheet as required)

Data Recorder: Doug Genter (PRINT NAME) D.G (INITIALS) 3/2/98 (DATE)

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125A →				
Proc. Step No.	Procedure Step Number	9.23	9.23	9.23		
Date	Date	3/2/98	3/2/98	3/2/98		
Time	Time, hr:min	14:05	14:15	14:25		
Test Instrumentation						
FI-temp	System Flow, gpm	143	143	145		
PI-temp-1	Supply Pressure, psig	44	43	44		
PI-temp-2	Press. upstream V-temp-2, psig	110	110	110		
PI-temp-3	Return Pressure, psig	3	3	3		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	73	74	74		
TI-3125A2, B2	Drive End Bearing Temp, °F	75	75	76		
SI-3125A, B	Motor Speed, rpm	2840	2831	2856		
VI-3125A1, B1	Thrust End Vibration, mils	0.16	0.16	0.21		
VI-3125A2, B2	Drive End Vibration, mils	0.09	0.10	0.13		
FIC-3125 PV	Fluid Flow Present Value, gpm	155	155	155		
FIC-3125 SP	Fluid Flow Set Point, gpm	155	155	155		
TI-3125A	Fluid Temp, °F	53	53	53		
PI-3125A, B	Fluid Inlet Pressure, psig	42	42	42		
PI-3125C, D	Fluid Outlet Pressure, psig	571	576	574		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta. psig	307	305	305		
TI-3126B	SLL-3160 Temp. Vent Sta. °F	52	52	53		
TI-3126A	SNL-3150 Temp. Vent Sta. °F	55	55	55		
TI-3125B	SNL-3150 Temp. Div Box, °F	52	52	53		

(Make copies of this sheet as required)

Data Recorder: DOUG GERICKE (PRINT NAME) DG (INITIALS) 3/2/98 (DATE)

REVISION NO. 0 ATTACHMENT A

B PUMP AUTO AT 110 GPM TEST POINT 1

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125B	P-3125B	P-3125B		
Proc. Step No.	Procedure Step Number	10.30	10.30	10.30		
Date	Date	3/24/98	3/24/98	3/24/98		
Time	Time, hr:min	10:10	10:20	10:30		
Test Instrumentation						
FI-temp	System Flow, gpm	107	108	107		
PI-temp-1	Supply Pressure, psig	54	56	56		
PI-temp-2	Press. upstream V-temp-2, psig	15	15	15		
PI-temp-3	Return Pressure, psig	0	0	0		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	62	64	65		
125A2, B2	Drive End Bearing Temp, °F	62	64	65		
SI-3125A, B	Motor Speed, rpm	1994	1995	2005		
VI-3125A1, B1	Thrust End Vibration, mils	0.01	0.01	0.01		
VI-3125A2, B2	Drive End Vibration, mils	0.01	0.01	0.01		
FIC-3125 PV	Fluid Flow Present Value, gpm	110	110	110		
FIC-3125 SP	Fluid Flow Set Point, gpm	110	110	110		
TI-3125A	Fluid Temp, °F	54	54	54		
PI-3125A, B	Fluid Inlet Pressure, psig	57	57	57		
PI-3125C, D	Fluid Outlet Pressure, psig	292	291	295		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	118	119	121		
TI-3126B	SLL-3160 Temp. Vent Sta, °F	50	49	51		
TI-3126A	SNL-3150 Temp. Vent Sta, °F	56	56	56		
TI-3125B	SNL-3150 Temp. Div Box, °F	51	49	50		

(Make copies of this sheet as required)

Data Recorder: DOUG GERLER (PRINT NAME) D.G. (INITIALS) 3/24/98 (DATE)

B-PUMP AUTO AT 100 GPM THROTTLED FOR POINT 2

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125B	P-3125B	P-3125B		
Proc. Step No.	Procedure Step Number	10.35	10.35	10.35		
Date	Date	3/24/98	3/24/98	3/24/98		
Time	Time, hr:min	10:40	10:50	11:00		
Test Instrumentation						
FI-temp	System Flow, gpm	109	108	109		
PI-temp-1	Supply Pressure, psig	56	56	56		
PI-temp-2	Press. upstream V-temp-2, psig	55	55	55		
PI-temp-3	Return Pressure, psig	0	0	0		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	67	68	68		
125A2, B2	Drive End Bearing Temp, °F	69	71	73		
SI-3125A, B	Motor Speed, rpm	2105	2100	2100		
VI-3125A1, B1	Thrust End Vibration, mils	0.01	0.01	0.01		
VI-3125A2, B2	Drive End Vibration, mils	0.01	0.01	0.01		
FIC-3125 PV	Fluid Flow Present Value, gpm	110	110	110		
FIC-3125 SP	Fluid Flow Set Point, gpm	110	110	110		
TI-3125A	Fluid Temp, °F	53	53	53		
PI-3125A, B	Fluid Inlet Pressure, psig	57	57	57		
PI-3125C, D	Fluid Outlet Pressure, psig	332	329	331		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	159	155	156		
TI-3126B	SLL-3160 Temp, Vent Sta, °F	53 ~~159~~	53	53		
TI-3126A	SNL-3150 Temp, Vent Sta, °F	56 ~~166~~	56	56		
TI-3125B	SNL-3150 Temp, Div Box, °F	50	50	50		

(Make copies of this sheet as required)

Data Recorder: DOUG GEARLEN (PRINT NAME) D.G. (INITIALS) 3/24/98 (DATE)

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or (B)	P-3125B	P-3125B	P-3125B		
Proc. Step No.	Procedure Step Number	10.40	10.40	10.40		
Date	Date	3/24/98	3/24/98	3/24/98		
Time	Time, hr:min	11:05	11:15	11:25		
Test Instrumentation						
FI-temp	System Flow, gpm	105	105	105		
PI-temp-1	Supply Pressure, psig	56	56	56		
PI-temp-2	Press. upstream V-temp-2, psig	130	130	130		
PI-temp-3	Return Pressure, psig	0	0	0		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	69	70	70		
3125A2 B2	Drive End Bearing Temp, °F	74	75	77		
SI-3125A, B	Motor Speed, rpm	2300	2300	2300		
VI-3125A1, B1	Thrust End Vibration, mils	0.02	0.02	0.02		
VI-3125A2, B2	Drive End Vibration, mils	0.01	0.01	0.01		
FIC-3125 PV	Fluid Flow Present Value, gpm	110	110	110		
FIC-3125 SP	Fluid Flow Set Point, gpm	110	110	110		
TI-3125A	Fluid Temp, °F	53	53	53		
PI-3125A, B	Fluid Inlet Pressure, psig	57	56	57		
PI-3125C, D	Fluid Outlet Pressure, psig	410	410	411		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	235	235	235		
TI-3126B	SLL-3160 Temp, Vent Sta, °F	53	53	53		
TI-3126A	SNL-3150 Temp, Vent Sta, °F	56	56	56		
TI-3125B	SNL-3150 Temp, Div Box, °F	50	51	51		

(Make copies of this sheet as required)

Data Recorder: Doug Gerkeed (PRINT NAME) D.G. (INITIALS) 3/24/98 (DATE)

B-Pump auto at 140 gpm POINT 1

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125 B	P-3125 B	P-3125B		
Proc. Step No.	Procedure Step Number	10.46	10.46	10.46		
Date	Date	3/24/98	3/24/98	3/24/98		
Time	Time, hr:min	11:35	11:45	11:55		
Test Instrumentation						
FI-temp	System Flow, gpm	140	140	140		
PI-temp-1	Supply Pressure, psig	44	44	44		
PI-temp-2	Press. upstream V-temp-2, psig	20	20	20		
PI-temp-3	Return Pressure, psig	0	0	0		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	72	73	73		
3125A2, B2	Drive End Bearing Temp, °F	79	81	82		
3125A, B	Motor Speed, rpm	2610	2610	2610		
VI-3125A1, B1	Thrust End Vibration, mils	0.08	0.05	0.05		
VI-3125A2, B2	Drive End Vibration, mils	0.06	0.04	0.04		
FIC-3125 PV	Fluid Flow Present Value, gpm	140	140	140		
FIC-3125 SP	Fluid Flow Set Point, gpm	140	140	140		
TI-3125A	Fluid Temp, °F	53	54	54		
PI-3125A, B	Fluid Inlet Pressure, psig	46	46	46		
PI-3125C, D	Fluid Outlet Pressure, psig	455	450	449		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	204	202	202		
TI-3126B	SLL-3160 Temp, Vent Sta, °F	53	53	53		
TI-3126A	SNL-3150 Temp, Vent Sta, °F	56	56	56		
TI-3125B	SNL-3150 Temp, Div Box, °F	53	54	54		

(Make copies of this sheet as required)

Data Recorder: DOUG GERKEN (PRINT NAME) D.G. (INITIALS) 3/24/98 (DATE)

B-pump AUTO point 2 @ 1406pm

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125B	P-3125B	P-3125B		
Proc. Step No.	Procedure Step Number	10.51	10.51	10.51		
Date	Date	3/29/98	3/29/98	3/29/98		
Time	Time, hr:min	12:05 PM	12:15	12:25		
Test Instrumentation						
FI-temp	System Flow, gpm	138	138	138		
PI-temp-1	Supply Pressure, psig	44	44	44		
PI-temp-2	Press. upstream V-temp-2, psig	135	135	D.V. 3/29/98 85		
PI-temp-3	Return Pressure, psig	1	1	0		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	74	74	75		
3125A2, B2	Drive End Bearing Temp, °F	83	84	85		
3125A, B	Motor Speed, rpm	2710	2710	2710		
VI-3125A1, B1	Thrust End Vibration, mils	0.05	0.05	0.05		
VI-3125A2, B2	Drive End Vibration, mils	0.03	0.03	0.03		
FIC-3125 PV	Fluid Flow Present Value, gpm	140	140	140		
FIC-3125 SP	Fluid Flow Set Point, gpm	140	140	140		
TI-3125A	Fluid Temp, °F	55	55	55		
PI-3125A, B	Fluid Inlet Pressure, psig	46	46	46		
PI-3125C, D	Fluid Outlet Pressure, psig	507	507	507		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	262	262	262		
TI-3126B	SLL-3160 Temp. Vent Sta, °F	53	53	54		
TI-3126A	SNL-3150 Temp. Vent Sta, °F	56	56	56		
TI-3125B	SNL-3150 Temp. Div Box, °F	53	~~53~~ 53 D.V. 3/29/98	53		

(Make copies of this sheet as required)

Data Recorder: DOUG GERKEN (PRINT NAME) O.G. (INITIALS) 3/29/98 (DATE)

B-pump auto 140gpm POINT 3

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125B	P-3125B	P-3125B		
Proc. Step No.	Procedure Step Number	10.56	10.56	10.56		
Date	Date	3/24/98	3/24/98	3/24/98		
Time	Time, hr:min	12:45	12:55	13:05		
Test Instrumentation						
FI-temp	System Flow, gpm	127	125	127		
PI-temp-1	Supply Pressure, psig	44	44	44		
PI-temp-2	Press. upstream V-temp-2, psig	195	195	195		
PI-temp-3	Return Pressure, psig	0	1	1		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	77°	77	77		
-3125A2, B2	Drive End Bearing Temp, °F	87	87	88		
3125A, B	Motor Speed, rpm	2910	2910	2910		
VI-3125A1, B1	Thrust End Vibration, mils	0.13	0.16	0.12		
VI-3125A2, B2	Drive End Vibration, mils	0.11	0.10	0.11		
FIC-3125 PV	Fluid Flow Present Value, gpm	140	140	140		
FIC-3125 SP	Fluid Flow Set Point, gpm	140	140	140		
TI-3125A	Fluid Temp, °F	56	56	56		
PI-3125A, B	Fluid Inlet Pressure, psig	46	46	46		
PI-3125C, D	Fluid Outlet Pressure, psig	614	612	610		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	367	366	366		
TI-3126B	SLL-3160 Temp, Vent Sta, °F	55	55	55		
TI-3126A	SNL-3150 Temp, Vent Sta, °F	56	56	56		
TI-3125B	SNL-3150 Temp, Div Box, °F	54	54	54		

(Make copies of this sheet as required)

Data Recorder: Doug Gerker (PRINT NAME) D.G. (INITIALS) 3/24/98 (DATE)

B-PUMP AUTO 155 GPM POINT 1

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125A	P-3125B	P-3125B		
Proc. Step No.	Procedure Step Number	10.62	10.62	10.62		
Date	Date	3/24/98	3/24/98	3/24/98		
Time	Time, hr:min	13:10	13:20	13:30		
Test Instrumentation						
FI-temp	System Flow, gpm	153	153	152		
PI-temp-1	Supply Pressure, psig	40	42	42		
PI-temp-2	Press. upstream V-temp-2, psig	25	25	25		
PI-temp-3	Return Pressure, psig	3	3	3		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	77	77	77		
3125A2, B2	Drive End Bearing Temp, °F	88	88	89		
3125A, B	Motor Speed, rpm	2850	2850	2840		
VI-3125A1, B1	Thrust End Vibration, mils	0.09	0.08	0.08		
VI-3125A2, B2	Drive End Vibration, mils	0.05	0.05	0.05		
FIC-3125 PV	Fluid Flow Present Value, gpm	155	155	155		
FIC-3125 SP	Fluid Flow Set Point, gpm	155	155	155		
TI-3125A	Fluid Temp, °F	56	56	57		
PI-3125A, B	Fluid Inlet Pressure, psig	40	40	41		
PI-3125C, D	Fluid Outlet Pressure, psig	526	525	522		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	242	242	242		
TI-3126B	SLL-3160 Temp. Vent Sta, °F	56	56	56		
TI-3126A	SNL-3150 Temp. Vent Sta, °F	56	56	56		
TI-3125B	SNL-3150 Temp. Div Box, °F	55	55	55		

(Make copies of this sheet as required)

Data Recorder: DOUG GERKEN (PRINT NAME) D.G. (INITIALS) 3/24/98 (DATE)

B-Pump auto 155 Gpm Point 2

Appendix G - System Data Sheet

Item	Description					
Pump ID	P-3125A or B	P-3125B	P-3125B	P-3125B		
Proc. Step No.	Procedure Step Number	~~10.67~~	~~10.67~~	~~10.67~~	10.67	10.67 3/24/98
Date	Date	3/24/98	3/24/98	3/24/98		
Time	Time, hr:min	13:40	13:50	14:00		
Test Instrumentation						
FI-temp	System Flow, gpm	151	152	152		
PI-temp-1	Supply Pressure, psig	42	40	40		
PI-temp-2	Press. upstream V-temp-2, psig	75	75	75		
PI-temp-3	Return Pressure, psig	3	3	3		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	78	78	78		
-3125A2, B2	Drive End Bearing Temp, °F	89	90	90		
125A, B	Motor Speed, rpm	2930	2950	2930		
VI-3125A1, B1	Thrust End Vibration, mils	0.16	0.10	0.15		
VI-3125A2, B2	Drive End Vibration, mils	0.10	0.07	0.10		
FIC-3125 PV	Fluid Flow Present Value, gpm	155	155	155		
FIC-3125 SP	Fluid Flow Set Point, gpm	155	155	155		
TI-3125A	Fluid Temp, °F	57	57	58		
PI-3125A, B	Fluid Inlet Pressure, psig	40	40	40		
PI-3125C, D	Fluid Outlet Pressure, psig	565	573	568		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press, Vent Sta, psig	292	285	285		
TI-3126B	SLL-3160 Temp, Vent Sta, °F	56	56	56		
TI-3126A	SNL-3150 Temp, Vent Sta, °F	56	56	56		
TI-3125B	SNL-3150 Temp, Div Box, °F	56	56	56		

(Make copies of this sheet as required)

Data Recorder: DOUG GERKEN (PRINT NAME) D.G. (INITIALS) 3/24/98 (DATE)

B-Pump AUTO 155 GPM POINT 3

Appendix G - System Data Sheet						
Item	Description					
Pump ID	P-3125A or B	P-3125B	P-3125A	P-3125B		
Proc. Step No.	Procedure Step Number	10.73	10.73	10.73		
Date	Date	3/29/98	3/29/98	3/29/98		
Time	Time, hr:min	14:10	14:20	14:30		
Test Instrumentation						
FI-temp	System Flow, gpm	145	145	145		
PI-temp-1	Supply Pressure, psig	40	42	42		
PI-temp-2	Press. upstream V-temp-2, psig	195	195	195		
PI-temp-3	Return Pressure, psig	3	3	3		
Pump Statistics (operating booster pump, from PCU-2 screen on MCS)						
TI-3125A1, B1	Thrust End Bearing Temp, °F	79	80	80		
3125A2, B2	Drive End Bearing Temp, °F	90	90	91		
3125A, B	Motor Speed, rpm	3150	3150	3140		
VI-3125A1, B1	Thrust End Vibration, mils	0.11	0.12	0.13		
VI-3125A2, B2	Drive End Vibration, mils	0.09	0.09	0.10		
FIC-3125 PV	Fluid Flow Present Value, gpm	155	155	155		
FIC-3125 SP	Fluid Flow Set Point, gpm	155	155	155		
TI-3125A	Fluid Temp, °F	59	59	59		
PI-3125A, B	Fluid Inlet Pressure, psig	40	39	40		
PI-3125C, D	Fluid Outlet Pressure, psig	692	692	682		
Header Data (from PCU-2 and PCU-3 screens on MCS)						
PI-3126B	SLL-3160 Press. Vent Sta, psig	406	404	402		
TI-3126B	SLL-3160 Temp. Vent Sta. °F	57	57	58		
TI-3126A	SML-3150 Temp. Vent Sta. °F	56	56	56		
TI-3125B	SML-3150 Temp. Div Box, °F	57	57	57		

(Make copies of this sheet as required)

Data Recorder: DOUG GERICEN (PRINT NAME) D.G. (INITIALS) 3/29/98 (DATE)

SIGNATURE/INITIAL VERIFICATION

All persons involved in procedure performance, data recording, and verification or evaluation of test steps shall provide their name, job title, signature, and initials in the following table.

NAME (PRINT)	TITLE	SIGNATURE	INITIAL
G Leshikar	Test Engineer	G Leshikar	GL
M.D. GERKEN	TEST ENGINEER		
[illegible]	ELECTRICIAN		
R.L. THOMSEN	NCO		
G COOPER	Labor		
Fidel Rivera	Electrician		
Lonnie J Steadman	Fitter		
William A. Johnson	Electrician		
Smith SL	Welder		
Steve Enloe	Fitter		
Carl van Katwijk	Project Engr		
N Z PARSONS	PROJ. MGR		
J.M. Neville	Super		
RONALD A. ARNDT	Q.C.		
DAVID A. GREENAWAY	TEST DIR.		
LARRY B. ATKINS	FDNW CE		
PJ ELMENDORF	LMHC QC		
J.E. DUNKS	TEST ENGINEER		
K. WILLOUGHBY	LMHC QC		
L.R. HALL	PROJECTS QE		
C.R. EICHMUTH	Test Dir.		
E. PACQUET	Test Manager		

TEST LOG

TEST NUMBER: HNF-1857

TEST LOG PAGE NUMBER: 10 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
9:00	Performed high bearing temperature tests on A1, A2, B1, and B2 (both pumps) using decade box
10:00	Performed motor winding temp test on both pump motores
1:00	Waiting on street elbows to replumb bearing oil level switches.

TEST LOG	TEST NUMBER: HNF-1857	TEST LOG PAGE NUMBER: 1 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
12/12 7:00Am	POTP-007 "Kickoff" Prejob Meeting
7:30Am	IA-V-1115A thru 1118A incorrect valve #'s, in procedure red-lined procedure (Appendix C) with correct valve #'s, IA-V-3115A thru 3118A.
9:00 Am	Breaker #'s listed in Appendix D incorrect per field verification, redlined procedure with correct breaker #'s per ECN-058-098
9:05Am	Redline Step 1.12.1, valve # corrected to IA-V-3105B.
10:00 Am	Ball valves on SOV's for flushing/cleanout (1 per SOV) should be verified to be in closed position.
10:30am	FE-3125, ultrasonic flowmeter, calibration certificate from vendor does not list cal. due date. Will check with vendor ← Never needs recal per vendor 12/17
3:00 pm	P-102-SY-02A 012 - Panel label where lock & tag placed Leads A, B, C removed
3:15pm	VSD-1 and VSD-2 LED screens show "MASTER INHIBIT" and FAULT indicator is illuminated. RESET button VSD keypad does not take VSD out of fault. Shutting off power to each VSD and then reclosing disconnect resulted in DRIVE READY indication, correcting problem and allowing ~~Section~~ Steps 2.1-2.10 and 3.1-3.10 to commence.

TEST LOG

TEST NUMBER: HNF-1857

TEST LOG PAGE NUMBER: 2 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
12/13 7:00	Pre-job meeting
8:10	Booster pump low oil level switch, LSL-3125B2, sightglass is empty Alarm table on MCS shows LAL-3125A2 and B2 in alarm.
8:15	Jumpered low oil level switches LSL-3125A2 and LSL-3125B2 closed so that booster pumps can be started for testing of other pump interlocks
8:30	Appears LSL-3125B1 and LSL-3125B2 are wired backwards (vice-versa)
9:30	Per field troubleshooting, LSL-3125B1 wires were swapped with LSL-3125B2 wires at 24V junction box at booster pump. Vendor drawings accurate, W-058 drawings don't show each wire termination, show cable runs, are OK. Fixed problem by swapping wires to correct configuration. Alarms were cleared from MCS alarm table
9:45	PLC logic being modified for LDA-3150 and LDA-3151 sump leak detection steps 1.32.5 and 1.32.7.
10:30	Step 2.23, Diversion Box Icon in transfer path (Scheme 2A) PCU-2 is RED and 244A Lift Station Icon is RED. Does not affect performance of Interlock tests as PATH CLEAR is indicated in GREEN on MCS overview screen, per test engineer.

TEST LOG

TEST NUMBER: HNF-1857

TEST LOG PAGE NUMBER: 3 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
10:40	~~with~~ Step 2.24, Boxes PCV-2 and PCV-4 on MCS overview screen in RED, acceptable per test engineer. ~~and~~ See previous in log.
10:45	Add step after 2.25.4, bypass hi-lo alarm on 102-SY-transfer pump so that it won't shut down pump after 5 minutes
11:00	Step 2.25.3, VSD-1 tripped on "over-frequency" and FAULT LED illuminated according to VSD-1 LED display, after booster pump START selected at MCS. Turned off power to VSD-1 (per vendor manual instructions for troubleshooting) and then restarted approx. a minute later, to reset VSD-1.
11:05	Step 2.25.3, booster pump start selected, RUN LED illuminated for approx 2 seconds then returned to DRIVE READY (LED illuminated). FAULT LED NOT illuminated. Booster pump stopped on MCS for unknown reason.
11:10	Retried. same result as above.
12:50	Rupture disks for 244-A configured incorrectly on PLC.
1:20	Reason why VSD-1 and booster pump shutting down was due to PLC logic error, 10 psig minimum required at PT-3125A and 50 psig required at PT-3125C (to get "booster pump is running" on MCS). Were programmed vice-versa. Switched to proper logic and transfer scheme 2H executed and booster pump started successfully, no shutdown at VSD-1

TEST LOG

TEST NUMBER: HNF-1857

TEST LOG PAGE NUMBER: 4 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
2:05	To allow booster pump to stop, must remove pressure provided to PT-31254 by the VTPS. Add step between 2.25.8 & 9 to perform this action
2:20	Step 2.25.9, VSD-1 stopped booster pump when STOP button pressed. however MCS still indicates START ENERGIZED (i.e. booster pump running) and 102-SY pump DRIVE RUNNING (transfer pump still running)
2:40	skipped to step 2.37, Interlock 10.7, step 2.37.3 not completely accurate, pump actually starts but then stops after 5 seconds, due to the 5 second delay programmed in the logic. Modify step 2.37.3 to ~~add "after~~ say "booster pump stops after 5 seconds."
2:50	After troubleshooting, step 2.25.9 thru .11 succesfully completed. (removed "force" left in PLC logic)
3:15	Computer terminal on right would not accept transfer scheme 2B valve lineup (Reset, initiate, type 2B), no path in GREEN
3:20	Step 3.23.1, Diversion Box Icon in transfer path (Scheme 2B) on MCS overview screen is illuminated in RED. Does not affect performance of interlock tests as PATH CLEAR is illuminated (GREEN). Step 3.37.6, add step to RESET P-102-SY-02A Hi-low limit alarm.
3:50	Remove step 3.37.11, booster pump does not stop on high inlet pressure, directly (would stop on low inlet pressure when transfer pump stopped)

TEST LOG

TEST NUMBER: HNF-1857

TEST LOG PAGE NUMBER: 5 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
3:55	Step 3.38.3 N/A, not required because removing step 3.37.11 (select booster pump START; verify pump stopped)
3:56	After step 3.38.4, Reset SY pump hi-low alarm
4:15	Testing Interlock 7,10,14 on both pumps P-3125A & B using VTPS. Other interlocks will test having pressures (20 psig at inlet & 60 psig outlet) "forced", which has same effect. Will not change of method in procedure.
4:20	Changing from Transfer Scheme 2B to 2A, reset & initiate 2A scheme and get correct valve lineup, however Transfer Path ~~or~~ illuminates (GREEN) on 2B path not 2A path like it should. → wrong, OK, slurry line path is LIT. (GRAPHIC IS CORRECT AS IS) confusion with SY-A and SY-B labels on screen make it appear like there is a path for 2A and 2B.
12/15 7:00	Pre-job meeting at Diversion Box
9:30	PCS forced bits (20 psig) to inlet pressure and (60 psig) discharge pressure on booster pumps, allowing VTPS's to be removed for Interlock 6 tests.
10:00	Interlock 15 test, booster pump DOES NOT physically start. When bypass valve, drain valves, or vent valve opened, "STATUS UNKNOWN" Appears on MCS screen for PCV-2 and pump will not start when the START button depressed.
11:00	on MCS screen, when drain valve (MOV) actuated the valve icon stays RED for approx 10 seconds until limit switch finally trips, turns icon WHITE OR GREEN

TEST LOG

TEST NUMBER: HNF-1857

TEST LOG PAGE NUMBER: 6 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
11:20	MOV-3125BE will not open from MCS, physically did not open - local verification
11:25	MOV-3125BF when opened from MCS, also opens MOV-3125BE.
1:30	Construction changing wire labels in 244-A, LDA-841 tripped on MCS screen (leak detection).
1:35	MOV-3125BE problem appears to have been caused by RSview (MCS) and the 9600 baud data highway. PCS thinks that stringing the new, temporary cable aboveground (in progress) will prevent such problems in futur. MOV-3125BE ; BF now operating properly.
1:40	L. Atkins, FDNW construction, added oil (topped off) oil reservoirs on pump bearing housings A1, A2, A3, A4 to manf. recommended levels.
2:00	LAL-3125AZ in alarm after oil fill
2:15	Nipple, 1/4" x 4", to AZ oiler bent downwards at threads after inspection. Perhaps a heavy object fell on it during shipment? Replaced nipple and refilled oiler
3:00	Adjusted oiler to max height and tightened oil float casing down about 2 threads, but LAL-3125AZ still in alarm on MCS. Will contact Sulzer Bingham field rep. to resolve.

TEST LOG

TEST NUMBER: HNF-1857

TEST LOG PAGE NUMBER: 7 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
4:10	Vibration interlock activates at 13.7ma, step 2.29.10, vibration velocity (0.61 m/s) tolerance ±0.05 in/s corresponds to ±.8ma on PLC (4ma-20ma scale) interlock within tolerance
12/16 7:00	Pre-job at Diversion Box
11:00	All morning, communications problems between OIT (MCS) computer terminals and PCU-1. Installation of new cable would help prevent these problems. (INSTALLED DATA HIGHWAY FROM OIT TO PCU1 TO CORRECT PROBLEMS S.S.)
11:30	LAL-3125AZ switch supposed to be fixed.
12:30	successfully completed pump seal high flow and low pressure tests for pump P-3125B.
1:00	Temperature simulator instrument has dead batteries.
1:15	Attempted to perform Interlock 2 test. Could not perform because PT-3168 pressure transmitter 0-1000 psi range has not yet been replaced with a -15psi to 30 psi range ~~transmitter~~ transmitter. (REPLACED TRANSMITTER WITH TRANSMITTER OF CORRECT RANGE. (VACUUM)

TEST LOG

TEST NUMBER: HNF-1857

TEST LOG PAGE NUMBER: 8 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
2:00	Have new batteries for temperature simulator, but now have no manual.
2:15	Step 3.31, drained entire bearing oil reservoir B1 and got no alarm, LAL-3125B1.
2:20	Volume of oil = 1020mL including oil in globe Volume of oil in globe = 200 mL
2:30	Discovered that LAL-3125B1 was jumpered out! Checked the other 3 to verify they ~~other~~ were not also jumpered.
3:00	Nobody can figure out temp. simulator manual. Will postpone and have Belhaven bring out a calibrated decade box tomorrow.
3:30	Performed pump seal high flow tests for pump P-3125A.
3:45	Problem with software, STOP bit for P-102-SY-02A transfer pump not dropping out (0:7/3 and 0:7/4)
4:30	Problem solved by Friedrich and PCS guy. Was caused by software change on SOV-3125D. THIS WAS HOW SY PUMP SHUTDOWN WAS VERIFIED AS OPOSED TO STEPS 2.50 & 2.51 AS PUMP WAS LOCKED OUT.

TEST LOG

TEST NUMBER: HNF-1857

TEST LOG PAGE NUMBER: 9 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
12/17 7:00	Pre-job meeting
	Ultrasonic Flowmeter DF868 Electronics Console Parameters
	Step 4.12 of Pre-requisites
	Parameter — Value
	Transducer No. — 30 — will be changed. Current transducer is rated for "cold" water only and needs to be replaced after testing with one rated for "hot" fluids.
	Pipe Material — Steel / Stainless Steel
	Pipe O.D. — 3.5 inches
	Pipe Wall — 0.216 inches
	Lining — No
	Tracking Windows — No
	Fluid Type — water
	Water — Normal water
	Water Temperature — 68°F
	Reynold's Correction — Standard
	Calibration factor — 1.0
	No. of traverses — 2
	Transducer Spacing — 3.279 in, 83.3 mm

TEST LOG	TEST NUMBER: HNF-1857	TEST LOG PAGE NUMBER: 10 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
12/18/97	PERFORMED VALVE LINEUPS, REWORK ON LEVEL SENSORS
	ON BP's (UNDER DIRECTION FROM SULZER BINGHAM
	FIELD REP), GENERAL PREP TO FILL PIPE
12/19/97	0836 BEGAN FILLING PIPE
	≈ 0945 EMPTY TRUCK - REFILL - CONTINUE FILLING.
	≈ 1245 BEGAN RECIRC WITH SUPPLY PUMP
	SYSTEM CLEARED OF AIR
	≈ 1600 VENTED BP - LARGE AIR BUBBLE IN PUMP
	↑ (OPENED TAP ON VENT LINE)
	≈ 1610 BUMPED PUMP - ROTATION WRONG
	≈ 1645 2nd BUMP - ROTATION CORRECT
	≈ 1650 RUN PUMP
	≈ 1720 LOCKED DOWN FOR EVENING
12/20/97	0730 TROUBLE SHOT PT ON VENT STA VENT HEATER.
	0900 BEGAN CIRC. OF WATER
	0900 ~~INITIATE BA 'A' RUN~~ VERIFY VALVE LINE UP PER APPENDIX
	F-1 - note valves SDV 312 C & E ARE OPEN FOR 'A' PP RUN.
	• ~~RESET~~ ACCEL TIME ON VSD TO 10 sec. (WAS 20) PER SR REQ.

TEST LOG	TEST NUMBER: HNF-1857	TEST LOG PAGE NUMBER: 11 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
12/20/97	≈ 1030 HRS ATTEMPTED TO START BPA – FAILED
	CHECKED PARAMETERS – FAILED AGAIN
	LOCKED OUT VSD – BEGAN TROUBLE SHOOTING.
	BROKE COUPLING – MOTOR SPINS – PUMP IS LOCKED
	DECISION MADE TO OPEN PUMP BEFORE TESTING
	IS CONTINUED
1500 HRS	RECONFIGURED TEMP & SYS. TO DRAIN SLURRY
	LINE BACK INTO TANKER – (SYS. WILL HAVE TO
	BE RECHECKED BEFORE TEST CAN CONTINUE)
	DRAINING IS REQUIRED TO DISASSEMBLE
	BPA VENT VALVE TO ALLOW DISASSBLY OF
	THE PUMP. KN 12/20/97

TEST LOG	TEST NUMBER: HNF-1857	TEST LOG PAGE NUMBER: 12 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
	RESUMED TESTING ON POTP-007 AFTER PUMP FAILURE
2/11/98	REVERIFIED ELECTRICAL LINEUP PER STEP 1.3 AND APPENDIX D.
	REVERIFIED STEPS 1.2 & 1.9 THRU 1.13
	COMPLETED STEPS 1.19 THRU 1.29
2/12/98	RESUMED TESTING ON POTP-007 STEP 1.30
	- DIVERSION BOX COMPRESS
	- TROUBLE SHOOTING
	- STEP 2.24 [2.3, 2.4] [2.48.1] BOXES ARE RED DUE TO MISSING JUMPERS & PRESSURE SIGNALS.
	- MOV-312SAK CYCLES ON AND OFF TURNED OFF POWER TO TROUBLESHOOT VALVE
	~~- WITH 2B PATH CLEAR IN STEP 3.12~~
2/13/98	- VENT STATION SUMP WAS IN ALARM - ADJUSTED ALARM AND RETESTED ALARM NOW CLEAR
	- RESUMING TESTING ON B-PUMP INTERLOCKS
	- TO FACILITATE TESTING THE B-PUMP HILTAP WILL BE USED TO TEST BOTH PUMPS WHICH REQUIRES VALVE SOV-312SG OPEN TO TEST A-PUMP (SEE STEP 7.19)

TEST LOG	TEST NUMBER: HNF-1857	TEST LOG PAGE NUMBER: 13 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
2/13/98	- TROUBLESHOOTING A PUMP VENT VALVE MOV-3125AK
	- PUMP IS BEING STARTED IN STEP 7.6 AT 20% (8.8)
	SPEED PER SULZER REQUEST FOR INITIAL STARTUP
	AND REDUCED TO 50% IN STEP 7.25.1 AFTER (8.22.1)
	PUMP STARTS. ALSO SULZER REQUESTED SPEED
	RAMP BE SET TO 5 SECONDS AT USD 1 & 2.
2/17/98	- SETUP SYSTEM TO OPERATE B-PUMP (COMPLETED TESTING SECTION 7)
	PER SECTION 8.0
	- STARTED B-PUMP TEST NOTICED A-PUMP
	WAS RECIRCULATING SAME DISCHARGE PRESSURE
	AS B-PUMP. STOPPED PUMP TO TROUBLESHOOT.
	FOUND VENT VALVE TO A-PUMP MOV-3125AK
	WAS NOT CLOSING.
2/18/98	- REPLACING A-PUMP VENT VALVE MOV-3125AK
	WITH DRAIN VALVE FROM A-PUMP (MOV-3125AV) TO ALLOW
	B-PUMP TESTING TO CONTINUE. B-PUMP VSD
	IS NOT WORKING PROPERLY FOUND LOOSE WIRE, TIGHTENED
	WIRE BUT PROBLEM PERSISTS.

- STEPS 7.33.1 THRU 7.33.5 ~~7.33.6~~ ALONG WITH 8.34.1 THRU 8.34.4 & 8.36 WERE DELETED AS THESE STEPS ARE TO ASSIST IN TUNING PID WHICH HAS ALREADY BEEN DONE.

TEST LOG

TEST NUMBER: HNF-1857

TEST LOG PAGE NUMBER: 14 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
2/19/98	- RESUMED TESTING OF B-PUMP AFTER ~~FAILURE~~ TROUBLESHOOTING B-PUMP SPEED DRIVE.
	- NOTED HIGH 7.0.30 IPS VIBRATION AT CERTAIN SPEEDS.
	- ENCASEMENT LEAK DETECTOR LDA-3160
	ALARMED AT 15:06, 15:12.
	- ENCASEMENT LEAK DETECTOR LDA-3161
	ALARMED AT: 16:16. ~~COMPLETED~~
	- COMPLETED B-PUMP TESTING ATTEMPTED TO RUN
	A-PUMP BUT THE USD EXHIBITS THE SAME
	PROBLEMS THAT THE B-DRIVE HAD. (DRIVE RPM
	DOES NOT MATCH MOTOR RPM AND WHEN DRIVE IS
	STOPPED FROM MCS MOTOR RPM SURGES BEFORE
	STOPPING) ALSO NOTED PUMP RESTARTS AUTOMATICALLY AFTER USD FAULT CLEARS.
	- AN INSERVICE LEAK TEST WAS PERFORMED ON
	THE A-PUMP AFTER REPLACING MOV VALVES 500-312SA & ~~500-312SB~~ MOV 500-312SB)
	AND WAS WITNESSED BY BOTH FDNW & LOCKHEED
	MARTIN QC. KW 2-20-98
	- NOTED HIGH VIBRATION 7.0.60IPS ON A PUMP
	AT APPROX 3000 RPM.

- NOTE USD VENDOR SET MINIMUM RUN FREQUENCY TO 30 HZ THEREFORE PUMPS WILL NOT RUN BELOW 1800 RPM AS CURRENTLY SETUP.

TEST LOG	TEST NUMBER: HNF-1857	TEST LOG PAGE NUMBER: 15 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
2/20/98	- ~~EXP~~ COMPLETED RUN IN OF A-PUMP IN MANUAL
	- ATTEMPTED TO RUN A PUMP IN PID-AUTO WITH SET POINT OF 240 GPM AND PROPORTIONAL BAND SET TO .8 ONLY GOT 90 GPM OF FLOW ALSO AFTER APPROX 10 MIN FLOW DID NOT INCREASE. ATTEMPTED DIFFERENT SET POINTS ~~BUT~~ WITH LIMITED SUCCESS STOP TESTING DUE TO TIME CONSTRAINTS.
2/23/98	- DID NOT RUN PUMPS DUE TO FDNW SAFETY CONCERNS. - RERANGED FLUSH PUMP FLOWMETER AND SLURRY PUMPS FLOW TRANSMITTER. ✳
2/24/98	- PERMALERT ON SITE TO INSTALL NEW SOFTWARE IN ENCASEMENT LEAK DETECTOR PANELS. ATTEMPTED TO OPERATE B-PUMP BUT VSD PROBLEMS CONTINUE TO SHUT DOWN PUMP.

✳ FI-3125 RERANGED FROM 0-240GPM TO 0-160GPM TO PREVENT PUMP FROM OPERATING OUTSIDE PUMP CURVE PER JIM COLLINS (FDNW LEAD DESIGN ENGINEER)

TEST LOG	TEST NUMBER: HNF-1857	TEST LOG PAGE NUMBER: 16 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
2/25/98	- ATTEMPTED TO RUN B- PUMP PUMP WILL NOT RUN PROPERLY ISOLATED PROBLEM TO VSD. (CONTACTED VSD VENDOR FOR ON-SITE SERVICE)
	- PERMANENT ON SITE LOADING NEW SOFTWARE SO PUMP TESTING IS STOPPED
2/26/98	- RAN A-PUMP GOT PUMP TO OPERATE IN AUTO (PID) WITH INITIAL PID SETTINGS.
	- HIGH VIBRATION CONTINUES ON A-PUMP AT APPROX 3900 RPM PIPEFITTERS WILL ATTEMPT TO ANCHOR PIPING DOWN AND THEN WE WILL RETEST PUMP.
	- RAN A-PUMP IN PID AUTO AT 110 GPM PER SECTION 9 OF PROCEDURE.
3/2/98	CONTINUED TESTING ON A PUMP IN PID AUTO MODE. COMPLETED A PUMP AUTO TESTING.

TEST LOG	TEST NUMBER: HNF-1857	TEST LOG PAGE NUMBER: 17 of 18

TEST TITLE: Preoperational Test POTP-007, Cross Site Transfer System Integrated Test

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
3/24/98	RESUMED TESTING STARTED SECTION 10.0
	- STEP 10.14.1 PCU-2 IS REQ BECAUSE INLET PRESS
	IS > 70 PSIG AND PCU-5 IS REQ BECAUSE 200E
	MPS IS IN ALARM. COMPLETED SECTION 10.0
3/27/98	CONTINUED TESTING SECTIONS 11 & 12.
3/28/98	COMPLETED TESTING SECTIONS 11 & 12.
✱3/31/98	DURING INTERLOCK TESTING WIRES NOTED HAD
	NOT BEEN LABELED PER LATEST DESIGN
	DOCUMENTS. CORRECT WIRES WERE LIFTED
	AS DETERMINED BY TEST ENGINEER AND WERE
	RELABELED TO MATCH DESIGN DOCUMENT PRIOR
	TO COMPLETION OF POTP-007.
	- NOTE STEP 7.15, 7.36, 8.27 & 8.38 THE USD AS DESIGNED
	DOES NOT PERFORM THESE FUNCTIONS.

TEST EXCEPTION LOG				
TE #	DATE	DESCRIPTION	DISPOSITIONED	DATE CLOSED
-001	12/20/97	Pump P-3125A is locked up, however motor turns freely when decoupled from pump.	Disassemble both pumps P-3125A & P-3125B under vendor supervision and determine cause of lock up. Vendor determined that the pump locked up because it was provided with a non protected (non overlaid) surface on the hub side of the impellers. Both pumps were modified to include a hub side wear ring and all wear rings were overlaid with the same type of material as the eye side wear rings for abrasive service, per SBPI NCR 155599, 155766 and 155767. Resume testing upon completion of corrective work and close-out of referenced NCR's.	02/11/98
-002	02/02/98	Observed leakage from pump air seals.	Replaced flowserve model #982 seals with new "wavy face" technolgy seals. Rechecked pump air seal flowrates per steps 1.8 and 1.9.	02/11/98

-003	02/17/98	When B pump was started, pressure sensors (located between the A pump closed inlet and discharge valves) on the A pump loop also indicated a pressure rise. This indicates a leakage path from the B pump discharge to the A pump loop. The problem was identified as a leak through the A pump vent valve (MOV-3125AK).	1. Replace MOV-3125AK valve body with valve body from first stage drain valve (MOV-3125AJ) and resume testing (concurrence by Jim Collins FDNW Lead Engineer). 2. Procure a direct replacement valve body and install it in the MOV-3125AJ position. 3. Verify that this rework meets original pressure testing requirements by performing a in service leak test.	02/19/98
-004	02/18/98	The B-pump VSD goes into either overcurrent or overvoltage fault which causes the speed drive to shut down. This happens intermittently when the VSD is given a remote speed change from PCU-2.	VSD vendor to troubleshoot and repair. Retest to verify remote speed changes do not cause the drive to go into fault and shutdown.	2/20/98

-005	02/19/98	Both the A and B-pumps exibit high vibration at certain RPM. The vibration on the A-pump exceeds the high vibration setpoint which causes the pump to automatically shutdown. Typically A pump exceeds .60 IPS at approximately 3,000 RPM and B pump exceeds .30 IPS at approximately 2,950 RPM.	Pump vendor to troubleshoot and repair. Retest to verify vibration is within acceptable tolerance. MOVED TO OAC PUNCHLIST	3/31/98
-006	02/19/98	Both A and B pumps restart automatically after a VSD fault because the start signal from PCU-2 is latched in and a VSD fault does not unlatch the start signal. Also the start/stop inputs to the VSD's are reversed.	Write ECN to correct logic (unlatch start signal)and wiring (start/stop inputs reversed) at PCU-2 and retest that pump does not restart after a VSD fault.	3/27/98

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
HNF-1857, 7.23	POTP-007 INTEGRATED TEST	TE-001

DESCRIPTION OF PROBLEM:

Pump P-3125A is locked up, however motor turns freely when decoupled from pump.

ORIGINATOR:

M. D. Gerken D.G. 12/20/97

ORG: DATE:

IMPACT ON TESTING: X HOLD FOR RESOLUTION ☐ CONTINUE

M. D. Gerken D.G. 12/20/97

TEST ENGINEER DATE

DISPOSITION:

Disassemble both pumps P-3125A & P-3125B under vendor supervision and determine cause of lock up.

Vendor determined that the pump locked up because it was provided with a non protected (non overlaid) surface on the hub side of the impellers. Both pumps were modified to include a hub side wear ring and all wear rings were overlaid with the same type of material as the eye side wear rings for abrasive service, per SBPI NCR 155599, 155766 and 155767.

Resume testing upon completion of corrective work and close-out of referenced NCR's on 01/23/98.

SEE ATTACHED VENDOR REPORT.

DISPOSITION AND RETEST REQUIREMENTS BY:

M. D. Gerken D.G. 02/10/98

DATE

DISPOSITION ACTIONS COMPLETE:

Verified [signature] 2-10-98

DATE

QAE CONCURRENCE WITH DISPOSITION (if required):

Larry R Hall 2/10/98

DATE

RETEST COMPLETE: N/A

TEST ENGINEER DATE

NONCONFORMANCE REPORT

Project No.	W.O. No.	Location (Bldg./Area)	Safety Class	NCR No.
W-058	C12300	Bldg. 6241-A/200W	3	W-058-27 (FDNW-18)

Job Title

Replacement Cross Site Transfer System

Requirement(s) (Including source document numbers, revision, paragraph, etc.)

Procurement Specification, W-058-P1, Revision 2, "Slurry Transfer Pumps"

Section 3.3.4 states: "The pump, motor, and ancillary equipment shall be designed for 10,000 hours of intermittent operation without maintenance..."

Description of Nonconformance:

During the performance of the Pre-operational test (POTP-007) the slurry transfer pump P-3125-A failed to function properly. It was noted during the performance of step No. 7.23, on 12/20/97, that the pump siezed. See Supporting Document HNF-1857.

Distribution 12-29-97

~~FDH~~ FDNW

J O Knight 1,3

NHC

J L Gilbert 1,3
E A Pacquet 1,3
G L Parsons 1,3
C Van Katwijk 1,3

FDNW

A I Files 1,3
Q C Files 1,3
Records Management 3
Const Doc Control 1,2
Compliance Assessment 1,2,3
Quality Engrg 1,3
PM/J L Henderson 1,2,3
FCE/T E Nemzek 1,2,3
J R Collins 1,2,3
J E Thomas 1,2,3
QA/L R Hall 1,3
J A Peltier 1,3

Originator	Date	Manager	Date
JEFF MIDDLETON	12/22/97		12/22/97

NONCONFORMANCE REPORT (continued)

Page 4 1-12-98
2 of 24

Disposition
☐ Use-as-is* ☐ Reject ☐ Repair* ☒ Rework
*Justification Required

ASME Code Related ☒ No ☐ Yes
(ASME Code Section _____)

Cause Code: MOS9

NCR No. W-058-27 (FDNW-18)

Disposition Instructions (generally not required for use-as-is and reject dispositions):

Sulzer Bingham Pumps to rework impellers per their NCR No. 155766, see attached.

ECN (generally required for repair and use-as-is dispositions):

☐ Yes ☒ No If yes, ECN No. _____

If no, provide explanation: NA

Disposition Justification (if applicable):

Pump impellers rework will enhance the wear parts on the hub side and does not affect the pumps capability to meet the original specification requirements.

Approval/Concurrence:

Construction Approval				Customer Projects Approval			
CF/CM Engineer	NA	Date	NA	Engineer	G.L. PARSONS (NHC)	Date	1-12-97
Field Quality Engineer	NA	Date	NA	QA	SEE DESIGN APPROVAL	Date	NA
Design Approval				**Other Concurrence**			
Design Engineer	J.R. COLLINS (FDNW)	Date	1/12/98	FDH	NA	Date	NA
Lead Engineer	J.R. COLLINS (FDNW)	Date	1/12/98	AI/ANI (ASME)		Date	
Quality Engineer	L.R. HALL (FDNW)	Date	1/12/98	FDNW Code Eng.		Date	
Safety Engineer	NA	Date	NA	Environmental		Date	

Closure
☐ Disposition Completed as Directed
☐ Other (Explain) Per Disposition, See Attached NCR #155766 for Rework Direction.

Originator or Representative _____ Date 1-13-98

Supervisor _____ Date January 13, 1998

PAGE 3 OF 4
SULZER PUMPS
NCR #W-058-27
(FDNW-18)

Between Bearings Business Unit
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Portland, OR 97210-1502
U.S.A.
Tel. (503) 226-5354
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Sulzer Bingham Pumps Inc., 2800 N.W. Front Avenue, Portland, OR, U.S.A. 97210-1502

Fluor Daniel Northwest Inc.
2355 Stevens Drive
Richland, Washington 99352-1100

Attn: Mr. Jack Henderson

Your reference: MZ4-APX-80708
Our reference: 1E776/777

Date: January 9, 1998

Subject : NCR Report No. 155766 & Efficiency Update

Dear Mr. Henderson:

Please find attached the NCR generated in our factory for the rework described in our previous letter.

Please also note that an error was made in the hub ring efficiency calculation. When the correct values are used, the calculated losses due to this upgrade are less than 0.2% which is negligible.

If you have any questions or require additional information, please feel free to call me.

Best regards,

Best regards,

Kevin M. Harold

Kevin M. Harold

SULZER BINGHAM PUMPS INC.
NON-CONFORMANCE REPORT (NCR)

PAGE 4 OF 4
NCR # W058-27
(FDNW-18)

NCR No. 155766
Sheet 1 of

FORM 561A-10
Ref Procedure H31.2

Note: All notations/documentation to be in black ink.

PART DESCRIPTION	ITEM (ASSEMBLY) NO.	SERIAL NO.	SALES ORDER NO.	WORK ORDER NO.
ELEMENT	200	1E776	1E776	N/A

DRAWING NUMBER REV.	MATERIAL	PATTERN NO.	LOCATION	SUPPLIER NAME	P.O. NO.
B-1E776-08	N/A	N/A	Pump Assy	N/A	N/A

QTY ON ORDER	QTY REJECTED	PART STATUS: COMPL. ☒ INCOMPL. ☐	Q.C. ORDER ☒ NON-Q.C. ORDER ☐
1	1		

COMPONENT NO.	LAST OPER. COMPL.	MATERIAL TRACE CODE NO.
N/A	N/A	Per List

LINE	QTY	NOTE: FOR REJECTABLE CONDITIONS, REPORT THE REQUIRED CONDITION AND THE ACTUAL CONDITION.	GRID MAP LOCATION ALPHA N/A NO. N/A
1	1	~~DISASSEMBLE ELEMENT AND DIMENSIONALLY INSPECT~~	
2		~~THE HUB DIAMETERS AND STAGE BIECE (HUB SIDE)~~	
3		~~DIAMETERS - RECORD DIMENSIONS~~	
4		~~CHECK PARTS TO DRAWINGS B 12675, B-1E776-25~~	
5		~~& B-1E776-27 - R 1/8/98~~	
6			
7		ELEMENT PICKED UP ON THE HUB SIDE ON STAGE	
8		#3 IN THE FIELD DURING START-UP.	
9			
10			

REPORTED BY: (Please Print Name) T. Richfield DATE: 1/5/98
APPROVED BY: (Quality Dept. Only) D. Frahm DATE: 1/8/98
RESPONSIBILITY CODE: 4900 ERROR CODE: 10 PART FAMILY: 42 WORK CENTER: N/A

LINE	ACTION TO CORRECT: Please check a box				
	☐ * USE AS IS	☐ SCRAP	☒ REWORK	* Use as is Disposition requires Engineering Justification.	
	☐ ** REPAIR	☐ OTHER	☐ RETURN TO SUPPLIER	** Requires Engineering Approval for non pre-approved repairs and Engineering Justification for ASME items only.	

REWORK EXISTING IMPELLERS TO DRAWINGS B-1E776-25 Rev A AND B-1E776-27 Rev A.

REWORK EXISTING CASE WEAR RINGS TO DRAWING B 49783

(Per ECR 01-014437)
INSTALL NEW WEAR RINGS, BALANCE IMPELLERS, REASSEMBLE ELEMENTS

DISPOSITION BY: (Please Print Name) Roger Risch DATE: 1/8/98

APPROVAL and/or CONCURRENCE

(Quality Department shall check the required signature boxes below for required approvals and/or concurrence)

	SIGNATURE	DATE		SIGNATURE	DATE
☐ Manuf. Engineer			Specify Other(s)		
☒ Design Engineer	Roger Risch	1/8/98	☐ Other		
☐ Purchasing			☐ Other		
☒ Quality Dept.		9/Jan 98	☐ Other		

☐ Check box if 10CFR Part 21 is reportable
☐ Check box if Corrective Action is required (Significant or Reccurring Conditions)

Reported by:
Approved by:

NCR Action Compl. (By Quality Dept. Only) CLOSED BY: DATE:

Telefax

SULZER PUMPS
Division of Sulzer Roteq

Sulzer Bingham Pumps Inc.
Between Bearing Pump
Bob Fowler
Contracts Administrator
2800 N.W. Front Avenue
Portland, OR 97210-1502
U.S.A.

Tel. (503) 226-5280
Fax (503) 226-5583

Date: February 26,1998

To: Fluor Daniel Northwest Fax 509-373-6303
Lanny Hall Phone 509-372-0583

Pages: 4 (including this one)

Subject: Transfer Pump Contract # DE-AC06-87RL10930
Purchase Order MZ4-APX-80708
SBPI S/O # 1E776/777
QA signed NCR Reports # 155599, 155766 & 155767

Dear Lanny,

Following up on your phone call this afternoon morning, attached is the information you requested with regards to the closed NCR reports:

Should you have any questions or need additional clarification, please call.

Best Regards,

Bob Fowler

cc: Kevin Harold
Tom Richfield

SULZER BINGHAM PUMPS INC.

NON-CONFORMANCE REPORT (NCR)

NCR No. 155766

FORM 561A-10

Sheet 1 of 2

Ref Procedure H31.2

Note: All notations/documentation to be in black ink.

PART DESCRIPTION	ITEM (ASSEMBLY) NO.	SERIAL NO.	SALES ORDER NO.	WORK ORDER NO.
ELEMENT	200	1E776	1E776	N/A

DRAWING NUMBER REV.	MATERIAL	PATTERN NO.	LOCATION	SUPPLIER NAME	P.O. NO.
B-1E776-08	N/A	N/A	Pump Assy	N/A	N/A

QTY ON ORDER	QTY REJECTED	PART STATUS: COMPL ☒ INCOMPL ☐	O.C. ORDER ☒ NON-O.C. ORDER ☐
1	1		

COMPONENT NO.	LAST OPER. COMPL.	MATERIAL TRACE CODE NO.
N/A	N/A	Per List

LINE	QTY	NOTE: FOR REJECTABLE CONDITIONS, REPORT THE REQUIRED CONDITION AND THE ACTUAL CONDITION.	GRID MAP LOCATION ALPHA N/A NO. N/A
1	1	~~DISASSEMBLE ELEMENT AND DIMENSIONALLY INSPECT~~	
2		~~THE HUB DIAMETERS AND STAGE BIGGE (HUB SIDE)~~	
3		~~DIAMETERS - PER RECORD DIMENSIONS.~~	
4		~~CHECK PARTS TO DRAWINGS B-17675, B-1E776-25~~	
5		~~1/2 B-1E776-27~~ - PL 1/8/98	
6			
7		ELEMENT PICKED UP ON THE HUB SIDE ON STAGE	
8		#8 IN THE FIELD DURING START-UP.	
9			
10			

REPORTED BY: (Please Print Name) T. Richfield DATE: 1/5/98

APPROVED BY: (Quality Dept. Only) J. Frahm DATE: 1/8/98

RESPONSIBILITY CODE: 4900 ERROR CODE: 10 PART FAMILY: 42 WORK CENTER N/A

LINE	ACTION TO CORRECT: Please check a box				
	☐ * USE AS IS	☐ ** REPAIR	☐ SCRAP	☒ REWORK	☐ RETURN TO SUPPLIER

* Use as is Disposition requires Engineering justification.

** Requires Engineering Approval for non pre-approved repairs and Engineering Justification for ASME items only.

REWORK EXISTING IMPELLERS TO DRAWINGS B-1E776-25 Rev A AND B-1E776-27 Rev A.

REWORK EXISTING CASE WEAR RINGS TO DRAWING B49783

(Per ECR 01-014437)

INSTALL NEW WEAR RINGS, BALANCE IMPELLERS, REASSEMBLE ELEMENTS

DISPOSITION BY: (Please Print Name) Roger Risch DATE: 1/8/98

APPROVAL and/or CONCURRENCE

(Quality Department shall check the required signature boxes below for required approvals and/or concurrence)

	SIGNATURE	DATE		SIGNATURE	DATE
☐ Manuf. Engineer			Specify Other(s)		
☒ Design Engineer	Roger Risch	1/8/98	☐ Other		
☐ Purchasing			☐ Other		
☒ Quality Dept.	[signature]	9:10am 98	☐ Other		

☐ Check box if 10CFR Part 21 is reportable

☐ Check box if Corrective Action is required (Significant or Reccurring Conditions)

Reported by: _____

Approved by: _____

NCR Action Compl. (By Quality Dept. Only) CLOSED BY: Gary Hedges DATE: 1-29-98

SULZER BINGHAM PUMPS INC.
QUALITY ASSURANCE DEPARTMENT

NON-CONFORMANCE REPORT (CON'T)

SHEET ___ OF ___

Line	Qty.	Report Rejectable Conditions And/Or Disposition Below
		W/O 1824586 ST6 #1 (SBP 60C) OK Impeller
		W/O 1824587 ST6 # 2 (SBP 60C) OK Impeller
		W/O 1824588 ST6 #3 (SBP 60C) OK Impeller
		W/O 1824589 ST6 # 5 (SBP 60C) OK Impeller
		W/O 1824590 ST6 #6 (SBP 60C) OK Impeller
		W/O 1824592 ST6 #8 (SBP 60C) OK Impeller
		W/O 1824591 ST6 #7 (SBP 60C) OK Impeller
		7 CASE Ring's HAVE been Reworked PER Dwg B49783 (SBP 60C)

ORIGINAL TO Q.A. WHEN COMPLETED

SULZER BINGHAM PUMPS INC.

NON-CONFORMANCE REPORT (NCR)

NCR No. 155767

Sheet 1 of 2

FORM 561A-10

Ref Procedure H31.2

Note: All notations/documentation to be in black ink.

DESCRIPTION	ITEM (ASSEMBLY) NO.	SERIAL NO.	SALES ORDER NO.	WORK ORDER NO.
ELEMENT	200	1E777	1E777	N/A

DRAWING NUMBER REV.	MATERIAL	PATTERN NO.	LOCATION	SUPPLIER NAME	P.O. NO.
B-1E776-08	N/A	N/A	PUMP ASSY	N/A	N/A

QTY ON ORDER	QTY REJECTED	PART STATUS: COMPL ☒ INCOMPL ☐	Q.C. ORDER ☒ NON-Q.C. ORDER ☐
1	1		

COMPONENT NO.	LAST OPER. COMPL	MATERIAL TRACE CODE NO.
N/A	N/A	Per List

LINE	QTY	NOTE: FOR REJECTABLE CONDITIONS, REPORT THE REQUIRED CONDITION AND THE ACTUAL CONDITION.	GRID MAP LOCATION ALPHA N/A NO. N/A
1		~~DISASSEMBLE ELEMENT AND DIMENSIONALLY INSPECT~~	
2		~~IMP HUB DIAMETERS AND STAGE FACE (HUB SIDE)~~	
3		~~DIAMETERS AND RECORD DIMENSIONS~~	
4		~~CHECK PARTS TO DRAWINGS B17675, B-1E776-25~~	
5		~~& B-1E776-27~~ TR 1/8/97	
6			
7		SEE NCR 155766 - THIS ELEMENT DID NOT	
8		START-UP, BUT WAS RETURNED FOR MODIFICATION	
9		PER 1E776 PUMP.	
10			

REPORTED BY: (Please Print Name) T. RICHFIELD DATE: 1/5/98

APPROVED BY: (Quality Dept. Only) J. Fraker DATE: 1/8/98

RESPONSIBILITY CODE: 4900 ERROR CODE: 10 PART FAMILY: 42 WORK CENTER N/A

LINE	ACTION TO CORRECT: Please check a box					
	☐ * USE AS IS	☐ ** REPAIR	☐ SCRAP	☐ OTHER	☒ REWORK	☐ RETURN TO SUPPLIER

* Use as is Disposition requires Engineering justification.
** Requires Engineering Approval for non pre-approved repairs and Engineering Justification for ASME items only.

7 REWORK EXISTING IMPELLERS TO DRAWINGS B-1E776-25 REV A AND B-1E776-27 REV A

7 REWORK EXISTING CASE WEAR RINGS TO DRAWING B&9783

7 (REWORK PER ECR 01-014437) INSTALL NEW WEARS, BALANCE IMPELLERS, & REASSEMBLE ELEMENT.

DISPOSITION BY: (Please Print Name) ROGER RISCH DATE: 1/8/98

APPROVAL and/or CONCURRENCE

(Quality Department shall check the required signature boxes below for required approvals and/or concurrence)

	SIGNATURE	DATE		SIGNATURE	DATE
☐ Manuf. Engineer			Specify Other(s)		
☒ Design Engineer	Roger Risch	1/8/98	☐ Other		
☐ Purchasing			☐ Other		
☒ Quality Dept.	[signature]	9Jan98	☐ Other		

☐ Check box if 10CFR Part 21 is reportable

☐ Check box if Corrective Action is required (Significant or Reoccurring Conditions)

Reported by:

Approved by:

NCR Action Compl. (By Quality Dept. Only) CLOSED BY: Gary Hedges DATE: 1-23-98

LYER BINGHAM PUMPS INC. | NON-CONFORMANCE REPORT (CONT) | SHEET ___ OF ___

QUALITY ASSURANCE DEPARTMENT

Line	Qty.	Report Rejectable Conditions And/Or Disposition Below
		W/O 1824586, ST6 #1 (BB) ok IMPELLER
		W/O 1824587, ST6 #2 (BB) ok IMPELLER
		W/O 1824588, ST6 #3 (BB) ok IMPELLER
		W/O 1824589, ST6 #5 (BB) ok IMPELLER
		W/O 1824590, ST6 #5 (BB) ok IMPELLER
		W/O 1824592, ST6 #8 (BB) OK IMPELLER
		W/O 1824591, ST6 #7 (BB) OK IMPELLER
		7 CASE RING'S HOUSE BORE REWORKED PER DWG B49783 (BB) 11/6/96

ORIGINAL TO Q.A. WHEN COMPLETED

FORM 561A-10

NCR No. 155599

Sheet 1 of 7

Ref Procedure H31.2

Note: All notations/documentation to be in black ink.

PART DESCRIPTION	ITEM (ASSEMBLY) NO.	SERIAL NO.	SALES ORDER NO.	WORK ORDER NO.
SHAFT NUT	1910839	N/A	5145 (WARRANTY)	01824593

DRAWING NUMBER REV.	MATERIAL	PATTERN NO.	LOCATION	SUPPLIER NAME	P.O. NO.
PER REPORT		N/A	Pump Assy		

QTY ON ORDER	QTY REJECTED	PART STATUS: COMPL. ☐ INCOMPL. ☒	Q.C. ORDER ☒ NON-Q.C. ORDER ☐
1	1		

COMPONENT NO.	LAST OPER. COMPL.	MATERIAL TRACE CODE NO.
1910835	1100	

LINE	QTY	NOTE: FOR REJECTABLE CONDITIONS, REPORT THE REQUIRED CONDITION AND THE ACTUAL CONDITION.	GRID MAP LOCATION ALPHA N/A NO. N/A
1	1	When TRYING TO RE ASSEMBLE ROTOR PER W/O - ASSY	
2		NOTED THAT (1) SHAFT NUT WOULD NOT TIGHTEN TO THE	
3		IMPELLER LIKE DESIGNED: (# 1910835 - DRAWING #	
4		A 39477) ROTOR DISASSEMBLED - PARTS INSPECTED TO	
5		DRAWINGS - They WERE TO PRINT.	
6			
7		Attention ENG: Roger Risch	
8			
9			
10			

REPORTED BY: (Please Print Name) Tom Crum DATE: 1/21/98

APPROVED BY: (Quality Dept. Only) J. Graham DATE: 1/22/98

RESPONSIBILITY CODE: 4900 ERROR CODE: 0010 PART FAMILY: WORK CENTER: N/A

LINE	ACTION TO CORRECT: Please check a box				
	☐ * USE AS IS	☐ ** REPAIR	☐ SCRAP	☒ REWORK	☐ RETURN TO SUPPLIER
	☐ OTHER				

* Use as is Disposition requires Engineering justification.
** Requires Engineering Approval for non pre-approved repairs and Engineering Justification for ASME items only.

REMACHINE SHAFT NUT (A39477). INCREASE DEPTH OF RELIEF ON ID TO 1.125. DRAWING WILL BE REVISED.

FOR S/N 1E777

DISPOSITION BY: (Please Print Name) ROGER RISCH DATE: 1/22/98

APPROVAL and/or CONCURRENCE

(Quality Department shall check the required signature boxes below for required approvals and/or concurrence)

	SIGNATURE	DATE		SIGNATURE	DATE
☐ Manuf. Engineer			Specify Other(s)		
☒ Design Engineer	Roger Risch	1/22/98	☐ Other		
☐ Purchasing			☐ Other		
☒ Quality Dept.	[signature]	2-2-98	☐ Other		

☐ Check box if 10CFR Part 21 is reportable

☐ Check box if Corrective Action is required (Significant or Recurring Conditions)

Reported by:

Approved by:

NCR Action Compl. (By Quality Dept. Only) CLOSED BY: Gary Hedges DATE: 1-23-98

Print Date: 01/22/98
Time: 15:51
Requestor: On-Line

PORTLAND PLANT (01)
** SULZER BINGHAM - WORK ORDER **
SULZER BINGHAM PUMPS INC.(US)

VISIBILITY/V6.2-SCS100RR
Page 5

ASSEMBLY #	Rev	WO#	TOTAL QTY	PLNR	PLANNED RELEASE DATE	TYPE	CHARGE TO	NEXT WHERE-USED	HIGHEST WHERE-USED
1910839	002	01824593	2.00	MU	02/05/98	H	14001	011.001 01705145	011.001

ROTATING ELEMENT MSE

COMP BY - DATE	TYPE	OPER#	WC#		SETUP TIME	RUN TIME	QTY REC'D	QTY COMP
				WITH THE APPLICABLE SEVEN DIGIT AND SALES ORDER NUMBER.				
				7. SIGN OFF OPERATION.				
	BV	1105	E2 -00	ENGINE LATHE	0.0	1.00	( )	( )
				MACHINE TO EXTEND REL LNTH.				
				- PER NCR INSTRUCTIONS.				
				Tools: NCR# 155599				
	BV	1110	INDH-00	INSPECTION - DIMENSIONAL	0.0	0.00	( )	( )
				INSPECT AND CONFIRM REWORK PER				
				NCR DISPOSITION.				
				Tools: NCR# 155599				
		1200	INDH-00	INSPECTION - DIMENSIONAL	0.0	1.00	( )	( )
				INSPECT ROTATING ELEMENT				
				2 INSPECTION #1 TO VERIFY				
				3				
		1300			0.0	1.00	( )	( )
				STORE AND RECORD LOCATION				

HNF-2504, REV. 0 ATTACHMENT 1 PAGE 41

SULZER PUMPS

Between Bearings Business Unit
Kevin Harold
Product Cell Manager
2800 N.W. Front Avenue
Portland, OR 97210-1502
U.S.A.
Tel. (503) 226-5354
Fax (503) 226-5583

Sulzer Bingham Pumps Inc., 2800 N.W. Front Avenue, Portland, OR, U.S.A. 97210-1502

Your reference: MZ4-APX-80708
Our reference: 1E776/777

Fluor Daniel Northwest Inc.
1100 Jadwin Ave
Richland, Washington 99352

Date: February 18,1998

Attn.: Jack Henderson - Project Manager
Bob Kitchen - Purchasing

Subject : **Transfer Pump Contract # DE-AC06-87RL10930**
Purchase Order # MZ4-APX-80708
SBPI S/O # 1E776/777
Reply to Telephone Conference Call, February 6,1998

Dear Jack,

In response to the conference call meeting minutes dated February 6,1998, below is SBPI's responses to the questions asked.

1) **Have SBPI explain the events of pump failure and their understanding of the mode failure.**

Action Item: SBPI to provide a written failure report including closed out Non Conformance Reports and corrective action.

Anticipated Completion Date: See explanation below

The element picked up because the pump was provided with a non protected (not overlaid) surfaces on the hub side of the impellers. This design was not suitable for the abrasive nature of the product. A hub side wear ring was added and the wear rings overlaid with the same type of material as the eye side wear rings for abrasive service.

Copy of closed out NCR's 155766, 155767 & 15599 enclosed (mailed to Jack Henderson on January 28,1998)

2) **Have SBPI explain the corrective action taken in detail.**

Action Item: Explanation provided in topic 1

3) **Have SBPI assure us that they have designed this pump to meet our specified requirements, specifically stating some of the design features and design verification methods use to assure that these requirement were met.**

Action Item: SBPI to provide additional information on SBPI pump applications. In addition, they will certify that they designed and manufactured these pumps for the specified life and service.

Anticipated Completion Date: **See explanation below**

Sulzer Bingham Pumps certifies that we have designed the slurry transport pumps to meet the operability, performance and life requirements set forth in the pump specifications.

The pump selection due to the head and flow rate required a multistage pump (although the optimum pump for slurry services is a slow running single stage pump; this pump will not provide the necessary dynamic head required). A single volute pump design was selected to provide two advantages:
1) The volute passageway is larger than a double volute design for the same flow (this provides improved flow of particulates and reduces erosion by reducing turbulent flow at the side walls)
2) The volute cavities are more easily drained due to improved accessibility caused by not having a long cross under passage.

The metallurgy selection of duplex stainless is because this material provides the best combination of corrosion and erosion protection of common cast materials. This material is used almost entirely in the sea water injection pump services where the erosion / corrosion problems are severe due to high fluid velocities inside these high speed machines combined with corrosiveness of the saline water. Wear parts are overlayed with a cobalt hardfacing for increased erosion protection. [The hardness of the overlayed surfaces > HRC 58 (543 HB). Sophisticated materials which are sometimes utilized in the classic "slurry" services were not utilized due to the added complexity of the design and the increased risk of brittle materials. Sometimes the overall reliability of the pump is jeopardized by this added complexity.

4) Have SBPI explain that the discussion this past week regarding possible monthly rotation had to do with achieving the optimum pump life in light of the long storage period predicted and in no way indicated that the specified requirements can not be met without any maintenance.

This should be followed by a discussion of the possible periodic pump "bumping" with the pump full of water and both suction and discharge valves closed. This would achieve the optimum pump life while minimizing the ALARA concerns.

Action Item: SBPI to provide written procedure for both of these options including appropriate cautionary notes and advice.

Anticipated Completion Date: **See attached instruction manual supplement**

5) No action required of SBPI

6) Have SBPI describe how this pump would physically deal with a slurry as specified. For example, describe the pressure difference across the bushings and wear rings and the direction and volume of flow. Also discuss the wear characteristic of the different materials used in areas of the pump subject to either high velocity flow and the related erosion or high wear areas.

Action Item: SBPI agreed to provide a summary of this discussion, correlating the technical requirements and the pump features.

Anticipated Completion Date **See explanation below**

Pump surfaces running in close proximity to one another are located at each side of the pump impellers, the center bushing and throttle bushing. It is at these surfaces where abrasion resistance is a design consideration. The other areas of the pump where the pumpage can cause wear to occur are described as high velocity areas.

SBPI has overlaid the wear surfaces, described above, with two hardness grades of Stellite. This provides a material combination that is resistant to abrasion due to particles in the pumpage, as well as the ability to tolerate contacting motion between the stationary and rotating components.

The other areas of concern for wear related mechanism resistance are "high velocity" areas of the pump. These are areas where the fluid velocity is greater than about 40 feet per second. The pump case and impellers are cast from duplex stainless steel. This material provides excellent protection from both corrosion and erosion wear mechanisms.

See WP-681 (attached, 9 stages) with regards to the flow paths through the pump during operation and the principles relating to axial pump thrust and product lubricated bearing stiffness. The higher viscosity fluids provide for a higher bearing stiffness which is a benefit to the design.

The design life is based on a minimum of 10,000 hours as specified by the contract.

7) **Have SBPI clearly identify their general inspection procedure for the MSE pump line and how it is designed to ensure that the equipment meets the design requirements.**

Action Item: SBPI to check on the data package question raised by John Verderber.

Anticipated Completion Date: **See explanation below**

Item 4 **Question Mark (?) Element Assembly Checklist for S/N 1E777**

Impeller stack-up is O.K. for element assembly?

This check is to insure the impellers are assembled on the shaft to eliminate the vanes being in alignment with one another. This check is done to insure there is not a vane passing frequency problem (usually shows as a vibration problem on test). The mechanic who marked the paperwork with a "?" had a question with regards to the stack up. The test engineer inspected the element and determined there was not a problem. The unit was assembled and performance tested. The vibration readings were well within acceptable levels. The element assembly check list was not corrected to remove the "?" mark. On the warranty re-build element assembly check list item was checked off as acceptable.

8) Have SBPI explain the reason for the difference in the minimum speed stated in the SBPI instruction manual and the more recent response to VFD start up procedure that recommends 2500 rpm. Ultimately, whatever is decided should be in the instruction manual for future operators.

Action Item: SBPI will provide a written addenda to their instruction manual adding specific information on starting the pump with a VFD.

Anticipated Completion Date: : **See explanation below**

The pump on startup should be brought up to 2500 rpm as quick as possible. After reaching 2500 rpm, the pump can be operated anywhere on the curve from 1200 rpm to 3600 rpm. Ramping up to 2500 rpm and reducing back to speeds below 2500 rpm is not required once the pump is running. SBPI will provide a supplement to the instruction manual noting this change in operations procedure.

9) Have SBPI discuss the reason why Flowserve (BW/IP Seals) decided to replace the mechanical seals.

Action Item: SBPI will provide revised mechanical seal drawing and a letter from the seal vendor explaining the reasons for the change, acknowledging that the new design is interchangeable with the old design and can operate with the same parameter.

Anticipated Completion Date: **See attached letter from Flowserve dated 21 January 1998**

Should you have any questions, please give me a call.

Best Regards,

Kevin M. Harold

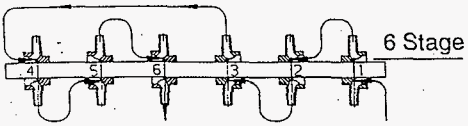
Kevin Harold
Product Cell Manager

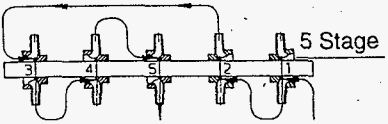
cc: Don Spencer
Tom Richfield - Field Service
Bob McCain - L.A. Sales

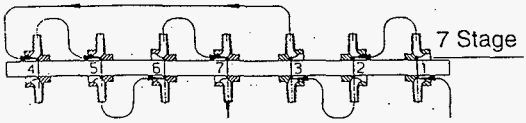
SULZER BINGHAM

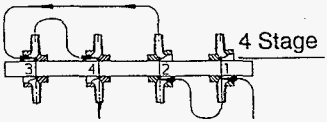
TECHNICAL DATA - TYPE MSE

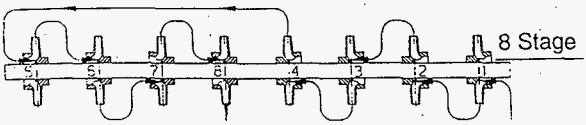
FLOW DIAGRAM - SINGLE SUCTION

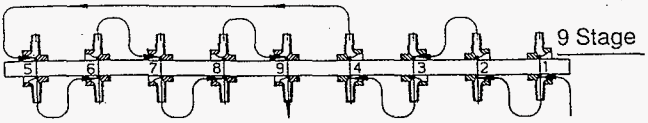


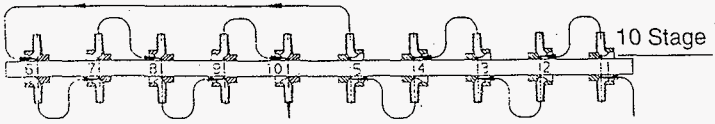


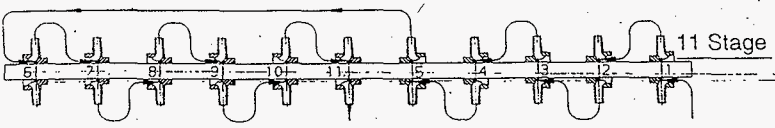


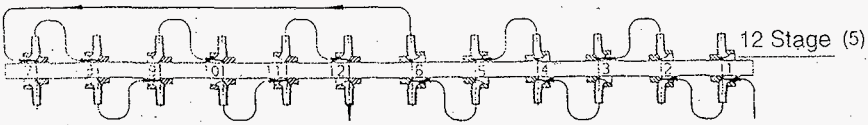












Notes:

(5) *For 50 Hertz services only. "REFER TO MARKETING".*

SULZER PUMPS

1E776/1E777 INSTRUCTION MANUAL SUPPLEMENT

RECOMMENDED PROCEDURE FOR 1E776/1E777 HANFORD TRANSFER HORIZONTAL MSE PUMPS

LONG TERM MAINTENANCE FOR INSTALLED PUMPS

WARNING: Seals must have gas purge maintained at all times when pump is flooded.

This procedure outlines three (3) methods that can be used for pumps which may have long terms of inactivity between in operation:

OPTION 1 FULL OPERATION - (Frequency: 15-30 minute runs every month)

The purpose of this monthly run is to circulate the oil around the bearing housing to prevent corrosion of metal parts:

1) PARTIALLY CLOSE DISCHARGE VALVE
2) START NITROGEN PURGE TO SEAL
3) OPEN PUMP SUCTION VALVE
4) OPEN VENT VALVES, ENSURE PUMP IS COMPLETELY PRIMED
5) CLOSE VENT VALVES
6) START PUMP, BRING UP TO 2500 RPM (WITHIN 5 SECONDS)
7) FULLY OPEN DISCHARGE VALVE AND ENSURE PUMP REACHES BEST EFFICIENCY FLOW AND DESIGN PRESSURE
8) OPERATE PUMP FOR 15-30 MINUTES

OPTION 2 'BUMP' OPERATION - (Frequency: Once every three (3) months or less)

Due to discharge system pipe work not being available/operational, an alternative is to 'bump' start pump (i.e. pump operates for approximately 15 seconds against fully closed discharge valve):

1) FULLY CLOSE DISCHARGE VALVE
2) START NITROGEN PURGE TO SEAL
3) OPEN PUMP SUCTION VALVE
4) OPEN VENT VALVES, ENSURE PUMP IS COMPLETELY PRIMED
5) CLOSE VENT VALVES
6) START PUMP, BRING UP TO 2500 RPM WITHIN 5 SECONDS
7) OPERATION AT 2500 RPM IS NOT TO EXCEED 10 SECONDS, (DUE TO TEMPERATURE INCREASE IN PUMPAGE) THEN STOP PUMP (COAST DOWN TIME IS ACCEPTABLE AND DESIRABLE)

TECHNICAL NOTE: The main concerns with infrequent operation is moisture in the bearing housing, which could cause corrosion. For this reason, SBPI selected a synthetic oil due to:

- Does not emulsify with water
- Synthetic corrosion inhibitors ironically bond to metal surfaces displacing water and other contamination's

Synthetic oil reduces operation time to every three (3) months, although every month would be even more desirable. Bump starting for 15 seconds (plus coast down time) will allow the oil rings to disperse synthetic oil throughout the bearing housing internals.

OPTION 3 REMOVE BEARINGS AND SEALS -

If the time between installation and pumping contaminants is long (>1 year) and pump is dry, bearing and seal removal from shaft should be considered:

Advantages:
- No maintenance (i.e., pump operation/turning not required)
- No risk of corrosion in bearing housing

The procedure is:

1) REMOVE COUPLING, BEARING HOUSINGS, COMPONENTS AND SEALS
2) COAT BEARING AND HOUSING SURFACES WITH RUST PREVENTATIVE (SHELL ENSIS FLUID NO. 210 OR EQUAL). ENCLOSE DESICCANT (BAGGED, NON-HALOGENATED, NON-DELIQUESCENT, CHEMICALLY INSERT SILICA GEL TO COMPLY WITH MIL-D-3464-D, TYPE 11). SEAL OFF WITH PROTECTIVE TARPAULIN
3) REMOVE SEALS. STORE SEALS IN ACCORDANCE WITH SEAL MANUFACTURERS INSTRUCTIONS.
4) PUMP ROTATING ELEMENT RESTS ON STATIONARY WEAR RINGS (NOTE - DO NOT TURN SHAFT!)
5) BLANK OFF STUFFING BOX WITH WOODEN COVER AND WRAP WITH TARPAULIN TO PREVENT ENTRY OF FOREIGN MATERIAL
6) SEAL OFF EXPOSED SHAFTS WITH TARPAULIN

TECHNICAL NOTE: During rebuild/start-up a SBPI Field Services representative is recommended. It is also recommended, that if the storage period is excessive (>1 year), all elastomers (in seals) and bearings should be replaced prior to 'contaminated' start up.

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
HNF-1857	POTP-007 INTEGRATED TEST	TE-002

DESCRIPTION OF PROBLEM:

Observed leakage from pump air seals.

ORIGINATOR:	IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION X CONTINUE
M. D. Gerken 02/02/98 D.G.	M. D. Gerken 02/02/98 D.G.
ORG: DATE:	TEST ENGINEER DATE

DISPOSITION:

Replaced flowserve model #982 seals with new "wavy face" ~~technology~~ TECHNOLOGY seals. Rechecked pump air seal flowrates per steps 1.8 and 1.9.

SEE ATTACHED VENDOR REPORT.

DISPOSITION AND RETEST REQUIREMENTS BY:	DISPOSITION ACTIONS COMPLETE:
M. D. Gerken 02/03/98 D.G.	02/11/98 Verified
DATE	DATE
QAE CONCURRENCE WITH DISPOSITION (if required): Tony R. Hall 2/03/98	RETEST COMPLETE: M. D. GERKEN 02/11/98 D.G.
DATE	TEST ENGINEER DATE

BW/IP International, Inc.
Seal Division

BW Seals
Pacific Wietz
Five Star Seal

1305 Fraser Street Suite D8
Bellingham Washington 98226
Telephone 360 676 0702
Fax 360 676 1004

21 January, 1998

Sulzer Bingham Pumps - Portland, OR Plant

Attention: Kevin Harold

CC: Tim Wegener

Subject: SULZER P.O.# 630234 / JOB# 96SEZ123726

Dear Mr. Harold:

The letter is to give notice of several issues regarding the Hanford Plant, Flowserve model 982 seals that are being retrofitted to incorporate the upgraded "Wavy Face" technology. Hanford discovered leakage problems with the job seals and contacted Flowserve (Tim Wegener) for input. Flowserve has agreed to, at Flowserve's expense, incorporate the newer "Wavy Face" technology to solve these performance issues. Flowserve will extend the warranty, upon receipt at the job-site, of the new retrofitted seals. The "Wavy Face" refers to the special "inverted wave" characteristic to the surface of the stationary seal faces. This technology has been utilized in the high performance compressor applications for eight years, and Flowserve is implementing this design into it's dry gas seal models (such as the 982 seal supplied). The seals faces are larger and require additional radial space. For this job we have engineered both inner / outer flanges, and sleeves (all to be made from the Hastalloy C). The only parts that could be reused are the springs. The status of this retrofit, that we are aggressively expediting, is for the heavy Hastalloy C components to arrive in Benicia, CA shop for complete assembly and testing on 1-31-98. The seals would, upon assembly and testing, immediately be air-freighted to Hanford.

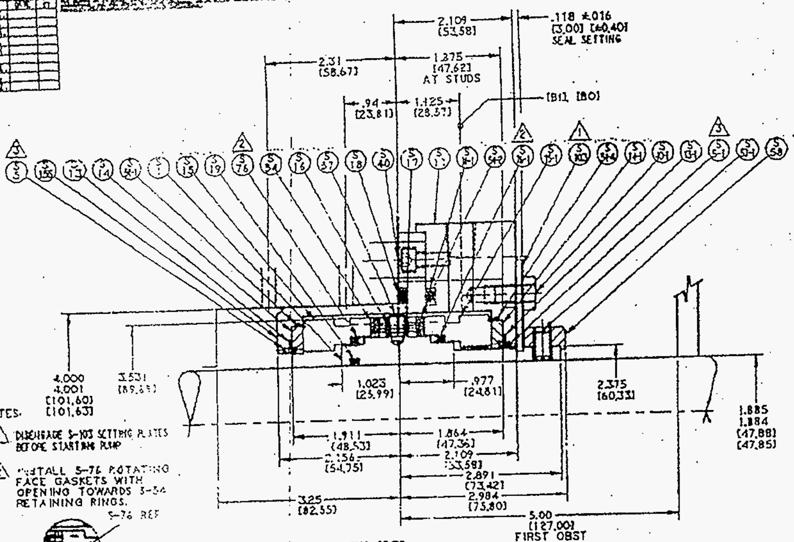
The existing control panel settings and the seal installation procedures will remain to original specifications. Flowserve will provide complete seal assembly prints for distribution.

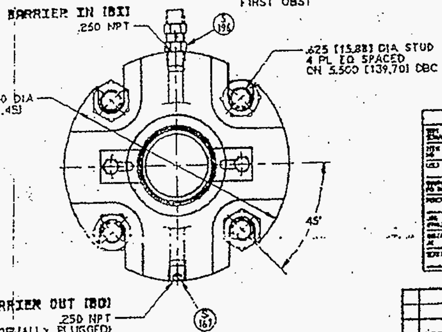
Should you have any questions or require additional information, please do not hesitate to contact us.

Sincerely,

Marc Hagn

Danny Trice - District Manager
Tim Wegener - Sales Engineer
Marc Hagn - Applications Engineer

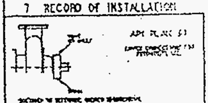




FLANGE VIEW
SCALE .6

NOTES:

1. DISCHARGE S-103 SETTING PLATES BEFORE STARTING PUMP
2. INSTALL S-76 ROTATING FACE GASKETS WITH OPENING TOWARDS S-54 RETAINING RINGS.
   S-76 REF
   S-54 REF
3. DO NOT USE LOCKING COMPOUND ON S-5 LOCK PINS.
4. U.S. PATENT NOS. 4,836,561 4,887,395 OTHERS PENDING
5. "YY" REQUIRED CERTIFICATION ON SEAL GLAND AND S'BOX LINER AS TO THEIR CHEMICAL AND MECHANICAL PROPERTIES.
6. "YY" REQUIRED CERTIFICATION ON MG MATL AS TO THEIR CHEMICAL AND PHYSICAL PROPERTIES, AND THEIR RESISTANCE TO THE RADIOACTIVE ENVIRONMENT.
7. RECORD OF INSTALLATION



PIPING REQUIREMENTS

DATA SHEET AND BILL OF MATERIAL

	QTY	ITEM	DESCRIPTION	PART NO.	CODE	MATERIAL		
	2	5	LOCK PIN	4R16402	NL	[illegible]	X	X
*	2	13	SEAT GASKET	568039	MG	[illegible]	X	X
*	2	14	STATIONARY FACE	3R31136	YO	[illegible]	X	X
*	2	15	ROTATING FACE	3R31137	AE	CARBON	X	X
	9	16	COIL SPRING	[illegible]	NL	[illegible]	X	X
	2	17	SPRING HOLDER	3R28950	NL	[illegible]	X	X
	2	54	RETAINING RING	3R29036	NL	[illegible]	X	X
*	2	54-1	RETAINING RING	568043	MG	[illegible]	X	X
	8	57	SSDP 5/16-18X3/8	4R0461	NL	[illegible]	X	X
*	2	76	ROT. FACE GASKET	4R16208	OV	[illegible]	X	X
	2	5-1	LOCK PIN	4R16402	NL	[illegible]	X	X
*	2	13-1	SEAT GASKET	568039	MG	[illegible]	X	X
*	2	14-1	STATIONARY FACE	3R31136	YO	[illegible]	X	X
*	2	15-1	ROTATING FACE	3R31137	AE	CARBON	X	X
	2	54-2	RETAINING RING	3R29036	NL	[illegible]	X	X
*	2	54-3	RETAINING RING	568043	MG	[illegible]	X	X
*	2	76-1	ROT. FACE GASKET	4R16208	OV	[illegible]	X	X
	2	1	SLEEVE	3R33851	NL	[illegible]		
5	2	11	FLANGE	2R23567	YY	[illegible]		
6 *	2	18	FLANGE GASKET	568346	YY	[illegible]		
6 *	2	18-1	FLANGE GASKET	568346	YY	[illegible]		
6 *	2	19	SLEEVE GASKET	568225	YY	[illegible]		
	4	40	SHCS 1/4-20 X 5/8	4R101736	D8	316		
	4	41-1	HHCS 5/16-18 X 1/2	4R2889	D8	316		
	12	51-1	SSCP 5/16-18 X 1/2	4R0434	D8	316		
	2	58	DRIVE COLLAR	670696	D8	316		
	4	103	SETTING PLATE	4N09587	D8	316		
5	2	155	STUFFINGBOX LINER	2R23568	YY	[illegible]		
	2	167	PIPE PLUG 1/4 NPT	4R3524	D8	316		
	2	196	CHECK VALVE	4R15743	ZZ	[illegible]		

SEAL TYPE AND SIZE	982	2625	982	2625	DBC		9DSZ	9DSZ

CUSTOMER SULZER BINGHAM PUMPS INC. ORDER NO. 430234
ADDRESS 2800 NW FRONT AVE. PORTLAND, OR 97210
ULTIMATE USER U.S. DEPARTMENT OF ENERGY
LOCATION RICHLAND, WA
PUMP SERIAL NO. 1E7747/777 ITEM NO. 241-P-3125 A/B
PUMP MFR. SULZER BINGHAM TYPE MSE SIZE 3X3X8.75
SEAL CHAMBER PRESSURE E17A95 SPGR 1.2-30 CP
FLUID RADIOACTIVE SLURRY OPER PRESS 40-120 PSIG
TEMP 125°-200° F RPM 3560 SUCT PRESS 10-60 PSIG
SP GR 1.0-1.5 TEMP 24-12 PSIG DISCH PRESS 1230-2077 PSIG

TITLE BLOCK

SERIAL NO.	1E7747
TITLE	WT-P-3125 A/B
USER	U.S. DEPT OF ENERGY
P.O. NO.	430234
PURCHASER	FOE WESTINGHOUSE HANFORD
PROJECT	SLURRY TRANSFER PUMPS
LOCATION	RICHLAND WASHINGTON
SERVICE	SLURRY TRANSFER

DRAWN M. TANNER DATE 13 JAN 98
CHECKED M. TANNER DATE 13 JAN 98
DWG NO. 123726
CAD DATABASE
DIMENSIONS ARE IN INCHES [MILLIMETERS]. WHEN REORDERING PLEASE REFER TO BW/IP ORDER NUMBER ... SPARE PARTS.
SCALE FULL
A2R21023
BW/IP Seals
BW/IP International, Inc. Seal Division
BW/IP ORDER NO. 96SEZ123726 C

D	ADDED SLEEVE GASKET	MKT	5 DEC 96	
		MKT		
LTR	REVISION	BY	DATE	CK

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
HNF-1857, 8.27	POTP-007 INTEGRATED TEST	TE-003

DESCRIPTION OF PROBLEM: When B pump was started, pressure sensors (located between the A pump closed inlet and discharge valves) on the A pump loop also indicated a pressure rise. This indicates a leakage path from the B pump discharge to the A pump loop. The problem was identified as a leak through the A pump vent valve (MOV-3125AK).

ORIGINATOR:	IMPACT ON TESTING: X HOLD FOR RESOLUTION ☐ CONTINUE
J. E. Dunks 02/17/98	J. E. Dunks 02/18/98
ORG: DATE:	TEST ENGINEER DATE

DISPOSITION:

1. Replace MOV-3125AK valve body with valve body from first stage drain valve (MOV-3125AJ) and resume testing (concurrence by Jim Collins FDNW Lead Engineer).
2. Procure a direct replacement valve body and install it in the MOV-3125AJ position.
3. Verify that this rework meets original pressure testing requirements by performing a in service leak test.

DISPOSITION AND RETEST REQUIREMENTS BY:	DISPOSITION ACTIONS COMPLETE:
J. E. Dunks 02/18/98	Verified 2-18-98
DATE	DATE
QAE CONCURRENCE WITH DISPOSITION (if required):	RETEST COMPLETE:
Larry R. Hall 2/18/98	2/19/98
DATE	TEST ENGINEER DATE

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
HNF-1857,	POTP-007 INTEGRATED TEST	TE-004

DESCRIPTION OF PROBLEM: The B-pump VSD goes into either overcurrent or overvoltage fault which causes the speed drive to shut down. This happens intermittently when the VSD is given a remote speed change from PCU-2.

ORIGINATOR:	IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION X CONTINUE
M. D. Gerken 02/18/98	M. D. Gerken 02/18/98
ORG: DATE:	TEST ENGINEER DATE

DISPOSITION: VSD vendor to troubleshoot and repair. Retest to verify remote speed changes do not cause the drive to go into fault and shutdown.

Vendor found drive in no motor test mode which caused the overcurrent/overvoltage problems.

See attached Vendor report.

DISPOSITION AND RETEST REQUIREMENTS BY:	DISPOSITION ACTIONS COMPLETE:
M. D. Gerken 02/19/98	Verified 02/20/98
DATE	DATE
QAE CONCURRENCE WITH DISPOSITION (if required): Larry R. Hall 3/30/98	RETEST COMPLETE: M. D. Gerken 02/20/98
DATE	TEST ENGINEER DATE

EATON

Cutler-Hammer & Westinghouse Products
5000 Meadows Road, Suite 300
Lake Oswego, Or. 97035

PHONE# ~~503-624-4016~~ 636-8333
FAX # ~~503-624-4044~~ 636-8545
ADNET # A567-4016

Fax Cover Sheet

DATE: 3/26/98 TIME:

TO: JACK HENDERSON PHONE: 509-376-9871

FAX: 509-373-0122

FROM: Scott MacLean

RE: ACC 700

Number of pages including cover sheet: 5

Message

HERE IS A COPY OF A ROUGH REPORT THAT COVERS PROGRESS TO DATE. I EXPECT TO RETURN NEXT WEEK TO CONTINUE ON UNIT "A".

→ G. Parsons
D. Gerken (for closeout of TE)

SCOTT

Post-It® Fax Note 7671	Date	# of pages ▶ 5
To E. PACQUET	From J. Lutz	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

Parts Used:

Part No.	Qty.	Chrg.	War.	Price
			Total	

Reported Problem: UNIT SURGING AND TRIPPING ON OVERLOAD AND OVERVOLTAGE FAULTS

Corrective Action: ARRIVED AT SIGHT AND RAN "B" DRIVE. OBSERVED THAT UNIT APPEARED TO HUNT FOR SPEED SET POINT AND WOULD FAULT ON OVERCURRENT. FOUND THAT UNIT WAS PROGRAMED FOR "MOTOR TEST". UNIT SHOULD NOT BE RUN IN MOTOR TEST WITH A MOTOR COUPLED TO DRIVE. RAN DRIVE AFTER REPROGRAMING FOR NORMAL OPERATION AND OBSERVED OVERVOLTAGE FAULT. EXTENDED DECEL RAMP TIME FROM 20 TO 60 SECONDS TO STOP REGENERATION FROM MOTOR. MEASURED DC BUS VOLTAGE @ 730VDC. LINE VOLTAGE IS AT 493 ON AB & AC AND 489 ON BC. HIGH BUS VOLTAGE IS A PRODUCT OF A HIGH AC LINE AND THE CLEAN POWER FRONT END OF VFD

Reviewed By: _____ Complete: Yes ____ No ____

Date: _____

Page 1

SERVICE REPORT CONTINUATION

Customer:

PRO / G.O. #

Date: 3/23

Generic Name: ALL 700

Corrective Action Continued:

RECOMEND RETAPPING OF ISOLATION/STEP DOWN TRANSFORMER TO GET LINE TO 480VAC OR AS CLOSE AS POSSIBLE.

ON VFD "A" FOUND THAT DC BUS VOLTAGE IS AT 605 VDC. TROUBLESHOOTING SHOWS THAT ALL SCR'S ARE GOOD (STATIC TEST) INPUT TRANSFORMER VOLTAGES ARE GOOD. FOUND THAT 3 SCR'S HAD LOWER GATE/CATHODE RESISTANCE READINGS. WILL CONTINUE T/S

TO EXPLAIN WHY VFD "B" WOULD HAVE CURRENT SURGES PLEASE SEE ATTACHED SHEET WHICH EXPLAINS MOTOR TEST PROGRAMMING AND OPERATION I BELIEVE THAT OPERATORS/ELECTRICIANS WOULD CHANGE PARAMETER DISPLAY AND BELIEVE THAT CHANGE WAS IMPLEMENTED. AFTER CHANGING PARAMETER FOR "MOTOR TEST" YOU NEED TO CYCLE POWER TO IMPLEMENT CHANGE. THIS IS TO ENABLE OR DISABLE THAT PARAMETER.

D. TEST PROCEDURE

10. Lift the bus end of the 400A fuse away from the bus and insulate it momentarily from the bus with a thin piece of insulation or paper. If it is a multiple inverter system, insulate the fuse bypass diode assembly from the bus as well.

    Close the main breaker and allow the drive to start up into its "drive ready" condition. Don't forget, this will put full dc on the main dc bus, so normal caution must still be observed. There should not be any red LEDs illuminated on the daughter boards. Check with a dc voltmeter that each gate lead has approximately -5V between the top two pins of each gate plug. Check that the plugs are firmly seated and that no wires have come adrift.

    Select "PROGRAM" on the keypad and then "PARAM" and "ENTER" and step down with the keys until "NO MOTOR" appears. Select "YES" and "ENTER" and open the main breaker. Wait a few seconds and reclose the breaker. After timeout, check that the drive is now in the "NO MOTOR" mode. Go to "HAND" and "LOCAL" and press the "START" button. The drive should start and gating should commence as indicated by the flashing LEDs on the daughter boards. The drive operating frequency is not important but at low speeds it will be observed that the C phase (top) and A phase (bottom) will appear to flash slightly different to the B phase (middle). This is entirely normal and is due to the way the signals are generated in this mode.

11. If all appears correct, proceed as follows. Press the "STOP" button and open the breaker. Allow enough time to discharge the dc link. If the motor can be disconnected easily, do so; if it cannot, disconnect the three leads connecting the inverter to the reactor in the bottom of the unit. Spread the

output connections and isolate them from ground. If there are multiple inverters disconnect them all from their associated reactors, ensuring that they cannot touch each other. Reconnect the 400A fuse for the inverter, together with its bypass diode, if a multiple system. Close the breaker, watch the dc come up, and start the drive. With an ac voltmeter check that the voltages across the three output terminals are balanced.

Switch off the drive and reconnect the next inverter (if fitted). Restart and check the ac voltages between similar output terminals of the two inverters. There should be very little difference (typically less than 1V ac).

Repeat with each inverter in turn until all are running.

Open the breaker and reconnect the output leads of the inverters to their respective reactors. Reconnect the motor if it was disconnected. Select bottom frequency, close the breaker and restart, observing the motor current. If all is OK, stop the drive select "NO MOTOR" and "OFF," reset the breaker and restart the drive.

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
HNF-1857,	POTP-007 INTEGRATED TEST	TE-005

DESCRIPTION OF PROBLEM: Both the A and B-pumps exibit high vibration at certain RPM. The vibration on the A-pump exceeds the high vibration setpoint which causes the pump to automatically shutdown. Typically A pump exceeds .60 IPS at approximately 3,000 RPM and B pump exceeds .30 IPS at approximately 2,950 RPM.

ORIGINATOR:	IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION X CONTINUE
M. D. Gerken 02/19/98 D.G.	M. D. Gerken 02/19/98 D.G.
ORG: DATE:	TEST ENGINEER DATE

DISPOSITION: Pump vendor to troubleshoot and repair. Retest to verify vibration is within acceptable tolerance.

THIS TEST EXCEPTION WILL BE CLOSED AND THIS ITEM WILL BE CARRIED AS AN EXCEPTION TO THE W-058 OAC PART II (REFERENCE 5-FACILITY TESTING-EXCEPTION 1) AND CONSIDERED A PUMP WARRANTY ITEM.

SEE ATTACHED VENDOR REPORT

DISPOSITION AND RETEST REQUIREMENTS BY:	DISPOSITION ACTIONS COMPLETE:
M. D. Gerken 02/20/98 D.G.	Verified [signature] 4-1-98
DATE	DATE
QAE CONCURRENCE WITH DISPOSITION (if required):	RETEST ~~COMPLETE:~~ MOVED TO OAC II D.G. 4/1/98
Larry R. Hall 3/25/98	TEST ENGINEER DATE
DATE	

Post-it® Fax Note 7671 | Date 3/10/98 | # of pages ▶ 19
To Jack Henderson | From D Spencer
Co./Dept. FDNW | Co. SBP
Phone # | Phone # 503 226 5418
Fax # 509-376-9766 | Fax # 503 226-5548

SULZER BINGHAM PUMPS INC.

SULZER BINGHAM PUMPS INC. DOCUMENT
E12.5.546

1E776 / 777: VIBRATION DIAGNOSIS

ASME CODE
SECTION N/A
CLASS NO.
CODE EDITION (YEAR)
ADDENDA
SEASON
YEAR

CUSTOMER FLUOR DANIEL HANFORD / D.O.E.

PROJECT Slurry transfer pump

'OMER P.O. NO. _____ CHANGE ORDER NO. _____

SPECIFICATION NO. _____ REVISION NO. 0

CUSTOMER APPROVAL NUMBER

SPACE FOR CUSTOMER APPROVAL STAMP
(when applicable/available)

CUSTOMER APPROVAL REQUIREMENT

☐ YES ☐ NO ☒ INFORMATION ONLY

CERTIFIED AS A VALID SULZER BINGHAM PUMPS INC. DOCUMENT

☒ For Outside Vendor

☐ For Manufacture at Sulzer Bingham Pumps Inc.

☐ Risk Release Inspection Report # _____

☐ Other (specify) _____

INITIAL APPROVALS (SIGNATURE)		Date
Engrg. Assurance	D Spencer	3/10/98
Quality Assurance	N/A	

HNF-2504, REV. 0 ATTACHMENT I PAGE 2 of 60

CERTIFICATION (when applicable)

This Document is certified to be in compliance with THE APPLICABLE PURCHASE ORDER, SPECIFICATIONS, PROCEDURES, AND ADDITIONAL REQUIREMENTS LISTED IN THE APPENDICES.

N/A

_____
Professional Engineer

_____ _____
State Registration No.

Date: (Seal)

Originating Dept.: HEADQUARTERS ENGINEERING

By: Thomas F. Kaiser

Title: DESIGN ANALYST

Initial Date: 03/09/1998

APPLICABLE S.O. NUMBERS

1E776 / 777
WP-98001

Control	Order Number	Rev.
		0

CONTENTS

ENCLOSURES

A-PUMP (1E776)

Enclosure 1: Horizontal 1x vibrations (POH, PIH, MIH [1.]) at various operating speeds
Enclosure 2: Horizontal overall vibrations (POH, PIH, MIH [1.]) at various op. Speeds
Enclosure 3: Vertical 1x vibrations (POV, PIV, MIV [1.]) at various operating speeds
Enclosure 4: Vertical overall vibrations (POV, PIV, MIV [1.]) at various op. Speeds
Enclosure 5: Vibration amplitude spectra taken at pump bearing housings (2910 RPM)
Enclosure 6: Vibration amplitude spectra and time waveform readings taken at motor inboard bearing housings (2910 RPM)
Enclosure 7: Impact test results (pump inboard bearing housing)
Enclosure 8: Impact test results (pump outboard bearing housing)

B-PUMP (1E777)

Enclosure 9: Impact test results (pump inboard bearing housing)
Enclosure 10: Impact test results (pump outboard bearing housing)

BOTH PUMPS

Enclosure 11: Mechanical finite element model of pump rotor
Enclosure 12: Results of non-linear static analysis (3560 RPM)
Enclosure 13: Lateral damped critical speed analysis: Campbell diagram
Enclosure 14: Lateral damped critical speed analysis: 1st bending mode

1.) POH: Pump Outboard Horizontal
POV: Pump Outboard Vertical
PIH: Pump Inboard Horizontal
PIV: Pump Inboard Vertical
MIH: Motor Inboard Horizontal
MIV: Motor Inboard Vertical

1. INTRODUCTION:

A root cause analysis was done for the 1E776 / 777 pumps in order to determine the source of the high vibration levels experienced when testing these units at DOE's HANFORD site. SBPI's analysis work included taking vibration readings a various locations and operating speeds, modal testing (impact tests) of the bearing housings and some up front analysis.

2. VIBRATION READINGS TAKEN AT A-PUMP (1E776)

Vibration readings were taken at various locations within an operating speed range of 2600 RPM to 3600 RPM. With each new operating point investigated, the system was given enough time to stabilize before taking readings. All operating conditions were close to or at Best Efficiency Point (BEP).

Throughout the vibration spectra obtained, synchronous speed (1x) is the only frequency were significant vibration levels occur. In the horizontal plane vibrations peak at 2950 RPM, in the vertical plane they peak at maximum speed (see Enclosures 1 to 6).

Synchronous vibration readings taken on the motor inboard bearing housing in horizontal and vertical direction indicate a motor airgap problem.

In case of high 1x vibrations caused by mechanical and / or hydraulic unbalance, simultaneous readings in two directions perpendicular to each other will show a 90° phase difference due to the fact that the force is rotating (with 1x). In case of an airgap problem, simultaneous vibration readings will be in phase, because the airgap excitation force is stationary.

The readings taken on the motor inboard bearing housing are perfectly in phase, as typical for an airgap problem (see Enclosure 6).

The vibration levels measured on the motor are very high for this type of equipment (WESTINGHOUSE TECO, frame 5009A, 300 HP). At 2950 RPM the horizontal 1x vibration levels at the motor inboard bearing housing is 0.31 ips. The motor pedestal 1x displacement is approximately 1 mil peak-peak at this operating point.

Modal testing of the pump bearing housings indicate resonance situations at 49 Hz in the horizontal plane (PIH, POH) and at 61 Hz in the vertical plane (see section 4). These resonance situations are likely to increase vibration amplitudes. However, the root cause seems to be the high excitation induced by the motor.

Recent finite element analyses on a similar design indicate that natural frequencies in the 1x cannot be excited by normal pump operation. But it is likely that high excitation forces acting on the casing / pedestals are capable of exciting those modes.

3. VIBRATION READINGS TAKEN AT B-PUMP (1E777)

The B-pump experienced lower vibration levels than the A-pump. Only one set of vibration readings was obtained. The horizontal 1x vibrations at the outboard bearing housing at 2900 RPM were 0.20 ips (0.47 ips at the A-pump and same operating conditions).

4. MODAL TESTING

The bearing housings of both pumps were impact tested in order to determine structural natural frequencies. The tables below as well as Enclosures 7 to 10 show the results of these tests.

Natural frequency	A-PUMP, PIH	A-PUMP, PIV	A-PUMP, POH	A-PUMP, POV	B-PUMP, PIH	B-PUMP, PIV	B-PUMP, POH	B-PUMP, POV
1st	48.88	--	48.95	61.24	48.88	61.31	48.88	61.3
2nd	106.68	96.21	108.69	96.29	108.66	96.31	106.34	98.6
3rd	451.23	286.26	433.78	288.76	441.33	286.26	438.77	278.7
4th	628.77	453.73	511.30	451.27	633.77	438.80	568.72	443.7
5th	688.69	516.23	651.28	508.77	706.22	528.77	668.78	
	Enclosure 7	Enclosure 7	Enclosure 8	Enclosure 8	Enclosure 9	Enclosure 9	Enclosure 10	N/A

The impact tests indicate that both units are almost identical with respect to bearing housing structural natural frequencies.

Impact test on the pump pedestals show natural frequencies in the 600 Hz range only.

5. LATERAL CRITICAL SPEED ANALYSIS

Prior to doing vibration analysis in the field, a damped lateral rotordynamic analysis has been performed. The analysis indicates that no critical speeds occur within the investigated operating speed range. The first bending mode is well separated from synchronous speed and sufficiently damped.

The analysis indicates that the pump has design integrity with respect to lateral rotordynamic behaviour.

6. OTHER POTENTIAL EXCITATION SOURCES

- The 'problem' frequency do not coincide with any of the know bearing frequencies;

EXCITATION FREQUENCY	SKF 7309 thrust bearing	SKF 6309 radial bearing
BPFO (ball pass freq. of the outer race)	80.3*RPM/1000	50.6*RPM/1000
BPFI (ball pass freq. of the inner race)	120.0*RPM/1000	82.7*RPM/1000
FTF (fundamental train frequency)	6.69*RPM/1000	6.32*RPM/1000
BSF (ball spin frequency)	33.3*RPM/1000	32.6*RPM/1000

- Long cross-over acoustic resonance takes place at vane passing frequency and not at 1x.

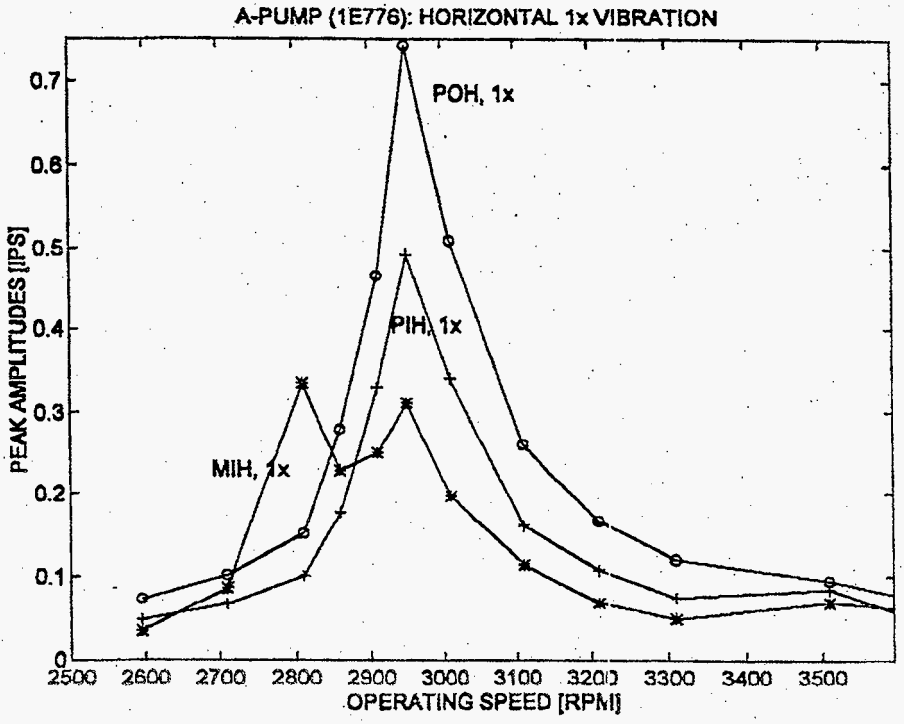
7. CONCLUSIONS

The data collected indicates a motor airgap problem. It is recommended to have the motor supplier inspect its equipment (both units) and correct the problem. The airgap problem may originate from misalignment between the motor rotor and stator.

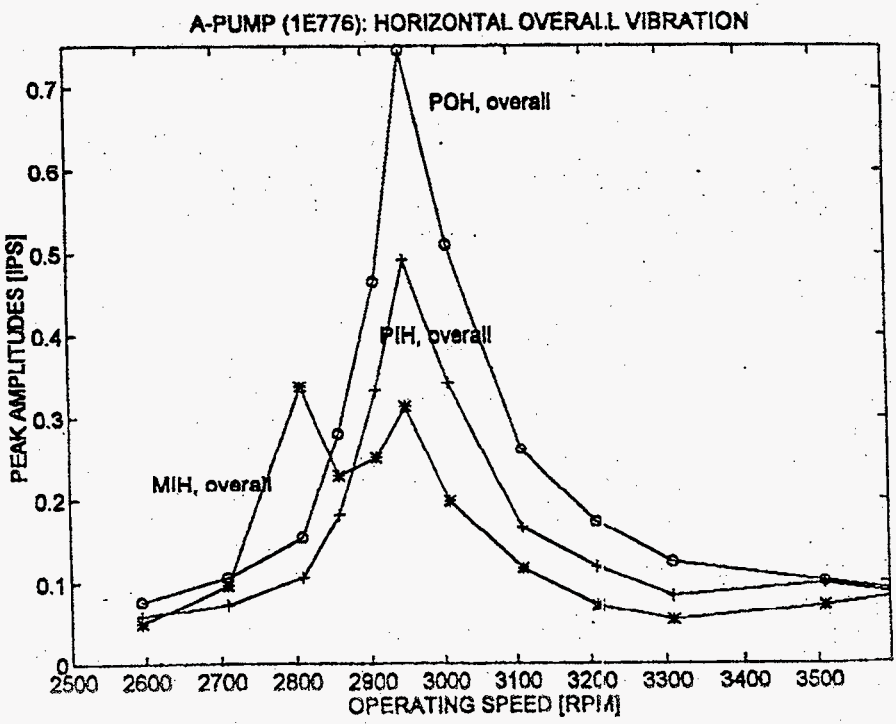
Summary;

1. Both units (A-pump and B-pump) are identical in design but show different bearing housing vibrations levels. This indicates that different levels of excitation forces are acting on the pumps.
2. The motor inboard bearing housing vibration levels as well as the motor pedestal vibration levels are high.
3. Simultaneous vibration readings on the motor inboard bearing housing in vertical and horizontal direction are ***in phase***, which points to a stationary excitation force (such as motor airgap excitation) to cause the high structural vibrations.
4. Pump induced vibrations at 1x synchronous speed (with no considerable 0.5x or 2x frequency components) are caused by unbalance (hydraulic and / or mechanical) or rotor bow. Both phenomenon represent rotating excitation forces which will result in a 90° phase difference between simultaneous readings in two directions perpendicular to each other.
5. It is unlikely that a 3x3x8.75 MSE pump will force a motor to vibrate at 0.3 ips levels.

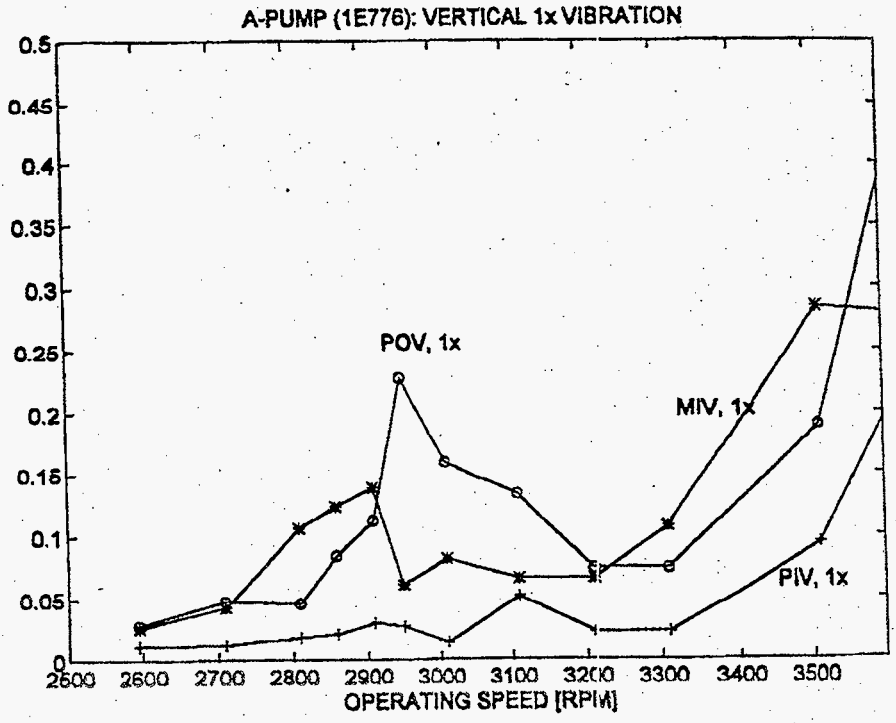
Enclosure 1


A-PUMP (1E776): HORIZONTAL 1x VIBRATION
POH, 1x
PIH, 1x
MIH, 1x
PEAK AMPLITUDES [IPS]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
OPERATING SPEED [RPM]

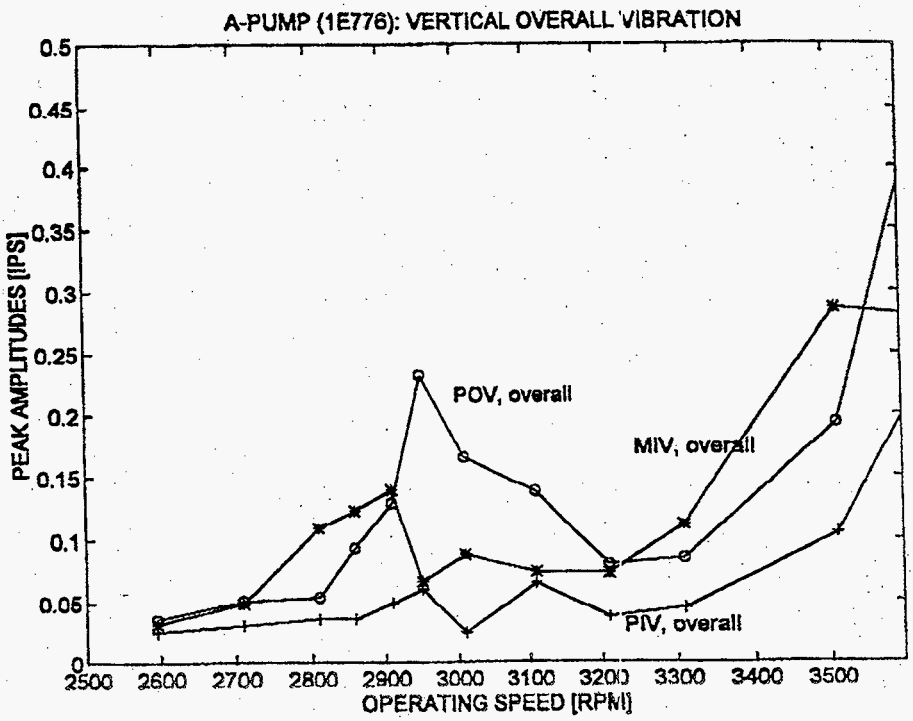
Enclosure 2


A-PUMP (1E776): HORIZONTAL OVERALL VIBRATION
POH, overall
PIH, overall
MIH, overall
PEAK AMPLITUDES [IPS]
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
OPERATING SPEED [RPM]

Enclosure 3


A-PUMP (1E776): VERTICAL 1x VIBRATION
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
POV, 1x
MIV, 1x
PIV, 1x
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
OPERATING SPEED [RPM]

Enclosure 4

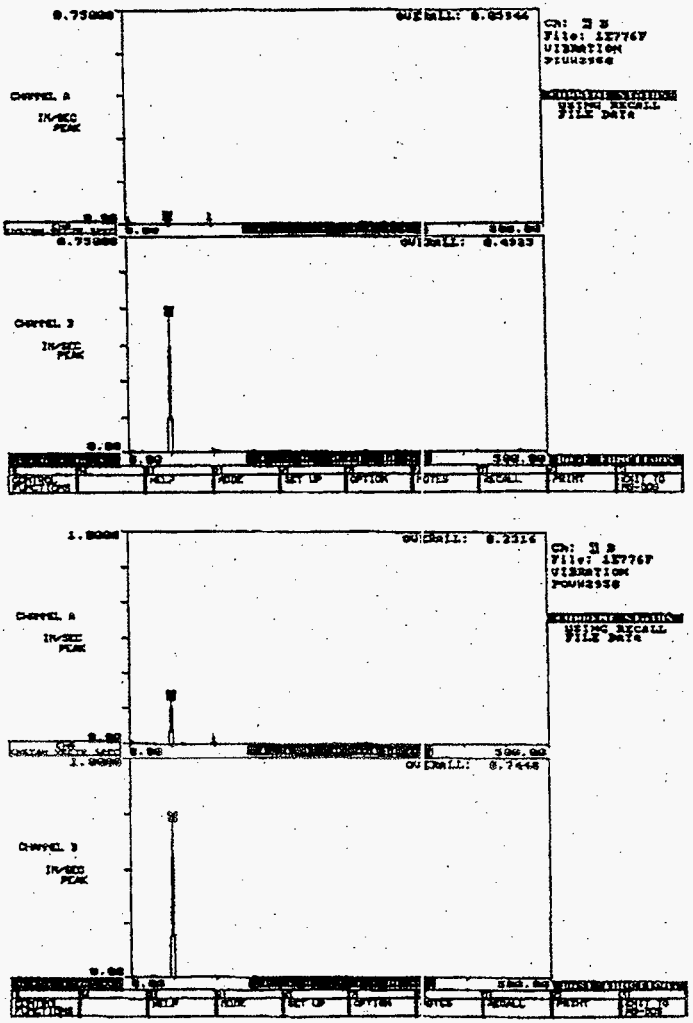

A-PUMP (1E776): VERTICAL OVERALL VIBRATION
PEAK AMPLITUDES [IPS]
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
OPERATING SPEED [RPM]
POV, overall
MIV, overall
PIV, overall

A-PUMP (1E776): VIBRATION AMPLITUDE SPECTRA TAKEN AT PUMP BEARING HOUSINGS UNIT OPERATING AT 2910 RPM

Enclosure 5

from top to bottom:

- **Pump inboard bearing housing, vertical direction (PIV)**
- **Pump inboard bearing housing, horizontal direction (PIH)**
- **Pump outboard bearing housing, vertical direction (POV)**
- **Pump outboard bearing housing, horizontal direction (POH)**

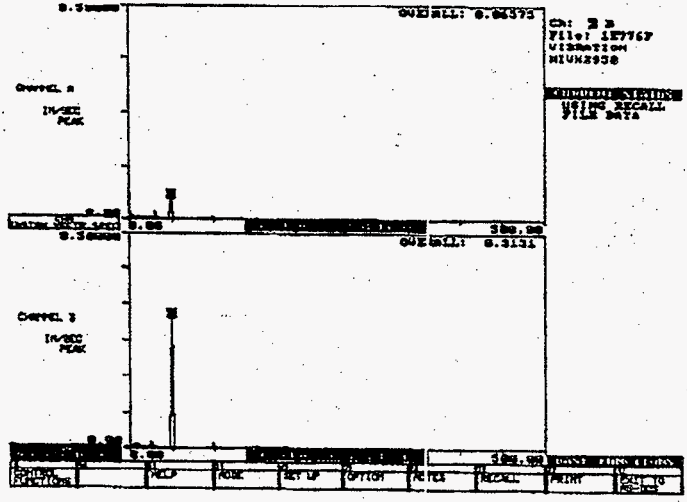


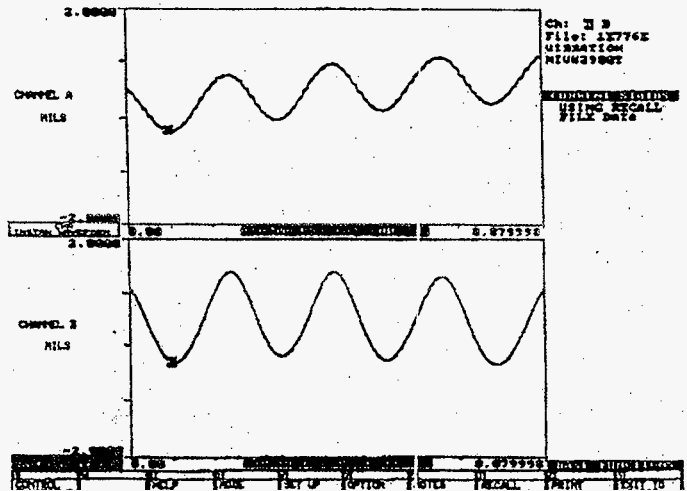
A-PUMP (1E776): VIBRATION AMPLITUDE SPECTRA AND TIME WAVEFORMS TAKEN AT MOTOR INBOARD BEARING HOUSING
UNIT OPERATING AT 2910 RPM

Enclosure 6

from top to bottom:

- Motor inboard bearing housing, vertical direction (MIV)
- Motor inboard bearing housing, horizontal direction (MIH)
- Motor inboard bearing housing, vertical direction (MIV)
- Motor inboard bearing housing, horizontal direction (MIH)

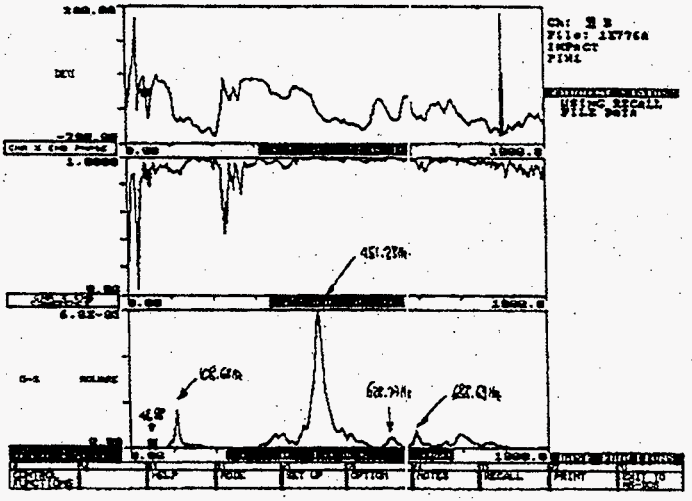


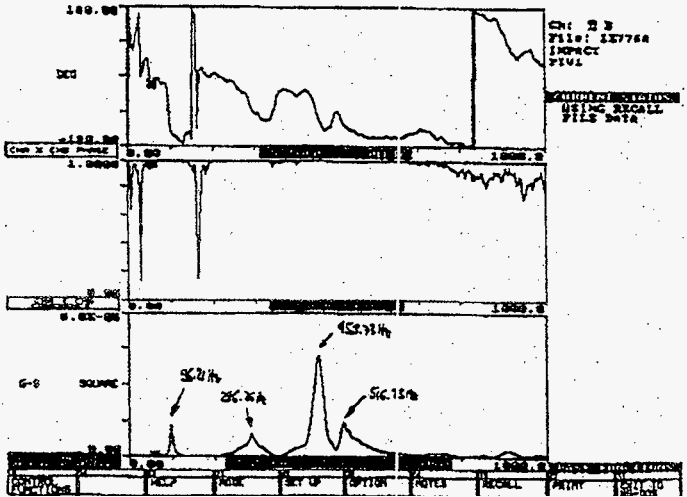


Enclosure 7

A-PUMP (1E776): MODAL TESTING OF PUMP INBOARD BEARING HOUSING

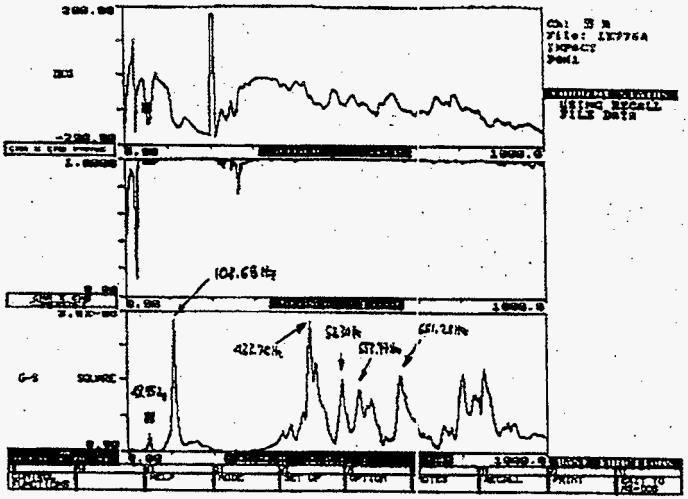
- **top: Pump inboard bearing housing, horizontal direction**
- **bottom: Pump inboard bearing housing, vertical direction**

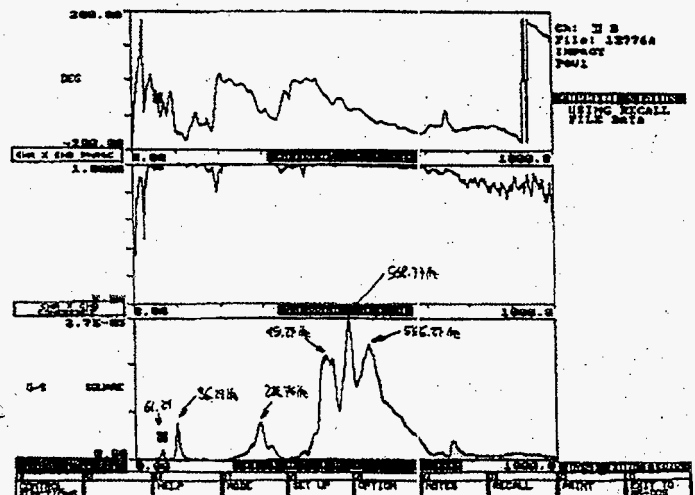




A-PUMP (1E776): MODAL TESTING OF PUMP OUTBOARD BEARING HOUSING **Enclosure 3**

- top: Pump outboard bearing housing, horizontal direction
- bottom: Pump outboard bearing housing, vertical direction

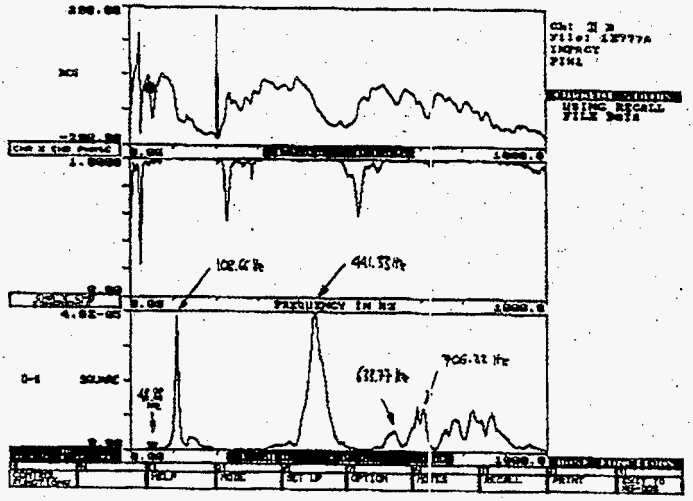


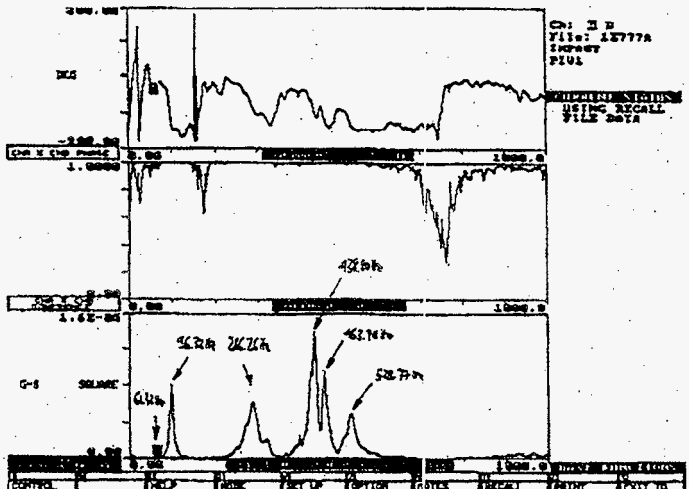


B-PUMP (1E776): MODAL TESTING OF PUMP INBOARD BEARING HOUSING

Enclosure 9

- **top: Pump inboard bearing housing, horizontal direction**
- **bottom: Pump inboard bearing housing, vertical direction**

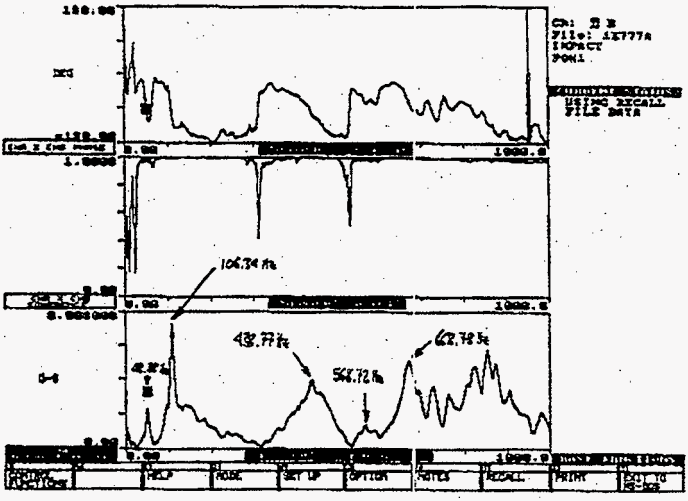




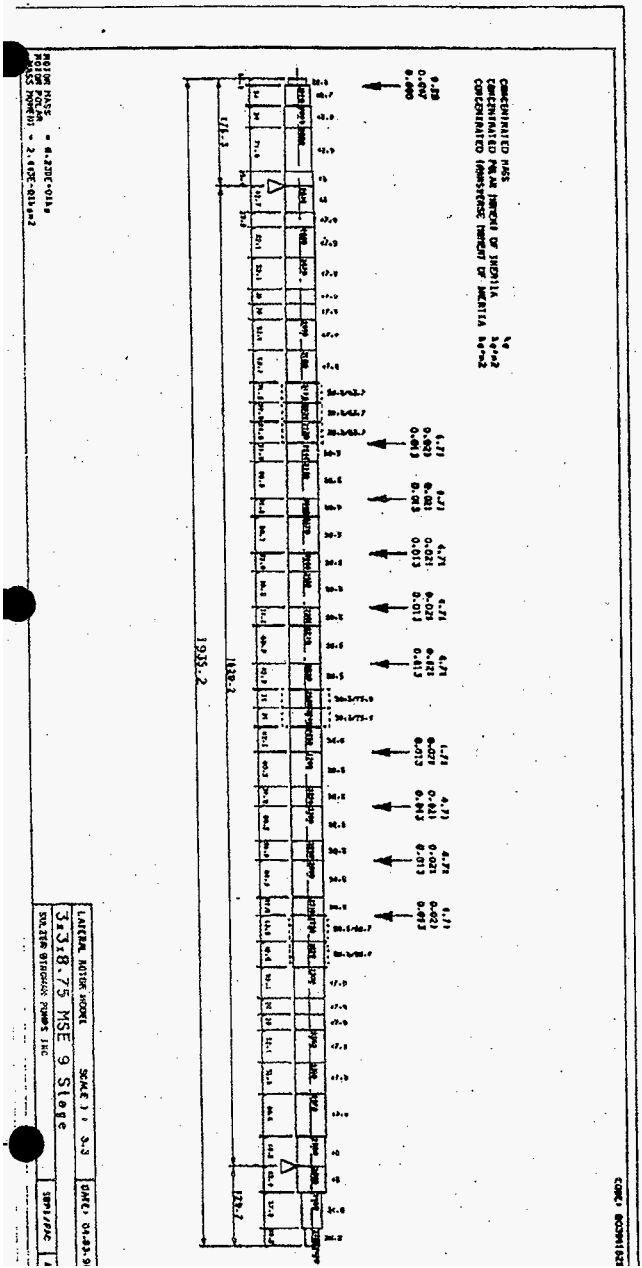
B-PUMP (1E776): MODAL TESTING OF PUMP OUTBOARD BEARING HOUSING

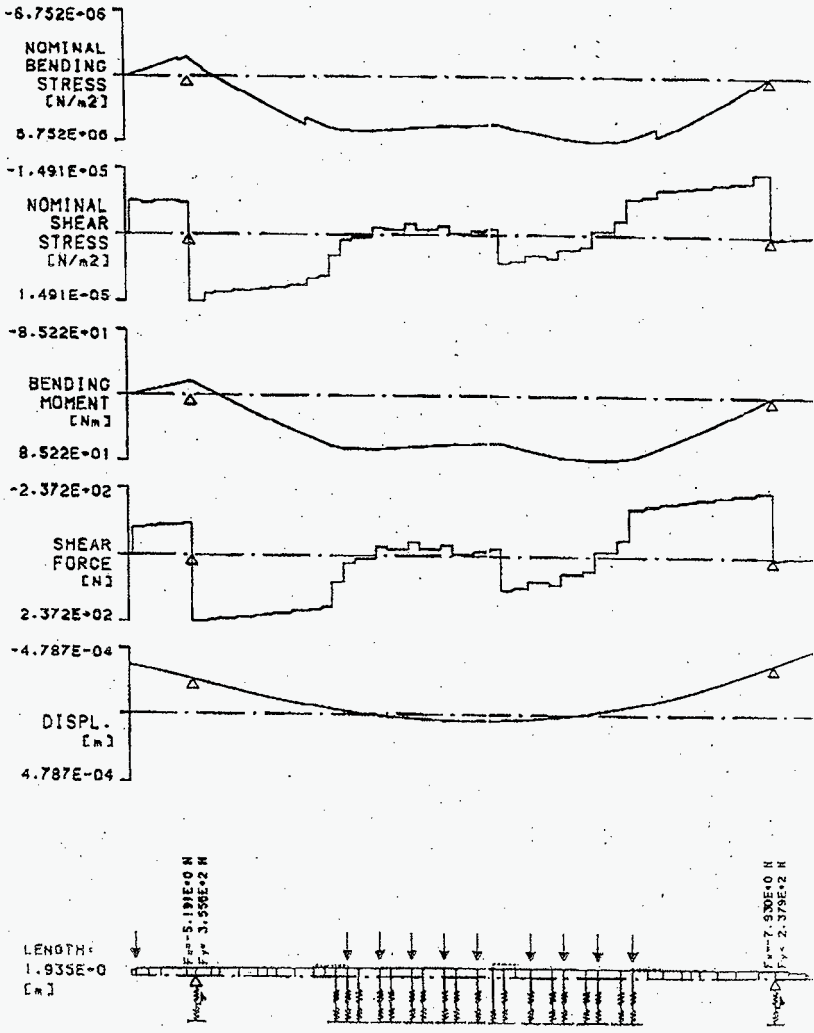
Enclosure 10

- top: Pump outboard bearing housing, horizontal direction



Enclosure 11





HNF-2504, REV. 0

ATTACHMENT 1 PAGE 276

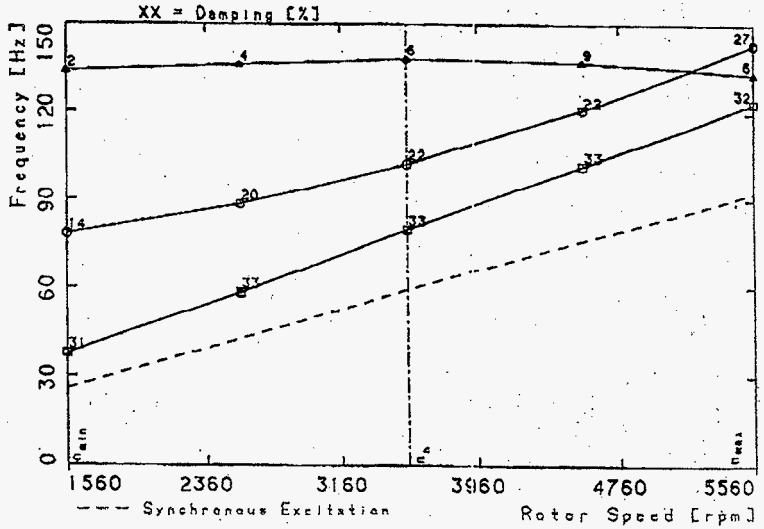
LATERAL NON-LINEAR STATIC ANALYSIS | DATE: 04.03.9

3 x 3 x 8.5 MSE 9 stg

Enclosure 13

LIST OF FREQUENCIES AND DAMPING

MODE NO.	SYMBOL	FREQUENCY [Hz]	FREQUENCY [rpm]	DAMPING [%]	ROTOR SPEED [rpm]	PRECESSION FACTOR
1	□	37.67	2260	31.1	1560	0.97
1	□	58.24	3495	32.5	2560	0.98
1	□	79.85	4779	32.8	3560	1.00
1	□	101.89	6113	32.6	4560	1.00
1	□	123.54	7412	32.1	5560	1.00
2	○	78.06	4684	14.4	1560	0.99
2	○	88.50	5310	19.6	2560	1.00
2	○	102.38	6143	22.0	3560	1.00
2	○	120.95	7257	22.1	4560	1.00
2	○	143.25	8595	26.5	5560	0.99
3	△	133.81	8028	2.5	1560	0.92
3	△	136.13	8168	4.1	2560	0.97
3	△	137.98	8279	6.1	3560	1.00
3	△	136.97	8218	8.9	4560	1.00
3	△	133.47	8008	6.3	5560	1.00

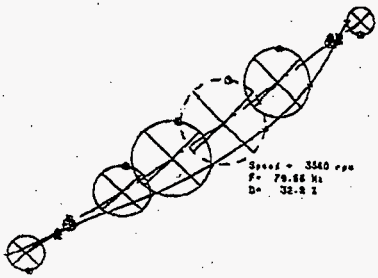


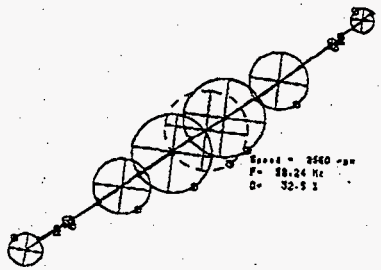
Pump State: New
Analysis..... 803041633, (HANFORD) 3x3x8.75 MSE 9Stg

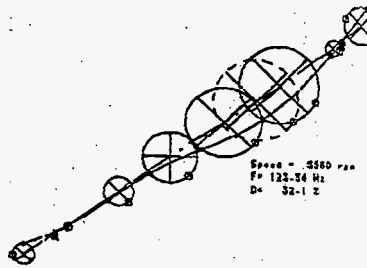
EIGVC: FREQUENCY LIST AND CAMPBELL DIAGRAM | DATE: 04.03.98

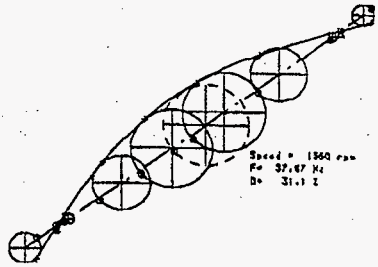
3 x 3 x 8.5 MSE 9 stg

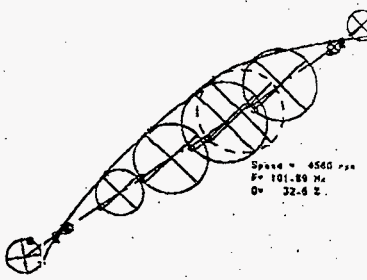
Enclosure 1

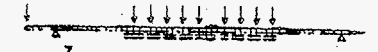


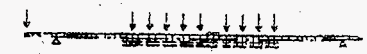


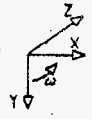












orbit with max. major ex a, + $\omega t = 0$, ⊙ $\omega t = \pi/2$

Mode Shape No. 1

Pump State: New

Analysis.... 803041633, (HANFORD) 3x3x8.75 MSE 9Stg

LATERAL DAMPED NATURAL FREQUENCIES ANALYSIS	DATE: 04.03.9
3 x 3 x 8.5 MSE 9 stg	

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
HNF-1857	POTP-007 INTEGRATED TEST	TE-006

DESCRIPTION OF PROBLEM: Both A and B pumps restart automatically after a VSD fault because the start signal from PCU-2 is latched in and a VSD fault does not unlatch the start signal. Also the start/stop inputs to the VSD's are reversed.

ORIGINATOR:
M. D. Gerken 02/19/98
D.G.
ORG: DATE:

IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION X CONTINUE
M. D. Gerken 02/19/98
D.G.
TEST ENGINEER DATE

DISPOSITION:

D.G. 3/31/98

Write ECN to correct logic (unlatch start signal ECN 393) and wiring (start/stop inputs reversed ECN-391) at PCU-2 and retest that pump does not restart automatically after a local stop.

Retest:

1. Start pump P-3125A /P-3125B verify start energized and pump status "ON" are green on pump graphic screen and pump is running locally.

2. After 6 seconds verify start energized and pump status "ON" go off on pump graphic screen and pump continues to run locally.

3. Initiate a pump stop from the VSD and verify pump stops locally and does not automatically restart.

NOTE: Operations needs to reconfigure RSVIEW so that the start energized and pump status "ON" remain enabled. This requires the VSD run signals for both pumps to be connected to a spare input at PCU-2 and assigning this input to operate the RSVIEW tags for pump status.

DISPOSITION AND RETEST REQUIREMENTS BY:
M. D. Gerken 02/20/98
D.G.
DATE

DISPOSITION ACTIONS COMPLETE:
Verified [signature] 3-31-98
DATE

QAE CONCURRENCE WITH DISPOSITION (if required):
[signature] 3/31/98
DATE

RETEST COMPLETE:
M. D. Gerken 03/27/98
D.G.
TEST ENGINEER DATE

ENGINEERING CHANGE NOTICE

Page 1 of 4

1. ECN 647594

Proj. ECN W-058-395

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [X] Direct Revision [] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	MA FRIEDRICH,TWRS,G3-14,376-7407	[] Yes [X] No	4-1-98
	6. Project Title/No./Work Order No. REPLACEMENT OF CROSS-SITE XFER SYSTEM, W058, C12300	7. Bldg./Sys./Fac. No. 241-SY	8. Approval Designator S Q/SC1
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-1857 REV 0-A	10. Related ECN No(s). NA	11. Related PO No. NA

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	NA	NA Design Authority/Cog. Engineer Signature & Date	NA Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? [] Yes [X] No

SC-3

HNF-1857, REV 0-A:
a) REVISE PAGE 13, AS SHOWN ON PAGE 3 OF THIS ECN.
b) REVISE PAGE 14, AS SHOWN ON PAGE 4 OF THIS ECN.

14a. Justification (mark one)

Criteria Change	[]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[X]	Design Error/Omission	[]

14b. Justification Details MAF 4-1-98

~~THE DECADE BOX HAS BEEN OMITTED~~. THE FLOW RATE TOLERANCE HAS BEEN REDEFINED. THE INTERLOK (I-15) HAS BEEN REVISED. THIS CHANGE DOES NOT AFFECT THE FUNCTION OR TECHNICAL ASPECTS OF THE DESIGN.

15. Distribution (include name, MSIN, and no. of copies)

FDNW DISTRIBUTION
CONST DOC CONTROL S2-53

DISTRIBUTION
W.H. BRYANT -LMHC S0-09
R.L. SCHLOSSER -LMHC R1-56
C. VAN KATWIJK - NHC R3-47

RELEASE STAMP
DATE: APR 01 1998
STA: 4
HANFORD RELEASE
ID: 2

A-7900-013-2 (05/96) GEF095

A-7900-013-1

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) W-058-395

16. Design Verification Required
[ ] Yes
[X] No

17. Cost Impact
ENGINEERING
Additional [X] $ 150.00
Savings [ ] $
CONSTRUCTION none
Additional [ ] $
Savings [ ] $

18. Schedule Impact (days) none
Improvement [ ]
Delay [ ]

19. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 13. Enter the affected document number in Block 20.

SDD/DD	[ ]	Seismic/Stress Analysis	[ ]	Tank Calibration Manual	[ ]
Functional Design Criteria	[ ]	Stress/Design Report	[ ]	Health Physics Procedure	[ ]
Operating Specification	[ ]	Interface Control Drawing	[ ]	Spares Multiple Unit Listing	[ ]
Criticality Specification	[ ]	Calibration Procedure	[ ]	Test Procedures/Specification	[ ]
Conceptual Design Report	[ ]	Installation Procedure	[ ]	Component Index	[ ]
Equipment Spec.	[ ]	Maintenance Procedure	[ ]	ASME Coded Item	[ ]
Const. Spec.	[ ]	Engineering Procedure	[ ]	Human Factor Consideration	[ ]
Procurement Spec.	[ ]	Operating Instruction	[ ]	Computer Software	[ ]
Vendor Information	[ ]	Operating Procedure	[ ]	Electric Circuit Schedule	[ ]
OM Manual	[ ]	Operational Safety Requirement	[ ]	ICRS Procedure	[ ]
FSAR/SAR	[ ]	IEFD Drawing	[ ]	Process Control Manual/Plan	[ ]
Safety Equipment List	[ ]	Cell Arrangement Drawing	[ ]	Process Flow Chart	[ ]
Radiation Work Permit	[ ]	Essential Material Specification	[ ]	Purchase Requisition	[ ]
Environmental Impact Statement	[ ]	Fac. Proc. Samp. Schedule	[ ]	Tickler File	[ ]
Environmental Report	[ ]	Inspection Plan	[ ]		[ ]
Environmental Permit	[ ]	Inventory Adjustment Request	[ ]		[ ]

20. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision
NA		

21. Approvals

	Signature	Date		Signature	Date
Design Authority	Margaret L. Brown	4/1/98	Design Agent	MA Friedrich	4-1-98
Prof. Engr.		1-4-98	PE		4.1.98
Cog. Mgr.	MA Parsons	4-1-98	QA	NA	NA
QA L.R. HALL (FDNW)	Larry R. Hall	4-1-98	Safety	NA	NA
Safety	M. Q. Tuler	4/1/98	Design	MA Friedrich	4-1-98
Environ.	NA	NA	Environ.	NA	NA
Other	MJ SUTEY	4-1-98	Other		
	NA	NA			

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

4.13.6 ~~Multi-meter 0-600V.~~ NOT REQUIRED D.G. 3/30/98
~~Manufacturer: _____ Model No. _____~~
~~Serial No. _____ Calibration Date _____~~
~~Calibration Due Date _____~~

4.13.7 Process Instrument Calibrator, with 4-20 mA signal capability ~~and simulating a 100 ohm (type 385) RTD~~. D.G. 12/17/97
Manufacturer: Beta Model No. 110
Serial No. 1776 Calibration Date 7/9/97
Calibration Due Date 7/9/98 Cal. Serial No. 817-23-01-002

4.13.8 Bucket, with volumetric markings on side, to collect oil drained from booster pump bearing housings

4.13.9 Decade Box
dlg 12/17/97
Manufacturer: General Resistance Inc. Model No. DA-74-3X
Serial No.: 723 Calibration Date: 5/97
Calibration Due Date: 5/98

5.0 PROCEDURE

5.1 Preoperational testing shall be performed using Attachment A of this procedure.

ECN No. W-058-395		Page 3/4	
Ref. Dwg. —		Sh. _	Rev. _
Prep. By M. FRIEDRICH	Ckd. By		

6.0 ACCEPTANCE CRITERIA

6.1 Transfer headers 3150 and 3160 from the Diversion Box to the Vent Station were filled with water; water was circulated through them by the booster pumps; and the headers were vented and drained.

Test Engineer Doug Huber

Quality Control _____

6.2 Booster pumps P-3125A and P-3125B operated at the design flowrates of ~~104~~ gpm ± (5) gpm and 140 gpm ± 7 gpm. and at a high flow condition of ~~160~~ gpm ± (8) gpm, under control of system flow feedback. (Sections 9.0 and 10.0). OK D.G.

Test Engineer Doug Huber

Quality Control _____

CHANGE

MARK, THIS IS EXPLANATION FOR CHANGE

TOLERANCE IS ± 3% OF RANGE (240 GPM) Doug

6.3 The following interlocks operate properly:

- I-2: On high pressure shutdown operating booster pump, P-3125A or P-3125B.
- I-6: The operating booster pump, P-3125A or P-3125B will shutdown:
  - A) On high pump bearing temperature
  - B) On high motor winding temperature
  - C) On high vibration
  - D) On pump seal failure
  - E) On low oil level
- I-7: The pump will not be permitted to operate if the inlet pressure is lower than 10 psig
- I-9: Transfer pump P-102-SY-02A will not be permitted to operate if operating booster pump is shutdown
- I-10: Upstream transfer pump P-102-SY-02A will be shutdown if inlet pressure reaches 70 psig
- I-14: On high discharge pressure, shutdown appropriate operating pump
- I-15: The booster pump will not be permitted to ~~operate~~ START if the associated vent and drain valves are not closed.
- I-20 (with respect to supernate line vent only); On high pressure, shutdown transfer pump P-102-SY-02A.

Test Engineer Doug Huber

Quality Control _____

ECN No. W-058-395	Page 4/4
Ref. Dwg. —	Sh. _ Rev. _
Prep. By M. FRIEDRICH	Ckd. By

W-058 Interlock Test Listing

INTERLOCK LOGIC (H-2-822400, Sh 1, Rev 5)

1. If a leak is detected shutdown operating Booster Pump, P-3125A or P-3125B, Transfer Pump P-102-SY-02A, and input signal to 200 West Master Pump Circuit. (Software)

2. On high pressure shutdown operating Booster Pump, P-3125A or P-3125B. (Software)

3. On low level, shutdown Transfer Pump, P-102-SY-02A. (Software)

4. Sump pump will not be permitted to operate if associated outlet valve is not open. (Software)

5. On positive pressure (gage), in transfer line, vent valves will not be permitted to open. (Software)

6. The operating Booster Pump, P-3125A or P-3125B, will shutdown:
   A) On high pump bearing temperature. (Software)
   B) On high motor winding temperature. (Software)
   C) On high vibration. (Software)
   D) On pump sear failure. (Software)
   E) On low oil level. (Software)
   X) On local control. (Software)

7. The Booster Pump will not be permitted to operate if the inlet pressure is lower than 10psig. (Software)

8. Shutdown operating Booster Pump when rupture disk PSE 841 or PSE 842 fails. (Software)

9. Transfer Pump P-102-SY-SY-02A, will not be permitted to operate if operating Booster Pump is shutdown. (Software)

10. Upstream transfer pump P-102-SY-02A, will be shutdown if inlet pressure reaches 70psig. (Software)

11. On leak detection, shutdown Booster Pump P-3125A and P-3125B. (Hardwired)

12. On leak detection, shutdown Transfer Pump P-102-SY-02A. (Hardwired)

13. On leak detection, input signal to 200East and 200West Master Shutdown Circuits. See Drawings H-2-822440 sh1 and 442 sh 1. (Hardwired)

14. On high discharge pressure shutdown appropriate operating pump. (Software)

15. The Booster Pump will not be permitted to operate is the associated vent and drain valves are not closed. (Software)

16. On high pressure, input signal to 200West Master Shutdown circuits. (Hardwired)

17. If valve is open, input signal to 200West Master Shutdown circuits. (Hardwired)

18. On low level, shutdown flush pump P-3100A. (Software)

19. On high process temperature, high heater sheath temperature, or low flow heater is shutdown. (Hardwired)

20. On high pressure, shutdown transfer pump P-102-SY-02A. (Software)

21. On positive pressure (gage), in transfer line, sump pump valves will not be permitted to open. (Software)

IL	SYS	DEVICE	P&ID	ALARM	IL ACTION/(HW or SW)	FUNCTION	LOCATION	TESTED	COMMENTS
01	SNL/SLL	LDE3150	403	LEAK	STOP P3125A/B & 2W MPS/S	SUMP LD	DB PUMP RM	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3150	403	LEAK	STOP P3125A/B & 2W MPS/S	SUMP LD	DB PUMP RM	POTP-008	2.18 (Note 5)
01	SNL/SLL	LDE3150A	403	LEAK	STOP P3125A/B & 2W MPS/S	SUMP LD	DB PUMP RM	POTP-008	2.31 (Note 5)
01	SNL/SLL	LDE3151	404	LEAK	STOP P3125A/B & 2W MPS/S	SUMP LD	VS VAULT	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3151	404	LEAK	STOP P3125A/B & 2W MPS/S	SUMP LD	VS VAULT	POTP-008	2.44 (Note 5)
01	SNL/SLL	LDE3151A	404	LEAK	STOP P3125A/B & 2W MPS/S	SUMP LD	VS VAULT	POTP-008	2.58 (Note 5)
01	SNL/SLL	LDE3160A	403	LEAK	STOP P3125A/B & 2W MPS/S	ENCASEMENT LD	DB SWGR RM	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3160B	403	LEAK	STOP P3125A/B & 2W MPS/S	ENCASEMENT LD	DB SWGR RM	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3160C	403	LEAK	STOP P3125A/B & 2W MPS/S	ENCASEMENT LD	DB SWGR RM	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3160D	403	LEAK	STOP P3125A/B & 2W MPS/S	ENCASEMENT LD	DB SWGR RM	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3161A	404	LEAK	STOP P3125A/B & 2W MPS/S	ENCASEMENT LD	VS SWGR RM	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3161B	404	LEAK	STOP P3125A/B & 2W MPS/S	ENCASEMENT LD	VS SWGR RM	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3161C	404	LEAK	STOP P3125A/B & 2W MPS/S	ENCASEMENT LD	VS SWGR RM	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3161D	404	LEAK	STOP P3125A/B & 2W MPS/S	ENCASEMENT LD	VS SWGR RM	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3162A	405	LEAK	STOP P3125A/B & 2W MPS/S	ENCASEMENT LD	CAB6241	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDE3162B	405	LEAK	STOP P3125A/B & 2W MPS/S	ENCASEMENT LD	CAB6241	ATP004//POTP005	9.10(A)/10.10(B)//12(MPS)
01	SNL/SLL	LDEPP	405	LEAK	STOP P3125A/B & 2W MPS/S	LIFT STATION LD	244A LIFT STA	POTP-004	9.34(A)(MPS)/10.34(B)(MPS)
02	SLL	PT3168	404	P>10PSIG	SHUT DOWN P3125A OR B/S	PROTECT VS HEPA	VS VAULT	ATP-004//POTP007	9.10/10.10//2.37/3.37
02	SLL	PT842	405	P>200PSIG	SHUT DOWN P3125A OR B/S	PROTECT EXST TF	244A LIFT STA	POTP-004	9.49(A)/10.49(B) (Note 1)
03	SNL	LSL3102	401	LEVEL LO	P102SYO2A PERMSVE/S	XFER PUMP LEVEL	SY102	ATP-003	9.1 (Note 2)
04	SNL	SOV3167A	404	≠OPEN	INHIBIT SUMP PUMP/S	SUMP DISCHARGE	VS VAULT	POTP-005	11.12-11.24
04	SNL	SOV3167B	404	≠OPEN	INHIBIT SUMP PUMP/S	SUMP DISCHARGE	VS VAULT	POTP-005	11.12-11.24
04	SNL	SOV3173A	403	≠OPEN	INHIBIT SUMP PP/S	SUMP DISCHARGE	DB PUMP RM	POTP-005	9.12-9.24
04	SNL	SOV3173B	403	≠OPEN	INHIBIT SUMP PP/S	SUMP DISCHARGE	DB PUMP RM	POTP-005	9.12-9.24
05	SNL	PT3126A	404	p>0PSIG	INHIB VENT VALVE OPEN/S	SUPER PRESSURE	VS VAULT	POTP-005	4.0
05	SLL	PT3126B	404	P>0PSIG	INHIB VENT VALVE OPEN/S	SLURRY PRESS	VS VAULT	POTP-004	5.0

IL	SYS	DEVICE	P&ID	ALARM	IL ACTION/(HW or SW)	FUNCTION	LOCATION	TESTED	COMMENTS
06A	SLL	TE3125A1	400/2	T>200°F	SHUTDOWN P3125A/S	BP BRG TEMP	DB PUMP RM	POTP-007	2.26
06A	SLL	TE3125A2	400/2	T>200°F	SHUTDOWN P3125A/S	BP BRG TEMP	DB PUMP RM	POTP-007	2.27
06A	SLL	TE3125B1	400/2	T>200°F	SHUTDOWN P-3125B/S	BP BRG TEMP	DB PUMP RM	POTP-007	3.26
06A	SLL	TE3125B2	400/2	T>200°F	SHUTDOWN P-3125B/S	BP BRG TEMP	DB PUMP RM	POTP-007	3.27
06B	SLL	TSH3125A	400/2	T>175°F	SHUTDOWN P3125A/S	BP MOTOR TEMP	DB PUMP RM	POTP-007	2.28
06B	SLL	TSH3125B	400/2	T>175°F	SHUTDOWN P-3125B/S	BP MOTOR TEMP	DB PUMP RM	POTP-007	3.28
06C	SLL	VT3125A1	400/1	V>.6IN/S	SHUTDOWN P3125A/S	BP VIBRATION	DB PUMP RM	POTP-007	2.29
06C	SLL	VT3125A2	400/2	V>.6IN/S	SHUTDOWN P3125A/S	BP VIBRATION	DB PUMP RM	POTP-007	2.30
06C	SLL	VT3125B1	400/1	V>.6IN/S	SHUTDOWN P-3125B/S	BP VIBRATION	DB PUMP RM	POTP-007	3.29
06C	SLL	VT3125B2	400/2	V>.6IN/S	SHUTDOWN P-3125B/S	BP VIBRATION	DB PUMP RM	POTP-007	3.30
06D	SLL	FSH3125A1	400/2	F>11SCFH	SHUTDOWN P3125A/S	BP SEAL AIR	DB COMP RM	POTP-007	2.33
06D	SLL	FSH3125A2	400/2	F>11SCFH	SHUTDOWN P3125A/S	BP SEAL AIR	DB COMP RM	POTP-007	2.34
06D	SLL	FSH3125B1	400/3	F>11SCFH	SHUTDOWN P-3125B/S	BP SEAL AIR	DB COMP RM	POTP-007	3.33
06D	SLL	FSH3125B2	400/3	F>11SCFH	SHUTDOWN P-3125B/S	BP SEAL AIR	DB COMP RM	POTP-007	3.34
06D	SLL	PSL3125A1	400/2	P< 110PSIG	SHUTDOWN P3125A/S	BP SEAL AIR	DB COMP RM	POTP-007	2.35
06D	SLL	PSL3125A2	400/2	P<110PSIG	SHUTDOWN P3125A/S	BP SEAL AIR	DB COMP RM	POTP-007	2.36
06D	SLL	PSL3125B1	400/3	P<110PSIG	SHUTDOWN P-3125B/S	BP SEAL AIR	DB COMP RM	POTP-007	3.35
06D	SLL	PSL3125B2	400/3	P<110PSIG	SHUTDOWN P-3125B/S	BP SEAL AIR	DB COMP RM	POTP-007	3.36
06E	SLL	LSL3125A1	400/2	LEVEL LO	SHUTDOWN P3125A/S	BP OIL LEVEL	DB PUMP RM	POTP-007	2.31
06E	SLL	LSL3125A2	400/2	LEVEL LO	SHUTDOWN P3125A/S	BP OIL LEVEL	DB PUMP RM	POTP-007	2.32
06E	SLL	LSL3125B1	400/2	LEVEL LO	SHUTDOWN P-3125B/S	BP OIL LEVEL	DB PUMP RM	POTP-007	3.31
06E	SLL	LSL3125B2	400/2	LEVEL LO	SHUTDOWN P-3125B/S	BP OIL LEVEL	DB PUMP RM	POTP-007	3.32
06X	SLL	HS3125A	400/2	OFF	SHUTDOWN P3125A/S	HAND-OFF-AUTO	DB SWGR RM	POTP-007	7.2.1
06X	SLL	HS3125B	400/2	OFF	SHUTDOWN P-3125B/S	HAND-OFF -AUTO	DB SWGR RM	POTP-007	8.4.1
07	SLL	PT3125A	403	P<10PSIG	INHIBIT P3125A /S	BP-A INLET P	DB PUMP RM	POTP-007	2.38
07	SLL	PT3125B	403	P<10PSIG	INHIBIT P-3125B/S	BP-B INLET P	DB PUMP RM	POTP-007	3.38

IL	SYS	DEVICE	P&ID	ALARM	IL ACTION/(HW or SW)	FUNCTION	LOCATION	TESTED	COMMENTS
08	SLL	YAS841	405	RD FAIL	STOP P3125A/B/S	RUPT DISK MON	244A	POTP-004	9.70(A)/10.70(B) (Note 1)
08	SLL	YAS842	405	RD FAIL	STOP P 3125A/B/S	RUPT DISK MON	244A	POTP-004	9.79(A)/10.79(B) (Note 1)
09	SNL/SLL	P3125A or B	403	RUN	P102SY02A PERMSVE/S	XFER PUMP	DB PUMP RM	POTP-007	2.25/3.25
10	SNL/SLL	PT3125A	403	P > 70PSIG	STOP TRANSFER PUMP/S	BP-A INLET P	DB PUMP RM	POTP-007	2.38
10	SNL/SLL	PT3125B	403	P>70PSIG	STOP TRANSFER PUMP/S	BP-B INLET P	DB PUMP RM	POTP-007	3.38
11	SLL	LDE3151	404	LEAK	STOP P 3125A&B/H	SUMP LD	VS VAULT	POTP-005	10.23/10.24
11	SLL	LDE3151	404	LEAK	STOP P 3125A&B/H	SUMP LD	VS VAULT	POTP-008	2.48/2.49 (Note 5)
11	SLL	LDE3151A	404	LEAK	STOP P 3125A&B/H	SUMP LD	VS VAULT	POTP-008	2.62/2.63(Note 5)
11	SLL	LDK3150	403	LEAK	STOP P 3125A&B/H	SUMP LD	DB PUMP RM	POTP-005	8.23/8.24
11	SLL	LDK3150	403	LEAK	STOP P 3125A&B/H	SUMP LD	DB PUMP RM	POTP-008	2.22/2.23(Note 5)
11	SLL	LDK3150A	403	LEAK	STOP P 3125A&B/H	SUMP LD	DB PUMP RM	POTP-008	2.34/2.35(Note 5)
12	SNL/SLL	LDE3151	404	LEAK	STOP XFER PMP SY-02A/H	SUMP LD	VS VAULT	POTP-005	10.19-10.22
12	SNL/SLL	LDE3151	404	LEAK	STOP XFER PMP SY-02A/H	SUMP LD	VS VAULT	POTP-008	2.46(Note 5)
12	SNL/SLL	LDE3151A	404	LEAK	STOP XFER PMP SY-02A/H	SUMP LD	VS VAULT	POTP-008	2.60 (Note 5)
12	SNL/SLL	LDK3150	403	LEAK	STOP P102SY02A/H	SUMP LD	DB PUMP RM	POTP-005	8.19-8.22
12	SNL/SLL	LDK3150	403	LEAK	STOP P102SY02A/H	SUMP LD	DB PUMP RM	POTP-008	2.20(Note 5)
12	SNL/SLL	LDK3150A	403	LEAK	STOP P102SY02A/H	SUMP LD	DB PUMP RM	POTP-008	2.32.1(Note 5)
13	SNL/SLL	LDE3151	404	LEAK	INPUT TO 2E & 2W MPS/H	SUMP LD	VS VAULT	POTP-005	10.25 (Note 3)
13	SNL/SLL	LDE3151	404	LEAK	INPUT TO 2E & 2W MPS/H	SUMP LD	VS VAULT	POTP-008	2.47 (Note 5)
13	SNL/SLL	LDE3151A	404	LEAK	INPUT TO 2E & 2W MPS/H	SUMP LD	VS VAULT	POTP-008	2.61(Note 5)
13	SNL/SLL	LDK3150	403	LEAK	INPUT TO 2E & 2W MPS/H	SUMP LD	DB PUMP RM	POTP-005	8.25 (Note 3)
13	SNL/SLL	LDK3150	403	LEAK	INPUT TO 2E & 2W MPS/H	SUMP LD	DB PUMP RM	POTP-008	2.21(Note 5)
13	SNL/SLL	LDK3150A	403	LEAK	INPUT TO 2E & 2W MPS/H	SUMP LD	DB PUMP RM	POTP-008	2.33(Note 5)
14	SLL	PT3125C	403	P>1250PSIG	STOP P3125A/S	BP-A OUTLET P	DB PUMP RM	ATP-004//POTP007	9.10//2.39
14	SLL	PT3125D	403	P>1250SPIG	STOP P-3125B/S	BP-B OUTLET P	DB PUMP RM	ATP-004//POTP007	10.10//3.39
15	SLL	MOV3125AA	400/2	*CLOSED	INHIBIT P3125A/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	2.40

IL	SYS	DEVICE	P&ID	ALARM	IL ACTION/(HW or SW)	FUNCTION	LOCATION	TESTED	COMMENTS
15	SLL	MOV3125AB	400/2	≠CLOSED	INHIBIT P3125A/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	2.40
15	SLL	MOV3125AC	400/2	≠CLOSED	INHIBIT P3125A/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	2.40
15	SLL	MOV3125AD	400/2	≠CLOSED	INHIBIT P3125A/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	2.40
15	SLL	MOV3125AE	400/2	≠CLOSED	INHIBIT P3125A/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	2.40
15	SLL	MOV3125AF	400/2	≠CLOSED	INHIBIT P3125A/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	2.40
15	SLL	MOV3125AG	400/2	≠CLOSED	INHIBIT P3125A/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	2.40
15	SLL	MOV3125AH	400/2	≠CLOSED	INHIBIT P3125A/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	2.40
15	SLL	MOV3125AJ	400/2	≠CLOSED	INHIBIT P3125A/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	2.40
15	SLL	MOV3125AK	400/2	≠CLOSED	INHIBIT P3125A/S	BP VENT VALVE	DB PUMP RM	POTP-007	2.40
15	SLL	MOV3125BA	400/2	≠CLOSED	INHIBIT P-3125B/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	3.40
15	SLL	MOV3125BB	400/2	≠CLOSED	INHIBIT P-3125B/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	3.40
15	SLL	MOV3125BC	400/2	≠CLOSED	INHIBIT P-3125B/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	3.40
15	SLL	MOV3125BD	400/2	≠CLOSED	INHIBIT P-3125B/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	3.40
15	SLL	MOV3125BE	400/2	≠CLOSED	INHIBIT P-3125B/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	3.40
15	SLL	MOV3125BF	400/2	≠CLOSED	INHIBIT P-3125B/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	3.40
15	SLL	MOV3125BG	400/2	≠CLOSED	INHIBIT P-3125B/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	3.40
15	SLL	MOV3125BH	400/2	≠CLOSED	INHIBIT P-3125B/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	3.40
15	SLL	MOV3125BJ	400/2	≠CLOSED	INHIBIT P-3125B/S	BP DRAIN VALVE	DB PUMP RM	POTP-007	3.40
15	SLL	MOV3125BK	400/2	≠CLOSED	INHIBIT P-3125B/S	BP VENT VALVE	DB PUMP RM	POTP-007	3.40
15	SLL	SOV3163	403	≠CLOSED	INHIBIT P3125A/B/S	PROCESS VV	DB PUMP RM	POTP-007	2.40, 3.40
16	SNL	PSH3113	402	P>10PSIG	2W MPS SHUTDOWN/H	SYS. PRESS	241SYA VP	POTP-005	12.34-12.37 (Note 1)
16	SNL	PSH3113	402	P>10PSIG	2W MPS SHUTDOWN/H	SYS. PRESS	241SYA VP	POTP-008	2.66, 2.68(Note 5)
16	SNL	PSH3113A	402	P>10PSIG	2W MPS SHUTDOWN/H	SYS. PRESS	241SYA VP	NEW	NEW (Note 4)
16	SNL	PSH3113A	402	P>10PSIG	2W MPS SHUTDOWN/H	SYS. PRESS	241SYA VP	POTP-008	2.71, 2.73(Note 5)
17	SNL	ZSH3113	402	≠CLOSED	2W MPS SHUTDOWN/H	VALVE POSITION	241SYA VP	POTP-005	12.39-12.43 (Note 1)
18	SNL/SLL	LIT302C-1	409	LEVEL<5'	STOP P3100A	FLUSH TK LEVEL	FLUSH TK	POTP-001	4.37-4.39

IL	SYS	DEVICE	P&ID	ALARM	IL ACTION/(HW or SW)	FUNCTION	LOCATION	TESTED	COMMENTS
19	SNL/SLL	FSL302C-4A	400/1	NO FLOW	SHUTDOWN HTR 2/H	FLUSH FLOW	FLUSH SKID	POTP-001	5.4-5.7
19	SNL/SLL	FSL302C-4B	400/1	NO FLOW	SHUTDOWN HTR 1/H	FLUSH FLOW	FLUSH SKID	POTP-001	5.4-5.7
19	SNL/SLL	TIC302C-4C	400/1	T>180°F	SHUTDOWN HTR 2/H	PROCESS TEMP HI	FLUSH SKID	POTP-001	5.72-5.80
19	SNL/SLL	TIC302C-4D	400/1	T>180°F	SHUTDOWN HTR 1/H	PROCESS TEMP HI	FLUSH SKID	POTP-001	5.26-5.34
19	SNL/SLL	TIC302C-4E	400/1	T>375°F	SHUTDOWN HTR 2/H	SHEATH TEMP HI	FLUSH SKID	POTP-001	5.87-5.94
19	SNL/SLL	TIC302C-4F	400/1	T>375°F	SHUTDOWN HTR 1/H	SHEATH TEMP HI	FLUSH SKID	POTP-001	5.41-5.48
20	SNL	PT3167	404	P>10PSIG	SHUT DOWN XFER PUMP/S	SUPER PRESS	VS PUMP RM	POTP-005	7.0-7.12
20	SNL	PT3173	403	P> 10PSIG	STOP P102SY02A/S	SUMP TO SUPER	DB PUMP RM	POTP-005	6.0-6.12
20	SNL	PT3185	404	P>10PSIG	SHUT DOWN XFER PUMP/S	SUPER PRESS	VS PUMP RM	POTP-007	2.44-2.56
21	SNL	PT3125E	403	P>0PSIG	INHIBIT SUMP VALVES	SUMP DISCHARGE	DB PUMP RM	POTP-005	5.8-5.14
21	SNL	PT3126E	404	P>0PSIG	INHIBIT SUMP VALVES	SUMP DISCHARGE	VS PUMP RM	POTP-005	4.9-4.14

Notes:

1 Jumpers not installed at the time of the test. Testing was performed, using appropriate signals, from the connection point at the pit interface.

2 LSL3102 (Level in Tank SY-102) does not show in the current design as a control element. (Wiring was removed per project ECN W-058-339, pages 4 and 9.) However, the functional control of this device was tested as part of ATP-003, section 9.1 in the event that it is reinstated..

3 In accordance with design requirements, W-058 leak detection is not connected to the 200E Tank Farm Master Pump Shutdown (MPS) scheme. Interposing relays are provided at the 244A lift station for future connection, if desired. These relays were tested for proper action. The project is connected to the 200W MPS and this connection was also tested.

4 Device PT3113A is redundant to PT3113. This device was not installed prior to the completion of testing for POTP-005.

5 Redundant devices PT3113A, LDE3150A, and LDE3151A were installed subsequent to the normal testing. POTP-008 was put in place to perform the testing of these devices and to retest the original instruments.

EP
Gcc: Gerlew
Dunks

SULZER PUMPS

Between Bearings Business Unit
Kevin M. Harold
Product Group Manager
2800 N.W. Front Avenue
Portland, OR 97210-1502
U.S.A.
Tel. (503) 226-5354
Fax (503) 226-5242

Your reference:
Our reference: 1E776/777

Date: January 20, 1998

Fluor Daniel Northwest Inc.
2355 Stevens Drive
Richland, Washington 99352-1100

Attn: Mr. Tony Gasperino

Subject : Oil Float Detectors - Revised

Dear Mr. Gasperino:

After further review, our engineering group has revised the oil level values as follows:

- Normal Oil level in bearing housing is **2.625** inches below shaft centerline
- Minimum Oil level in bearing housing (switch activation level) remains at 3.06 inches below shaft centerline

We apologize for the confusion. If you have any questions, please contact our office.

Best regards,

Kevin M. Harold

Kevin M. Harold

CORRESPONDENCE DISTRIBUTION COVERSHEET

Author	Addressee	Correspondence No.
G. R. Porter 372-2648	R. J. Brown, LMHC	NHC-9852239 March 11, 1998

Subject: PROJECT W-058, "REPLACEMENT CROSS-SITE TRANSFER SYSTEM", BOOSTER PUMP STORAGE RECOMMENDATION

DISTRIBUTION

Approval	Date	Name	Location	w/att
		Correspondence Control	A3-01	X
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		J. L. Henderson	G3-14	X
		Lockheed Martin Hanford Corporation		
		M. G. Al-Wazani	T4-07	X
		C. B. Bryan	T4-07	X
		C. R. Reichmuth	T4-07	X
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P.A. HAINE

NHC
Numatec Hanford Corporation
An SGN/Cogema, Inc. Company

March 11, 1998

NHC-9852239

Mr. R. J. Brown, Manager
Technical Operations and Projects T4-08
Lockheed Martin Hanford Corporation
Post Office Box 1500
Richland, Washington 99352-1505

Dear Mr. Brown:

PROJECT W-058, "REPLACEMENT CROSS-SITE TRANSFER SYSTEM", BOOSTER PUMP STORAGE RECOMMENDATION

Supplemental recommendations for long term maintenance of the Cross-Site Transfer System booster pumps has been received from Sulzer Pumps. A copy of these recommendations is attached for your information.

The Project recommends that Option 3 be implemented by Operations for the long term maintenance/storage of the subject pumps. This option entails some pump disassembly, but provides the greatest long term protection of the pump with the least maintenance monitoring activities. This option is also consistent with current TWRS planning that reflects no slurry transfers within the next several years.

Very truly yours,

G. L. Parsons, Project Manager
Replacement Cross-Site Transfer System
Tank Farm Upgrade Projects

map

Attachment

SULZER PUMPS

1E776/1E777 INSTRUCTION MANUAL SUPPLEMENT

RECOMMENDED PROCEDURE FOR 1E776/1E777 HANFORD TRANSFER HORIZONTAL MSE PUMPS

LONG TERM MAINTENANCE FOR INSTALLED PUMPS

WARNING: Seals must have gas purge maintained at all times when pump is flooded.

This procedure outlines three (3) methods that can be used for pumps which may have long terms of inactivity between in operation:

OPTION 1 FULL OPERATION - (Frequency: 15-30 minute runs every month)

The purpose of this monthly run is to circulate the oil around the bearing housing to prevent corrosion of metal parts:

1) PARTIALLY CLOSE DISCHARGE VALVE
2) START NITROGEN PURGE TO SEAL
3) OPEN PUMP SUCTION VALVE
4) OPEN VENT VALVES, ENSURE PUMP IS COMPLETELY PRIMED
5) CLOSE VENT VALVES
6) START PUMP, BRING UP TO 2500 RPM (WITHIN 5 SECONDS)
7) FULLY OPEN DISCHARGE VALVE AND ENSURE PUMP REACHES BEST EFFICIENCY FLOW AND DESIGN PRESSURE
8) OPERATE PUMP FOR 15-30 MINUTES

OPTION 2 'BUMP' OPERATION - (Frequency: Once every three (3) months or less)

Due to discharge system pipe work not being available/operational, an alternative is to 'bump' start pump (i.e. pump operates for approximately 15 seconds against fully closed discharge valve):

1) FULLY CLOSE DISCHARGE VALVE
2) START NITROGEN PURGE TO SEAL
3) OPEN PUMP SUCTION VALVE
4) OPEN VENT VALVES, ENSURE PUMP IS COMPLETELY PRIMED
5) CLOSE VENT VALVES
6) START PUMP, BRING UP TO 2500 RPM WITHIN 5 SECONDS
7) OPERATION AT 2500 RPM IS NOT TO EXCEED 10 SECONDS, (DUE TO TEMPERATURE INCREASE IN PUMPAGE) THEN STOP PUMP (COAST DOWN TIME IS ACCEPTABLE AND DESIRABLE)

TECHNICAL NOTE: The main concerns with infrequent operation is moisture in the bearing housing, which could cause corrosion. For this reason, SBPI selected a synthetic oil due to:

1E776/1E777 INSTRUCTION MANUAL SUPPLEMENT

RECOMMENDED PROCEDURE FOR 1E776/1E777 HANFORD TRANSFER HORIZONTAL MSE PUMPS

LONG TERM MAINTENANCE FOR INSTALLED PUMPS

- Does not emulsify with water
- Synthetic corrosion inhibitors ironically bond to metal surfaces displacing water and other contamination's

Synthetic oil reduces operation time to every three (3) months, although every month would be even more desirable. Bump starting for 15 seconds (plus coast down time) will allow the oil rings to disperse synthetic oil throughout the bearing housing internals.

OPTION 3 REMOVE BEARINGS AND SEALS -

If the time between installation and pumping contaminants is long (>1 year) and pump is dry, bearing and seal removal from shaft should be considered:

Advantages:
- No maintenance (i.e., pump operation/turning not required)
- No risk of corrosion in bearing housing

The procedure is:

1) REMOVE COUPLING, BEARING HOUSINGS, COMPONENTS AND SEALS
2) COAT BEARING AND HOUSING SURFACES WITH RUST PREVENTATIVE (SHELL ENSIS FLUID NO. 210 OR EQUAL). ENCLOSE DESICCANT (BAGGED, NON-HALOGENATED, NON-DELIQUESCENT, CHEMICALLY INSERT SILICA GEL TO COMPLY WITH MIL-D-3464-D, TYPE 11). SEAL OFF WITH PROTECTIVE TARPAULIN
3) REMOVE SEALS. STORE SEALS IN ACCORDANCE WITH SEAL MANUFACTURERS INSTRUCTIONS.
4) PUMP ROTATING ELEMENT RESTS ON STATIONARY WEAR RINGS (NOTE - DO NOT TURN SHAFT!)
5) BLANK OFF STUFFING BOX WITH WOODEN COVER AND WRAP WITH TARPAULIN TO PREVENT ENTRY OF FOREIGN MATERIAL
6) SEAL OFF EXPOSED SHAFTS WITH TARPAULIN

TECHNICAL NOTE: During rebuild/start-up a SBPI Field Services representative is recommended. It is also recommended, that if the storage period is excessive (>1 year), all elastomers (in seals) and bearings should be replaced prior to 'contaminated' start up.

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	E.A. Pacquet - W-058 Testing	Date 03/31/98
Project Title/Work Order		EDT No. 623670
Replacement Cross-Site Tranfer System		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
R.J. Brown, LMHC	T4-08	X			
W.G. Brown, LMHC	T4-07	X			
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