Sta.4 (6)

FEB 20 1998

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 623663

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. This test report contains the results of preoperational testing of the water flush system. Attached are: HNF-1552, Rev 0, ECN W-058-376, and ECN W-058-378.		**10. System/Bldg./Facility:** SY Farm
11. Receiver Remarks: **11A. Design Baseline Document?** [ ] Yes [X] No		**12. Major Assm. Dwg. No.:** H-2-822409
		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-1917		0	Pre-Operational Test Report, Cross-Site Transfer Water Flush System	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	1. Approved	4. Reviewed no/comment
	2. Release	5. Post-Review	2. Approved w/comment	5. Reviewed w/comment
	3. Information	6. Dist. (Receipt Acknow. Required)	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: Warren Brown W.W. Brown 2/19/98			
N/A		Design Agent N/A			
1/2	1	~~Cog.~~ Eng.: EA Pacquet 2/19/98			
1/2	1	~~Cog.~~ Mgr.: GL Parsons 2/19/98			
1/2	1	QA: LR Hall for L. R. Hall S2-47 2/19/98			
1/2	1	Safety: OM Jaka 2/19/98			
N/A		Env.N/A			

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No.
JE Dunkle 2/19/98	EA Pacquet 2/19/98	GL Parsons 2/19/98	[ ] Approved
Signature of EDT Originator Date	Authorized Representative for Receiving Organization Date	Design Authority/ Cognizant Manager Date	[ ] Approved w/comments
			[ ] Disapproved w/comments

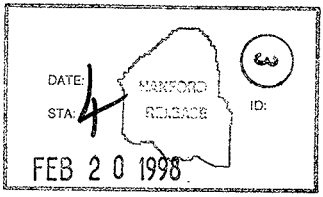
PREOPERATIONAL TEST REPORT, CROSS-SITE TRANSFER WATER FLUSH SYSTEM (POTP-001)

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

EDT/ECN: 623663 UC: 2030
Org Code: 8C160 Charge Code: N58U7
B&R Code: 39EW31301 Total Pages: ~~88~~ 91

Key Words: Project W-058, Heaters, Caustic Addition, Flush Pump, 302C Tank.

Abstract: This report documents the results of the testing performed per POTP-001, for the Cross-Site Transfer Water Flush System. (HNF-1552, Rev. 0) The Flush System consists of a 47,000 gallon tank (302C), a 20 hp pump, two 498kW heaters, a caustic addition pump, various valves, instruments, and piping. The purjpose of this system is to provide flush water at 140°F, 140gpm, and pH 11-12 for the Cross-Site Transfer System operation.



Release Approval 2/20/98 Date

Release Stamp

Approved for Public Release

HNF-1917 Pg 1

APPROVAL DESIGNATOR SQ

TEST REPORT APPROVAL BY TEST REVIEW BOARD (TRB)

TRB Chair	2/19/98 Date	TWRS Operations	2/19/98 Date
TWRS Engineering	2-19-98 Date	TWRS Safety	2/19/98 Date
Startup Engineer	2/19/98 Date	Quality Assurance	2/19/98 Date
Project Management	2/19/98 Date		

ATTACHMENTS

Attachment-1: Copy of original test procedure with recorded data, and the dispositioned test exception reports.

Attachment-2: ECN W-058-378

Attachment-3: ECN W-058-376

Attachment-4: MCS Caustic to Raw Water Flow Ratio Setting

Attachment-5: Pump P3100A Performance Design Point

Attachment-6: W-058 Interlock Test Listing

Attachment-7: Caustic to Raw Water Flow Measurement Tolerance

REFERENCES

1. HNF-1552, Rev.0, *Preoperational Testing; Cross-Site Transfer Water Flush System*
2. HNF-SD-W058-SUP-002,Rev.1, *Project W058 Startup Test Plan*
3. Calculation No. W058-P-050, *pH Adjustment of Water Using Sodium Hydroxide/Pump Injection rate.*
4. ECN W-058-340
5. ECN W-058-357

INTRODUCTION

Preoperational test HNF-1552 was performed in November and December 1997 according to the attached testing procedure and attached ECN. Nine test exceptions were generated and dispositioned with the result of the equipment operating properly. Troubleshooting and CGA (Calibration Grooming and Alignment) were required to get the hardware operational for testing. The technical requirements for the cross-site transfer water flush system performance were satisfied.

SUMMARY OF TEST RESULTS

ACCEPTANCE CRITERIA

1) Determine the Flush Water Pump performance curve as installed; at 140 gpm the head must be at least 240 ft per vendor information.
(Criteria met)

2) Verify the Flush Water System Sump Pump is operational.
(Criteria met)

3) The In-Line Heaters must raise the temperature of water in the test tank to at least 140+/-5 F°.
(Criteria met)

4) The Chemical Addition Pump capacity has been verified to deliver 12.4 gph ± 5% at a raw water flow of 170 gpm. The chemical addition pump shall maintain the corresponding pre-set caustic/water injection ratio.
(Criteria met)

5) Local and Remote control devices, instruments and interlocks operate in accordance with design specifications. Specifically: 1) Interlock 18 shuts down pump P-3100 A on low tank level; and 2)Interlock 19 turns off the heater(s) on the *Element Sheath High Limit Controller, the Process High Limit Controller*, and *Flow Switch*. Interlock 19 is provided as part of the vendor package.
(Criteria met)

A complete inventory of W-058 Interlocks tests is given in Attachment 6

NOTABLE EVENTS

Minor field hardware adjustments had to be made during the course of testing. These are recorded and described in the Test Log and/or as Test Exceptions.

The caustic addition pump (P-3100B), tested in Sections 2 and 3, was initially undersized and replaced with a larger model per ECN W-058-357, these test sections were repeated.

The installation design of the P-302C-3 Sump Pump was not complete at the time testing started and the test procedure had to be modified to accommodate the final installation per ECN W-058-376.

Field labeling of circulation heaters HTR-302-1 and HTR-302-2 was initially inversed and corrected per ECN W-058-340.

Auxiliary contacts from pump P3100A to PCU1 were installed per ECN W-058-376 and required retesting according to test exception 7.

COMMENTS

The caustic to raw water flow ratio setting at the MCS is 163% (see Attachments 4 and 7) to achieve 12.4 gph ±5% of 25% NaOH per 170 gpm of water.

The chemical injection pump P3100B "passed" the POTP-001 requirements; i.e it delivers adequate flow of caustic and automatically maintains the proper ratio between caustic and water as the water flow varies.

CONCLUSION

The Flush Water System will deliver 140 gpm of pH 11 water at 140°F to the cross-site transfer system.

Sta 4 (3)

Field Copy

NOV 13 1997

ENGINEERING DATA TRANSMITTAL

1. EDT 622911

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		P3100A
		10. System/Bldg./Facility:
		SY Farm
11. Receiver Remarks: 11A. Design Baseline Document? [] Yes [X] No		12. Major Assm. Dwg. No.:
		H-2-822409
		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-1552		0	Preoperational Testing, Cross-Site Transfer Water Flush System	~~N/A~~ S Q CS 11-13-97	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	M Parsons	11/13/97	R3-47						
CS 11-13-97 1/2	1	Cog. Proj. Startup	EA Pacquet	11-12-97	R3-47						
1, 2	~~N/A~~ 1	QA ~~N/A~~	Stacy R. Hall	11/12/97	R3-47						
1,2	~~N/A~~	Safety ~~N/A~~	M. B. Johnson	11/12/97	55-12						
N/A	N/A	Env. N/A						For Approvals see page 1 of document			

18.	19.	20.	21. DOE APPROVAL (if required) Ctrl. No.
Craig Shaw ~~QA Technician~~ Craig Shaw 11-13-97	EA Pacquet 11-12-97	GL Parsons M Parsons 11/13/97	[] 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

11 NOV 1997 D.E. Rand

BD-7400-172-1

Field Record Copy
Craig Shaw

Pre-Operational Testing, Cross-Site Transfer Water Flush System

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

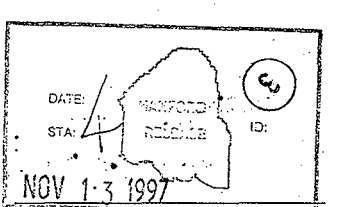
EDT/ECN: 622911 UC: 2030
Org Code: 8C610 Charge Code: N58U7
B&R Code: 39EW31301 Total Pages: ~~51~~ 52
KMS 11/13/97

Key Words: Project W-058, Pre-Operational, Flush System, Heater

Abstract: This procedure documents the steps required to fully demonstrate that the flush system caustic addition and heaters meets the pre-operational acceptance criteria given in the Project W-058 Startup Test Plan, HNF-SD-W058-SUP-002

Printed in the United States of America. To obtain copies of this document, contact: Document Control Services, P.O. Box 950, Mailstop H6-08, Richland WA 99352, Phone (509) 372-2420; Fax (509) 376-4989.

Release Approval 11/13/97 Date



Approved for Public Release

HNF-1917 Rev 0

Author
Craig P Shaw/Jim Dunks Print Name/Signature

APPROVAL DESIGNATOR SQ

PROCEDURE APPROVAL BY TEST REVIEW BOARD (TRB)

TRB Chair	11-17-97 Date	TWRS Operations	11-12-97 Date
TWRS Engineering (Waiver 11/12/97 Brown Design Auth.)	11-12-97 Date	TWRS Safety	11/12/97 Date
Craig Shaw Startup Engineer	11-12-97 Date	Quality Assurance	11/12/97 Date
Project Management	11/12/97 Date	FDNW Construction	11/13/97 Date

TABLE OF CONTENTS PAGE

1.0 PURPOSE

1.1 This procedure has been prepared to verify the Cross Site Transfer System Flush Water System operates in accordance with system design.

2.0 INFORMATION

2.1 SCOPE

Temporary hardware will be installed to by-pass Tank 302C and use a 4000 to 8000 gallon tank for testing (tank size depends on availability). Tank 302C is contaminated and its use would contaminate the flush system.

2.1.1 This procedure will demonstrate the operation of the following components in the the Flush Water System:

- Flush Water Pump
- Chemical Addition Package (including drum heater)
- Flush Tank Sump Pump
- Circulation Heater Package

2.1.2 This test will demonstrate the operation of system interlocks and controls both local and remote. The test will also demonstrate and record the equipment's performance capabilities as it is installed in the field.

2.2 TERMS AND DEFINITIONS

2.2.1 PCU - Process Control Unit
2.2.2 HS - Hand Switch
2.2.3 MCS - Monitoring and Control Station
2.2.4 HV - Hand Valve
2.2.5 PI - Pressure Indicator
2.2.6 T - Prefix used to designate temporary equipment

2.3 RESPONSIBILITIES

2.3.1 The Construction Forces craft personnel are responsible for:

- Providing assistance during the test.
- Corrective actions required on equipment.

BLANK PAGE gll 1.12.98

2.3.2 Test Director responsiblities:

- 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 The Engineering Personnel responsibilites:

- Ensures the equipment found in Step 4.7 of this procedure is available.
- 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.
- Properly disposing of water at the completion of test.

2.4 CHANGE CONTROL

2.4.1 Test procedure administrative or editorial changes required during testing may be accommodated as exceptions in the released test report, if the 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 in test procedures prepared as supporting documents must be made by engineering change notice.

2.5 EXCEPTIONS

2.5.1 Exceptions to results or to the test procedure will be given a sequential number and recorded on Attachment E, Test Exception log sheet. 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
- H-2-822400, P&ID Legend
- H-2-822409, P&ID Water Flush System
- H-2-824451, Electrical 252-S Substation One-Line Diagram
- H-2-822500, Sh.2 & 3, Electrical Partial Plan & Details "SY" Tank Farm
- H-2-822502, Sh. 1 & 2, Electrical Elementary Diagrams Flush System
- YS-058-Y82, Logic Diagram Miscellaneous Interlocks
- Vendor File 22798 - "Hydroflo" Chemical Feed System
- Vendor File 22798 - "Gould" Flush Pump
- Vendor File 22798 - "Indeeco" Circulation Heater Package
- Calcualtion No. W058-P-050 Sodium Hydroxide Addition

2.7 ENVIRONMENTAL

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

2.8 SAFETY

Warning - Hot,140°F, water will be used during testing; special attention should be given to avoiding hot piping and hoses.

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 The work covered by this procedure is performed outside of the tank farm and does not require entry into a radiation/contamination control area.

2.10 QUALITY ASSURANCE/QUALITY CONTROL

2.10.1 No Quality Assurance witness or hold points are required in this procedure. Quality Assurance shall review and approve the test procedure, the final test report and the disposition of all test exceptions. LMHC QC will witness testing 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.

2.12.6 Steps in this POTP may be performed out of sequence at the direction of the Test Engineer and Test Director.

3.0 RECORDS

3.1 This procedure as well as all completed attachments/appendices are kept as a permanent record. Test report will be issued to doucument results in accordance with HNF-PRO-446.

4.0 PREREQUISITES

Unless otherwise specified, prerequisite actionswill be performed in this order.

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

4.1.1 Chemical Addition Package, including calibration column.
4.1.2 In-line Heaters.
4.1.3 Flush Pump.
4.1.4 Sump Pump.
4.1.5 Instrumentation: Flowmeters, thermometers, pressure gages.

Test Engineer: Craig Shaw

4.2 Perform a walkdown inspection of the systems tested and the temporary hardware and configuration needed by this procedure.

Test Engineer: Craig Shaw

4.3 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).

~~*See Exception #3~~ CS Test Engineer Craig Shaw 11-21-97

4.4 Communications between the control room and field test personnel has been verified.

Test Director Craig Shaw 11-21-97

4.5 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 Craig Shaw 11-21-97

4.6 Perform a pretest briefing for all personnel involved in the performance of this test.

Test Director [signature]

4.7 All personnel who will be involved with this procedure have provided the required signature verification information in Attachment B.

Test Engineer: Craig Shaw 11-21-97

4.8 The test engineer has verified, by review of the tag log and a walkdown of the systems being tested, that components within and including the test boundary have been "blue" tagged as appropriate.

Not Required.
Test Engineer: Craig Shaw
" " Director: JDC

4.9 VERIFY pump P-3100A bearing oil reservoir level is in accordance with the manufacturer's recommendation.
Test Engineer: Craig Shaw

4.10 EQUIPMENT/INSTRUMENTS

Supplied by Test Engineer, as needed, unless otherwise noted.

4.10.1 Clamp-on Ammeter: 0-40 Ampere.
Manufacturer: Amprobe Model No. _____
Serial No. 950-45-02-038 Calibration Date 12-9-96
Calibration Due Date 12-9-97

817-45-02-004
Cal 9-20-97
9-20-98
New Probe

4.10.2 Multi-meter 0-480V (0-750 VAC)
Manufacturer: Fluke Model No. 87-III
Serial No. 950-45-03-008 Calibration Date 8-96-97
Calibration Due Date 8-6-98

4.10.3 Ohmmeter (OHM): Quantity of 2 required.
Manufacturer: Fluke Model No. 8024
Serial No. 950-45-08-038 Calibration Date 8-6-97
Calibration Due Date 8-6-97

4.10.4 Calibration Column:
Maufacturer: Hydroflo - Model 14303-1
Serial No. None

4.10.5 Vibration Meter
Manufacturer: Dynamic Research Co Model No. DSA80/DJ-S
Serial No. 4763/4805 Calibration Date 11-24-97
Calibration Due Date 11-24-98

4.10.6 Temporary test tank (~~4000 to~~ 8000gal), assorted hoses, pipes, fittings, strainers, as per Attachment F.

4.10.7 55 gallon drum of water

4.10.8 Contact Pyrometer
Manufacturer: Fluke Model No. 52
Serial No. 4695429 Calibration Date 5-1-97
Calibration Due Date 5-1-98

4.10.9 Pressure Gage -30 "Hg to 60 psig 1.22.98 -15 to 50 psig, 1/2" mpt
Manufacturer: Wika Model No. 30/0/60
Serial No. BAT-PG-001 Calibration Date 11-17-97
Calibration Due Date 11-17-98

4.10.10 ~~Thermometer - 0 to 100°C, 1/2" mpt~~ NOT USED IN THIS POTP 1.22.98
~~Manufacturer:~~ Model No.
~~Serial No.~~ ~~Calibration Date~~
~~Calibration Due Date~~ 11-20-97 CS W058-378 (1)

5.0 PROCEDURE

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

6.0 ACCEPTANCE CRITERIA

REF TE-004 ~ RESTRICTED FLOW METER RANGE PREVENTED DATA COLLECTION FOR THE FULL RANGE OF THE PUMP. HARD DATA FOR PUMP PERFORMANCE AT THE OPERATING POINT WAS COLLECTED AND THE PUMP DID MEET THE STATED REQUIREMENT 1.22.98

6.1 Determine the Flush Water Pump performance curve as installed; at 140 gpm the head must be at least 240 ft per vendor information.
Test Engineer Craig Shaw 12-16-97
Test Director 12/16/97
QC PJ Glumendaf 1.22.98

6.2 Verify the Flush Water System Sump Pump is operational.
Test Engineer Craig Shaw 12-22-97
Test Director 12-22-97
QC Ken Williams REF. W058-378 W058-378(2) 12/11
NOTE: PART # N0202-3503J-001 IS THE SAME AS MOD. SPRINT II (512L) PER TELECON WITH PUMP INDUSTRIES, SEATTLE. 2/19/98

6.3 The In-Line Heaters must raise the temperature of of water ~~flowing~~ in the test tank CS to at least 140 F°.
±5 CS W058-378(2) 12/11
Test Engineer Craig Shaw 12-16-97
Test Director 12/17/97
QC PJ Glumendaf 1.22.98

6.4 The Chemical Addition Pump capacity has been verified to deliver 12.4 gph ± 5% raw at ~~service~~ water flow of 170 gpm. The chemical addition W058-378(3) 1/2 2/18/98 SEE HNF-1917 ATT 7

pump shall maintain the corresponding pre-set caustic/water injection ratio.

Test Engineer Craig Shaw 12-16-97
Test Director [signature] 12-16-97
QC Ken Wallace 2-19-98
REF. HNF-1917 ATT. #7

6.5 Local and Remote control devices, instruments and interlocks operate in accordance with design specifications. Specifically: 1) Interlock 18 shuts down pump P-3100 A on low tank level; and 2)Interlock 19 turns off the heater(s) on the *Element Sheath High Limit Controller, the Process High Limit Controller*, and *Flow Switch*. Interlock 19 is provided as part of the vendor package.

Test Engineer Craig Shaw 12-22-97
Test Director [signature] 12-23-97
*QC Ken Wallace FOR JANICE ELMENDORF 2-19-98
* SEE EXCEPTION #007.

1.0 INITIAL CONDITIONS

1.1 VERIFY all system instrumentation in Appendix A is calibrated and has a current calibration tag affixed to each instrument.
Test Engineer: Craig Shaw

1.2 VERIFY the system is aligned for preoperational testing in accordance with Appendix B.
Test Engineer: Craig Shaw

1.3 VERIFY system electrical circuit breakers are aligned in accordance with Appendix C.
Test Engineer: Craig Shaw

1.4 VERIFY system is configured with the temporary water tank, hoses, and valving as shown in Attachment F.
Test Engineer: Craig Shaw

1.5 VERIFY that Hydroflo Chemical Injection Pump is set up per vendor instructions and temporary test conditions. This includes setting the Back Pressure Valve PRV-302C-3 to 35 psig and installing the calibration column per vendor instructions.
Test Engineer: Craig Shaw

1.6 VERIFY vibration targets have been attached to pump P-3100A as described in Appendix D-1
Test Engineer: Craig Shaw

1.7 STAGE a 55 gallon drum of sanitary water at the Chemical Addition System skid.
Test Engineer: Craig Shaw

1.8 CONNECT Chemical Addition Pump suction line to the ~~water drum~~ Bucket. (2.8) 11-20-97 ©W058-378
Test Engineer: Craig Shaw

1.9 CONNECT Hydroflo Calibration Column per manufacturers instructions.
Test Engineer: Craig Shaw

~~1.10 CONNECT Chemical Addition Pump temporary discharge line to the water drum as shown in Attachment F.14~~ (2.5) 11-20-97 ©W058-378

③ W058-378 GJC 1/12/98

Test Engineer: Craig Shaw 12/11

1.11 CONNECT relief valve PRV-302C-3 discharge line to the water drum.
Test Engineer: CS 12/11

2.0 Chemical Addition System Testing and Calibration with Water

This section will calibrate the flow of the chemical injection pump by means of a factory supplied calibration cylinder. The output of the pump will be manually set to a percentage of its output and the actual flow determined by timing the flow out of ~~250 mil.~~ the calibration column.

④ W058-378 > 2.01 attach PIC CS 12/11 GJC 1/12/98

SEE TEST LOG DTD 1.22.98 RE: MANUAL SETTING OF INJECTION PUMP. GJC 1.22.98

2.1 ENERGIZE Chemical Addition Pump P-3100B by closing circuit breaker #3 located in panel PP-1.

2.2 VERIFY Chemical Addition Pump P-3100B STARTS.
Test Engineer: CS 12/11

2.3 OPEN Chemical Addition System injection line vent valve T4, see Attachment F. CS

2.4 CLOSE Chemical Addition System injection line vent valve T4 when water issues from the vent. CS

⑤ W-058-378 GJC 1/12/98 > 2.05 Remove PIC

2.5 STOP Chemical Addition Pump P-3100B by opening circuit breaker #3 located in panel PP-1. CS

2.6 VERIFY Chemical Addition Pump P-3100B STOPS.
Test Engineer: Craig Shaw

2.7 VERIFY Chemical pump calibration column is filled.
Test Engineer: CS

2.8 Manually set the chemical addition pump P-3100B to 25% capacity.
Test Engineer: CS

2.9 Start (close breaker 3) the chemical addition pump P-3100B and record the time required to empty the calibration column.

_____ Seconds 26.5 sec/10 increment

⑥ W058-378 GJC 1/12/98 8.91 [(No increments)(time Sec)] 239/Sec = 3.36 gph
Test Engineer: CS

2.10 **Stop** (open breaker 3)the chemical addition pump P-3100B.
Test Engineer: CS

2.11 **Refill** the chemical-pump calibration column.
Test Engineer: CS

12ma

2.12 **Manually** set the chemical addition pump P-3100B to 50% capacity.
Test Engineer: CS

2.13 **Start** (close breaker 3)the chemical addition pump P-3100B and record the time required to empty the calibration column.
_____Seconds 11.75 sec/10 increments

⑦ W058-378 JLL 1/12/98 (number incr.)/time (sec) 8.91 ~~239/Sec~~ = 7.58 gph
Test Engineer: CS

2.14 **Stop** (open breaker 3)the chemical addition pump P-3100B.
Test Engineer: CS

2.15 **Refill** the chemical pump calibration column.
Test Engineer: CS

2.16 **Manually** set the chemical addition pump P-3100B to 75% capacity.
Test Engineer: CS

2.17 **Start** (close breaker 3)the chemical addition pump P-3100B and record the time required to empty the calibration column.
_____Seconds 7.6 sec/10 increment

⑧ W058-378 JLL 1/12/98 (number increments)/time(sec) 8.91 ~~239/Sec~~ = 11.72 gph
Test Engineer: CS

2.18 Stop (open breaker 3)the chemical addition pump P-3100B.
Test Engineer: CS

2.19 **Refill** the chemical pump calibration column.
Test Engineer: CS

2.20 **Manually** set the chemical addition pump P-3100B to 100% capacity.
Test Engineer: CS

2.21 **Start** (close breaker 3)the chemical addition pump P-3100B and record the time required to empty the calibration column.

_____Seconds 5.8 sec / 10 increments

(9) W058-378 (No increments) 8.91 / Time(sec) — ~~239/Sec~~ 0 = 15.36 gph

Test Engineer: CS

2.22 **Stop** (open breaker 3)the chemical addition pump P-3100B.

Test Engineer: CS

FUNCTIONAL TEST OF DRUM HEATER, NO ACCEPTANCE CRITERIA

2.23 Using a calibrated pyrometer, MEASURE and RECORD temperature of the water drum at the Chemical Addition skid.

2.23.1 Water Drum temperature 56 °F 9:30 Time 11-18-97

Test Engineer: Craig Shaw

2.24 ENERGIZE the drum heater at the Chemical Addition skid.

2.25 MONITOR drum temperature with pyrometer.

2.26 VERIFY an increasing drum temperature, measure at end of shift (the rest of testing may proceed while drum is warming).

2.26.1 Water Drum temperature 94 °F 10:15 Time 11-19-97

Test Engineer: Craig Shaw

2.27 DE-ENERGIZE the Chemical Addition skid drum heater.

Test Engineer: Craig Shaw

3.0 **Temporary Water Tank Fill Testing and Chemical Addition Ratio Test**

This section of the test will demonstrate the flowmeter measuring the water that fills the flush tank reads out both locally and at the MCS. This section also demonstrates that the chemical injection pump maintains the ratio, set at MCS, between fill rate and chemical injection. In this test a tanker truck will be filled rather that tank 302C.

To verify the ratio (823:1)of service water to caustic injection (25% NaOH) divide the gpm displayed by FE/FT 302C-1 by 170 and multiply by 19.3 to calculate the number of seconds expected to empty the 250 ml calibration cylinder.

(10) W058-378 CS

3.1 SET at the MCS the ratio of service water to caustic addition at ~~823:1~~ 1L 3 % (11) W058-378 JJL 1/12/98 CS 12/11

Test Engineer: CS

3.2 CLOSE Valve TV-1

Test Engineer: CS

3.3 OPEN Valve TV-2

Test Engineer: CS

3.4 VERIFY flowmeter FE/FT-302C-2 is programmed to display units of gallons per minute (gpm).

Test Engineer: CS

3.5 RESET FQI-302C-2 to zero at the MCS screen.

Test Engineer: CS

3.6 RECORD the following data:

Temporary Water Tank level 0 % Full
~~Service Water totalizer~~ ~~SW-FQI-3101~~ _____ gal CS 12/11 (12) W058-378 JJL 1/12/98
Service Water Pressure SW-PI-3128 140 psig
Test Engineer: CS

3.7 SLOWLY OPEN Flush Water Tank fill line isolation valve V-3186A to establish a flowrate of approximately 50 gpm.

3.8 RECORD the following data:

~~Service Water Pressure~~ ~~SW-PI-3128~~ _____ ~~psig~~ CS 12/11 (13) W058-378 JJL 1/12/98
Water Flush Tank fill flowrate FIC-302C-2 50 gpm
Test Engineer: CS
(14) W058-378 JJL 1/12/98 FIC-302C-2

3.9 VERIFY AND RECORD Water Flush Tank flowrate display on the ~~MCS~~ is equivalent to the display on the local flowmeter. +/-3%

FE/FT-302C 50 gpm
MCS .51 gpm
Test Engineer: CS

3.10 VERIFY chemical addition pump P-3100B is off.

Test Engineer: CS

3.11 Refill calibration column. CS

Test Engineer: CS

3.12 **Valve** calibration column to suction of chemical addition pump P-3100B.

Test Engineer: CS

3.13 **START** Chemical Addition Pump P-3100B by closing circuit breaker #3 located in panel PP-1. EXCEPTION #10

3.14 **VERIFY** Chemical Addition Pump starts.

Test Engineer: CS

3.15 **RECORD** the following data:

3.15.1 Water Flush Tank fill flowrate FIC-302C-2 51 gpm

3.15.2 Chemical Addition Pump flowrate ~~Empty Cal column~~ ~~Sec~~ ~~Ratio~~ 3.13 gpm

28.5 sec / 10 increments

(no increments) time (sec) Test Engineer: CS

(15) W058-378 QAR 1/12/98

3.16 **OPEN** Flush Water Flow tank fill line isolation valve V-3186A to establish a flowrate of approximately 100 gpm.

3.17 **RECORD** the following data:

(16) W058-378 QAR 1/12/98 ~~Service Water Pressure~~ ~~SW-PI-3128~~ ~~psig~~ CS 12/11

Water Flush Tank fill flowrate FIC-302C-2 101 gpm

Test Engineer: CS

FIC-302C-2 (17) W058-378 QAR 1/12/98

3.18 **VERIFY AND RECORD** Water Flush Tank flowrate display on the ~~MCS~~ is equivalent to the display on the local flowmeter.+/-3%

W058-378 (18) QAR 1/12/98 FE/FT-302C 3101 gpm

MCS 101 gpm

CS 12/11 start CS 12-11

Test Engineer: CS

~~3.19~~ **Stop** chemical addition pump P-3100B by opening breaker #3.

Test Engineer: CS

3.20 Refill calibration column.

Test Engineer: CS

3.21 **Valve** calibration column to suction of chemical addition pump P-3100B.

Test Engineer: CS

3.22 **START** Chemical Addition Pump P-3100B by closing circuit breaker #3

located in panel PP-1.

3.23 **VERIFY** Chemical Addition Pump starts.
Test Engineer: CS

3.24 **RECORD** the following data:
3.24.1 Water Flush Tank fill flowrate FIC-302C-2 101 gpm
3.24.2 Chemical Addition Pump flowrate ~~Empty Cal. column Sec~~ ~~Ratio~~ 6.91 gph
12.9 sec / 10 increments
(no. increments) 8.91 = ∴ gph
time (Sec)
Test Engineer: CS
⑲ W058-378 JLL 1/12/98

3.25 **SLOWLY OPEN** Flush Water Tank fill line isolation valve V-3186A to establish a flowrate of approximately ~~150~~ gpm.
170 CS 12/11
⑳ W058-378 JLL 1/12/98

3.26 **MEASURE AND RECORD** the following data:
~~Service Water Pressure SW-PI-3128 _____ psig~~ CS 12/11
Water Flush Tank fill flowrate FIC-302C-2 173 gpm
Test Engineer: _____

3.27 **VERIFY** Water Flush Tank flowrate display on the MCS is equivalent to the display on the local flowmeter.+/-3% 173
Test Engineer: CS

Step 3.28 **Stop** chemical addition pump P-3100B by opening breaker #3.
Test Engineer: CS

3.29 **Refill** calibration column.
Test Engineer: CS

3.30 **Valve** calibration column to suction of chemical addition pump P-3100B.
Test Engineer: CS

3.31 **START** Chemical Addition Pump P-3100B by closing circuit breaker #3 located in panel PP-1.

3.32 **VERIFY** Chemical Addition Pump starts.
Test Engineer: CS

3.33 **RECORD** the following data:
3.33.1 Water Flush Tank fill flowrate FIC-302C-2 171 gpm
3.33.2 Chemical Addition Pump flowrate ~~Empty Cal. column Sec~~
7.3 sec / 10 increments
(no. increments)(8.91) / time (Sec) = 12.21 gph
㉑ W058-378 JLL 1/12/98

Test Engineer: CS

CS 3.34 SLOWLY OPEN Flush Water Tank fill line isolation valve V-3186A to establish a flowrate of approximately 200 gpm.

CS 3.35 RECORD the following data:
Service Water Pressure SW-PI-3128 _____ psig
Water Flush Tank fill flowrate FIC-302C-2 _____ gpm
Test Engineer: _____

CS 3.36 VERIFY Water Flush Tank flowrate display on the MCS is equivalent to the display on the local flowmeter.+/-3%
Test Engineer: _____

3.37 Stop chemical addition pump P-3100B by opening breaker #3.
Test Engineer: CS

CS DELETE 3.38 Refill calibration column.
Test Engineer: _____

CS 3.39 Valve calibration column to suction of chemical addition pump P-3100B.
Test Engineer: _____

CS 3.40 START Chemical Addition Pump P-3100B by closing circuit breaker #3 located in panel PP-1.
(22) W058-378 1/12/98

CS 3.41 VERIFY Chemical Addition Pump starts.
Test Engineer: _____

CS 3.42 RECORD the following data:
3.42.1 Water Flush Tank fill flowrate FIC-302C-2 _____ gpm
3.42.2 Chemical Addition Pump flowrate Empty Cal. column ___Sec
RATIO _____
Test Engineer: _____

Start CS 3.43 COMPLETE FILLING Temporary Water Flush Tank

3.44 SLOWLY CLOSE Flush Water Tank fill line isolation valve V-3186B and V-3186A.

3.45 VERIFY temporary flush tank is full. 100 % Full 8099 CS 12/8

Test Engineer: Craig Shaw

4.0 Flush Pump P-3100A

This section of the test measures the characteristic curve at six points for the 20 hp flush pump. At each test point electric data of amps and volts is measured for each motor phase and the pump vibration is measured. This test will verify the pump meets the process requirement of delivering 140 gpm at 240 ft as claimed by the vendor. This test also gathers benchmark data on pump performance for future use.

This will require a permit to work on an energized circuit!

NA did in MCS software.

Adjust software to bypass tank low level (LZT-302C-1). (30) W058-378 JRR 12/8/98

4.1 ~~DISCONNECT wire numbers LIT-302C1(-) and PS1(+) from~~ terminal ~~block PCU-1-TB1 terminals 37 & 38 located in PCU-1~~.

4.2 ~~CONNECT the Process Instrument Calibrator (PIC) to~~ PCU-1-TB1 ~~terminals 37 and 38.~~ (31) W058-378 JRR 12/8/98

4.3 ~~SET the PIC for an output of 16 mA~~.

4.4 CLOSE the Flush Pump disconnect located at the local motor controller.

Test Engineer: Craig Shaw

4.5 VERIFY valve V-3186A closed.

Test Engineer: Craig Shaw ✓ CS 12/8

4.6 VERIFY valve V-3187A closed.

Test Engineer: Craig Shaw ✓ CS/12/8

4.7 VERIFY valve V-3188D open.

Test Engineer: Craig Shaw ✓ CS/12/8

4.8 VERIFY valve V-3188C open.

Test Engineer: Craig Shaw ✓ CS/12/8

4.9 VERIFY the Flush Pump motor controller indicates pump is stopped, both MCS and local. CS 12/8

Test Engineer: Craig Shaw

4.10 VERIFY the following on the MCS for flush pump P-3100A:

~~4.10.1 The STOP button under the label "Pump Controls" on the P-3100A screen is illuminated.~~ CS 11-26-97 (23) W-058-378 12/1/98 CS 12/8

Test Engineer: Craig Shaw

4.10.2 Pump Status OFF button is illuminated. CS 12/8

Test Engineer: Craig Shaw

4.10.3 P-3100A FAILURE button is NOT illuminated. CS 12/8

Test Engineer: Craig Shaw

4.11 VERIFY flowmeter FE/FT-302C-1 is programmed to show flow rate on its local digital screen and the MCS, in units of gallons per minute (gpm). CS 12/8

Test Engineer: Craig Shaw

4.12 FULLY Close temporary valve TV-3 CS 12/8

Test Engineer: Craig Shaw

"FILLING AND VENTING"

4.13 FULLY OPEN temporary valves TV-1 and TV-2 in order to fill pump suction piping with water from the temporary test tanker. CS 12/8

Test Engineer: Craig Shaw

4.14 FULLY OPEN V-3188B to vent the air from the system. CS 12/8

Test Engineer: Craig Shaw

4.15 CLOSE V-3188B when water comes out. CS 12/8

Test Engineer: Craig Shaw

4.16 OPEN Flush System recirculation valve V-3187B to approximately ¼ open. (See Exception #5) CS 12/8 (24) W058-378 12/1/98

Bump

4.17 START the Flush Pump P-3100A by pressing local START button and verify correct rotation Craig Shaw Test Eng CS 12/8 (30) W058-378 12/1/98

~~4.18 VERIFY Pump Status ON button is illuminated on the MCS.~~ (25) W058-378 12/1/98 SEE TE-001 12.22.98

4.17.1 Start P3100A by pressing local start button and operate until air is purged from test loop. (See Exception #6) Craig Shaw

CS 11-26-97

~~HNF-1552~~

~~Test Engineer:~~ _____ CS 12/8

Note: Pump operating curve is documented in the following steps. When recording pump shut-off head, minimize the length of time that V-3187B is closed. Step 4.18, closing v-3187B, measures pump data at shutoff conditions.

4.19 CLOSE Flush System recirculation valve V-3187B.

4.20 RECORD required data for Flush Pump P-3100A in Appendix D-1 data sheet:

Test Engineer: Craig Shaw 12/8

4.21 OPEN Flush System recirculation valve V-3187B to establish a system flowrate of approximately 50 gpm.

4.22 RECORD data for Flush Pump P-3100A in Appendix D-1 data sheet:

Test Engineer: Craig Shaw 12/8

4.23 ADJUST Flush System recirculation valve V-3187B to establish a system flowrate of approximately 100 gpm.

4.24 RECORD data for Flush Pump P-3100A in Appendix D-1 data sheet:

Test Engineer: Craig Shaw 12/8

4.25 ADJUST Flush System recirculation valve V-3187B to establish a system flowrate of approximately 140 gpm.

4.26 RECORD data for Flush Pump P-3100A in Appendix D-1 data sheet:

Test Engineer: Craig Shaw 12/8

CS 12/8 SEE T.E. #4 LH

4.27 ADJUST Flush System recirculation valve V-3187B to establish a system flowrate of approximately 200 gpm.

DELETE

4.28 RECORD data for Flush Pump P-3100A in Appendix D-1 data sheet:

Test Engineer: _____

(26) W058-378 11/18/98

4.29 ADJUST Flush System recirculation valve V-3187B to fully open. (This gpm will likely be beyond the calibration of FI-302C-1 but will provide benchmark data)

SEE T.E. #4 1-21-99

4.30 RECORD data for Flush Pump P-3100A in Appendix D-1 data sheet:

DELETE

Test Engineer: _____

(26) W058-378 1.22.98

4.31 ADJUST Flush System recirculation valve V-3187B to establish a system flowrate of approximately 140 gpm.

Test Engineer: _____

4.32 PRESS the Flush Pump P-3100A local control STOP button.

VERIFY Flush Pump P-3100A STOPS.

Test Engineer: ~~Craig Shaw~~ 1.22.98 OK CS

4.33 VERIFY Pump Status OFF button is illuminated on the MCS.

Test Engineer: SEE TE-007 1.22.98 ~~Craig Shaw~~ OK CS

4.34 START Flush Pump P-3100A from the remote control START button at the MCS.

4.35 VERIFY Flush Pump P-3100A STARTS.

Test Engineer: Craig Shaw

4.36 VERIFY Pump Status ON button is illuminated on the MCS.

Test Engineer: Craig Shaw

This next step domonstrates low tank level interlock 18.

4.37 SIMULATE a flush tank level of 5 feet at LIT-302C-1.

(32) W058-378 1.22.98

~~Refer back to Sec 4.1,4.2,4.3 where the PIC output was set at 16mA to allow Pump P-3100A to operate.~~

Removed software over ride on Low Tank level used earlier to do curve.

REFER TO SEC 4.1 & 4.2 - CONNECT PIC 1.22.98

Logic ≤ 5'

4.38 SET PIC for an output of 8mA. (12.5 ma "Worksheet") Test Engineer: Craig Shaw 12-8

4.39 VERIFY Flush Pump P-3100A STOPS. Interlock 18 verified to stop pump on low tank level.

Test Engineer: Craig Shaw 12-8

4.40 VERIFY alarm indication is shown on MCS.

Test Engineer: Craig Shaw 12-8

4.41 VERIFY Pump Status on MCS indicates OFF. Exception #8

Test Engineer: Craig Shaw per 12-8-97

Resolution of exception #8

5.0 Circulation Heater Testing

This section energizes the heaters and demonstrates their capability of heating the water to 140°F. This section also verifies and demonstrates "Interlock 19" that was supplied by the vendor as part of the heater package. The Interlock 19 turns off the heater(s): 1) *Element Sheath High Limit Controller, 375°F, the Process High Limit Controller*, 180°F, and *Flow Switch*, ~~45 gpm latch 22 gpm unlatch.~~ (33) W058-378 per 1.1298

Adjust software to bypass tank 302C low level input from LIT-302C-1 (34) W058-378 per 1.1298

5.1 ~~SET the PIC for an output of 16 mA. (This allows pump P-3100A to operate)(See Sec 4.1 — 4.3)~~ Software overidan

Test Engineer: CS 12-9

		12/9	12/10
5.2	POSITION VALVES		
5.2.1	Temporary Valve TV-1 open	CS	CS
5.2.2	Temporary Valve TV-2 open	CS	CS
5.2.3	V-3187B 1/8 open	CS	CS
5.2.4	V-3188C closed	CS	CS
5.2.5	V-3188D closed	CS	CS
5.2.6	V-3188E open	CS	CS
5.2.7	V-3188F open	CS	CS
5.2.8	V-3188G open	CS	CS

12/9 12/10

5.2.9 V-3188H open CS CS
5.2.10 V-3187A closed CS CS
5.2.11 Tempoarary Valve TV-3 closed CS CS
5.2.12 V-3186A closed CS CS

Test Engineer: Craig Shaw 12-9

CS 12-9 5.2.13 Closed disconnect P3100A CS 12/9 (35) W058-378 GJH 1-12-98

5.3 START Flush Pump P-3100A from the remote control START button at the MCS. SEE EXCEPTION TE-007 CONTROLLED LOCALLY 1-12-98

(36) W058-378 GJH 1-12-98

5.4 Adjust V-3187B until a flow of 140 +/-10 gpm is show on FE/FT 302C-1. CS 12/9 Failed CS 12/9 Gpm 138 CS 12/9

CS 12-9 5.4.1 Stop pump locally 5.4.2 Start pump remote (37) W058-378 Test Engineer: CS 12/9

(38) W058-378 GJH 1-12-98 CS 12-9 5.5 Operate at this flow for 15 minutes to purge air from heaters.

5.5.1 Energize Heaters 5.5.2 Turn on Control circuit (39) W058-378 Test Engineer: Craig Shaw 12/9

Exception #9 5.6 Slowly Close valve V-3187B until flow switches FSL 302C-4A & 4B indicate inadequate flow. CS Local NA MCS

(45) W058-378 5.6.1 Verify heaters de-energize CS

5.7 Record the flow indicated on FE/FT 302C-1 20 Exc. #9

(41) W058-378 GJH 1-12-98 ~~(22 gpm +/- 5)~~ ~~50-60~~ CS

Test Engineer: Craig Shaw

5.8 Slowly Open valve V-3187B until flow switches FSL 302C-4A & 4B indicate flow. CS Local NA MCS

5.9 Record the flow indicated on FE/FT 302C-1 20 Exc. #9

(43) W058-378 GJH 1-12-98 ~~(45 gpm +/- 5)~~ ~~2-6~~ CS

5.8.1 Verify heater energizes CS (42) W058-378 GJH 1-12-98 Test Engineer: Craig Shaw

5.10 Adjust flow to 140 +/-10 gpm with V-3187B as read on FE/FT 302C-1

Test Engineer: CS

HEATER #1 2 per ECN W058-340 E.P

5.11 VERIFY Circulation Heater #12 local control switch is in the OFF position.

Test Engineer: CS

5.12 CLOSE Circulation Heater #12 local disconnect switch located next to the heater control panel. CS

5.13 RECORD the following data:

5.13.1 Recirc line water temp.(from MCS) TI-302C-2 58 °F.
5.13.2 Recirc line water temp. (local) TE-302C-2 58 °F.
(50) W058-378 Sht 1 Rev 298 CS 11:10 2
Test Engineer: Craig Shaw

This will require a permit to work on an energized circuit!

5.14 ADJUST Circulation Heater #2 Process Temperature Controller to approximately 10 °F below the lowest temperature recorded in Step above. CS per ECN W-058-340 EP

5.14.1 Reset Sheath & Process Overtemp CS (44) W058-378 Sht 1 Rev 298

5.15 PLACE Circulation Heater #2 control switch in the ON position. CS

5.16 VERIFY Circulation Heater #2 DOES NOT ENERGIZE by observing that the ~~starter contactor~~ for Circulation Heater #2 ~~does not close.~~ ~~has~~ amps are drawn. "0" (45) W058-378 Sht 1 Rev 298 Test Engineer: Craig Shaw

5.17 ADJUST Circulation Heater #2 Process Temperature Controller to approximately 10 °F above the lowest temperature recorded in Step 5.10 above.

5.18 VERIFY Circulation Heater #2 ENERGIZES by observing ~~the starter contactor for Circulation Heater #1 closing~~ amperes are drawn. (46) W058-378 Sht 1 Rev 298 amps (300+) REF Sht 1 Rev 298
Test Engineer: Craig Shaw

~~5.19~~ CS ~~SIMULATE~~ a low inlet flow condition in Circulation Heater #1 by lifting the P16 lead at the flow switch terminal block.

~~5.20~~ CS VERIFY Circulation Heater #2 DEENERGIZES by observing the starter contactor for Circulation Heater #1 opening.

DELETE

Test Engineer: _____

~~5.21~~ CS PLACE Circulation Heater #2 control switch in the OFF position. (47) W058-378 Sht 1 Rev 298

~~5.22~~ CS RECONNECT the P16 lead.

Test Engineer: _____

(47) W058-378 GRL 1-12-98

5.23 ~~PLACE Circulation Heater #1 control switch in the ON position.~~ 2 per ECN W058-340 E.P

5.24 RE-SET the Circulation Heater #1 Process Temperature Controller to 140°F.

Test Engineer: Craig Shaw

5.25 VERIFY Circulation Heater #1 ENERGIZES by observing ~~the starter contactor~~ for Circulation Heater #1 closing. 5 amps (285) are drawn Test Engineer: Craig Shaw

Ref GRL 1-22-98 (48) W058-378 GRL 1-12-98

Testing Process High Temperature Limit Thermocouple

5.26 SET the process high limit controller to 180. °F.

Test Engineer: CS

5.27 PLACE Circulation Heater #1 control switch in the OFF position. CS

5.28 DISCONNECT the type J Process High Limit Thermocouple, TE302C-4C, from terminals TC3(Red wire) and TC4 (White wire). CS

5.29 CONNECT the Automated Temperature Calibrator to terminals TC3 and TC4. CS

5.30 PROGRAM the thermocouple input instrument for a type J thermocouple. CS

5.31 PLACE Circulation Heater #1 control switch in the ON position. CS

5.32 VERIFY Circulation Heater #1 ENERGIZES by observing ~~the starter contactor for Circulation Heater #1 closing~~. amperes are drawn.

5 amps (49) W-058-378 GRL 1-12-98 Test Engineer: CS

5.33 PROGRAM a temperature of 180 °F on the Automated Temperature Calibrator.

5.34 VERIFY the following:

5.34.1 Circulation Heater #1 outlet temperature high alarm TAH-302C1B annunciates at the MCS. Test Engineer: Craig Shaw

5 outlet (51) W058-378 GRL 1-12-98

2 per ECN W058-340 E.P

5.34.2 Circulation Heater #1 DEENERGIZES.
Test Engineer: Craig Shaw

5.35 PLACE Circulation Heater #2 control switch in the OFF position. CS

5.36 DISCONNECT the Automated Temperature Calibrator from terminals TC3 and TC4. CS

5.37 RE-CONNECT the type J Process High Limit Thermocouple, TE302C-4C, to terminals TC3(Red wire) and TC4 (White wire). CS

5.38 PLACE Circulation Heater #2 control switch in the ON position. CS

5.39 VERIFY the following:

5.39.1 Circulation Heater #2 outlet temperature high alarm TAH 302c-1B clears at the MCS. CS
(52) W058-378 gdl 1-12-98

5.39.2 Circulation Heater #2 ENERGIZES.
Test Engineer: Craig Shaw

5.40 PLACE Circulation Heater #2 control switch in the OFF position.

Testing Sheath High Tempeature Limit Thermocouple

5.41 DISCONNECT the type J Sheath High Limit Thermocouple, TE302C-4E, from terminals TC5(Red Wire) and TC6(White Wire). CS

5.42 CONNECT the Automated Temperature Calibrator to terminals TC5 and TC6. CS

5.43 VERIFY the sheath high limit controller is set at 375°F.
Test Engineer: CS

5.43.1 ~~Reset alarm.~~ Read sheath and process over temperature (53) W058-378 gdl 1-12-98

5.44 PROGRAM the thermocouple input instrument for a type J thermocouple. CS

5.45 PLACE Circulation Heater #2 control switch in the ON position.

5.46 VERIFY Circulation Heater #2 ENERGIZES by observing ~~the starter contactor for Circulation Heater #1 closing.~~ (54) W058-378 gdl 1-12-98 amperes are drawn ~~amps~~

Test Engineer: Carey Shaw

5.47 PROGRAM a temperature of 375 °F on the Automated Temperature Calibrator.

5.48 VERIFY the following: per ECN W058-340 E.P

5.48.1 Circulation Heater #2 outlet sheath temperature high alarm TAH 302C-18 annunciates at the MCS. 2 OUTLET GD 1.22.98
Test Engineer: CS
(58) W058-378 GD 1.12.98

5.48.2 Circulation Heater #2 DEENERGIZES.
Test Engineer: CS

5.49 PLACE Circulation Heater #2 control switch in the OFF position.
Test Engineer: CS

5.50 DISCONNECT the Automated Temperature Calibrator from terminals TC5 and TC6. CS

5.51 RE-CONNECT the type J Process High Limit Thermocouple, TE302C-4C, to terminals TC5(Red wire) and TC6 (White wire). CS

5.52 PLACE Circulation Heater #2 control switch in the ON position.

5.53 VERIFY the following:

5.53.1 Circulation Heater #2 outlet sheath temperature high alarm clears at the MCS. 2 OUTLET GD 1.22.98 CS

5.53.2 Circulation Heater #2 ENERGIZES.
Test Engineer: CS

~~5.54~~ PLACE Circulation Heater #2 control switch in the OFF position.

~~5.55~~ ALLOW Circulation Heater #2 to operate long enough to cycle on and off via temperature controller TIC-302C-4A.

~~5.56~~ PLACE Circulation Heater #2 control switch in the OFF position.
(56) W058-378 GD 1.12.98

DELETE

HEATER #2 1 per ECN W058-340 E.P

1 per ECN W058-340 E.P

5.57 ADJUST Circulation Heater #1 Process Temperature Controller to approximately 10 °F below the lowest temperature recorded in Step 5.4 above. 1 CS

5.58 VERIFY Circulation Heater #1 local control switch is in the OFF position.

Test Engineer: CS

1

5.59 CLOSE Circulation Heater #1 local disconnect switch located next to the heater control panel.

5.59.1 Reset Alarms (57) W058-378 1-12-98

5.60 RECORD the following data:

5.59.2 Turn on heater control circuit (58) W058-378 1-12-98

5.60.1 Recirc line water temp.(from MCS) TI-302C-2 100 °F.

5.60.2 Recirc line water temp.(local) TI-302C-3 107 °F.

Test Engineer: CS

1

5.61 PLACE Circulation Heater #1 control switch in the ON position. CS

1

5.62 VERIFY Circulation Heater #1 DOES NOT ENERGIZE by observing that ~~the starter contactor for Circulation Heater #2 does not close.~~ no amperes ~~are~~ are drawn (59) W058-378 1-12-98 Test Engineer: CS

1

5.63 ADJUST Circulation Heater #1 Process Temperature Controller to approximately 10 °F above the lowest temperature recorded in Step above. CS

1

5.64 VERIFY Circulation Heater #1 ENERGIZES by observing ~~the starter contactor for Circulation Heater #1 closing~~ amperes are drawn. (60) W058-378 1-12-98 Test Engineer: CS

CS

5.65 SIMULATE a low inlet flow condition in Circulation Heater #2 by lifting the P16 lead at the flow switch terminal block.

CS

5.66 ~~VERIFY~~ DELETE Circulation Heater #1 DEENERGIZES by observing the starter contactor for Circulation Heater #1 opening. 1

Test Engineer:

(61) W058-378 1-12-98

CS

5.67 PLACE Circulation Heater #1 control switch in the OFF position. 1

5.68 RECONNECT the P16 lead.

Test Engineer: _____

5.69 PLACE Circulation Heater #1 control switch in the ON position.

5.70 RE-SET the Circulation Heater #1 Process Temperature Controller to 140°F.

Test Engineer: _____

5.71 VERIFY Circulation Heater #1 ENERGIZES by observing amperes are drawn ~~the starter contactor for Circulation Heater #1 closing~~.

Test Engineer: _____

Testing Process High Temperature Limit Thermocouple

5.72 SET the process high limit controller to 180 °F.

Test Engineer: _____

5.73 PLACE Circulation Heater #1 control switch in the OFF position.

5.74 DISCONNECT the type J Process High Limit Thermocouple, TE302C-4D, from terminals TC3(Red wire) and TC4 (White wire).

5.75 CONNECT the Automated Temperature Calibrator to terminals TC3 and TC4.

5.76 PROGRAM the thermocouple input instrument for a type J thermocouple.

5.77 PLACE Circulation Heater #1 control switch in the ON position.

5.78 VERIFY Circulation Heater #1 ENERGIZES by observing amperes are drawn ~~the starter contactor for Circulation Heater #2 closing~~

Test Engineer: _____

5.79 PROGRAM a temperature of 180 °F on the Automated Temperature Calibrator.

5.80 VERIFY the following:

5.80.1 Circulation Heater #1 outlet temperature high alarm

B (GS) W058-378-2221-1298
TAH-302C-1A annunciates at the MCS. Test Engineer CS

1 per ECN W058-340 EP
5.80.2 Circulation Heater #2 DEENERGIZES. Test Engineer: CS

1
5.81 PLACE Circulation Heater #2 control switch in the OFF position. CS

5.82 DISCONNECT the Automated Temperature Calibrator from terminals TC3 and TC4. CS

5.83 RE-CONNECT the type J Process High Limit Thermocouple, TE302C-4D, to terminals TC3(Red wire) and TC4 (White wire). CS

1
5.84 PLACE Circulation Heater #2 control switch in the ON position.

5.85 VERIFY the following:

1
5.85.1 Circulation Heater #2 outlet temperature high alarm TAH-302C-1A clears at the MCS. Test Engineer: CS
B CS (GS) W058-378-2221-1298

5.85.2 Circulation Heater #1 ENERGIZES. Test Engineer: CS

1
5.86 PLACE Circulation Heater #2 control switch in the OFF position. CS

Testing Sheath High Tempeature Limit Thermocouple

5.87 DISCONNECT the type J Sheath High Limit Thermocouple, TE302C-4F, from terminals TC5(Red Wire) and TC6(White Wire). CS

5.88 CONNECT the Automated Temperature Calibrator to terminals TC5 and TC6. CS

5.89 VERIFY the sheath high limit controller is set at 375°F. Test Engineer: CS

5.90 PROGRAM the thermocouple input instrument for a type J thermocouple. CS

5.91 PLACE Circulation Heater #1 per ECN W058-340 E.P control switch in the ON position. CS

5.92 VERIFY Circulation Heater #1 ENERGIZES by observing amperes are drawn ~~the starter contactor for Circulation Heater #1 closing~~. W058-378 GD 1.12.98
Test Engineer: CS

5.93 PROGRAM a temperature of 375 °F on the Automated Temperature Calibrator. CS

5.94 VERIFY the following:

5.94.1 Circulation Heater #1 ~~sheath~~ temperature high alarm TAH-302C-1A annunciates at the MCS. OUTLET GD 1.12.98
Test Engineer: CS
B CS W058-378 GD 1.12.98

5.94.2 Circulation Heater #1 DEENERGIZES.
Test Engineer: CS

5.95 PLACE Circulation Heater #1 control switch in the OFF position. CS

5.96 DISCONNECT the Automated Temperature Calibrator from terminals TC5 and TC6. CS

5.97 RE-CONNECT the type J Process High Limit Thermocouple, TE302C-4D, to terminals TC5(Red wire) and TC6 (White wire). CS

5.98 PLACE Circulation Heater #1 control switch in the ON position.

5.99 VERIFY the following:

5.99.1 Circulation Heater #1 ~~sheath~~ temperature high alarm TAH-302C-1A clears at the MCS. OUTLET GD 1.12.98
Test Engineer: CS
B CS W058-378 GD 1.12.98

5.99.2 Circulation Heater #1 ENERGIZES.
Test Engineer: CS

CS
~~5.100 PLACE Circulation Heater #1 control switch in the OFF position.~~ W058-378 GD 1.12.98
Test Engineer: _____

5.101 RECORD the following data:

5.101.1 Recirc line water temp.(from MCS) TI-302C-2 109 °F.
5.101.2 Recirc line water temp. (local) ~~TE-302C-2~~ 102 °F. TI-302C-3
Test Engineer: CS 12.2.98
(70) W058-378-920 1.12.98

5.102 Check water flow on FE/FT 302C-1, adjust to 140 +/-10 gpm.
Gpm 139
Test engineer: CS

5.103 Energize both Heaters 1 and 2 (started 8:20 @ 74°F) (Stop 10:43 @135°F)
Test Engineer: CS
5.104 Operate heaters until water reaches 140°F. ± 10 CS (71) W058-378 1.12.98
on Temp Water Tank CS 12/11
~~TE-302C-2~~ °F
Test Engineer: CS 12/11
5.105 Verify operation of temperature controller ~~by observing contactors cycling on and off~~ for 30 minutes.
Test Engineer Craig Shaw 12/11

5.106 De-Energize Heaters 1 and 2
Test Engineer Craig Shaw 12/11
~~5.107 Allow pump P-3100A to run for 10 minutes after heaters are de-energized~~ CS 12/11 (72) W058-378 1.12.98
~~Test Engineer~~

5.108 Turn Off pump P-3100A
Test Engineer CS 12/11

6.0 Water Flush Tank Sump Pump Testing
This test is a simple demonstration that the sump pump operates. ~~and empties the sump.~~ CS 12/11
(73) W058-378 1.12.98 CS 12/11
Sump Pump P-302C-3 transfers water in its final approved configuration.
6.1 VERIFY ~~the Water Flush Tank Sump is clear of debris that could cause fouling of the pump suction.~~
Craig Shaw 12-22-97
Test Eng
~~6.2 ADD water, if necessary, to the Water Flush Tank Sump until~~ Sump
CS 12/11 (74) W058-378 1.12.98

Pump P-302C-3 suction line is covered by 4 to 6 inches of water.

CS 6.3 OPEN the Sump Pump P-302C-3 discharge valve to the Water Flush Tank.

CS 6.4 Close the power supply breaker to Sump Pump P-302C-3.

CS ~~6.5~~ START Sump Pump P-302C-3 with local control switch.

CS ~~6.6~~ MEASURE amps and volts

(94) W058-378 GR 1.12.98

DELETE

_____ A phase amps
_____ B phase amps
_____ C phase amps

_____ volts A-B
_____ volts A-C
_____ volts B-C

Test Engineer:_____

CS ~~6.7~~ VERIFY Sump Pump P-302C-3 transfers water from the Water Flush Tank Sump to the Water Flush Tank.

Test Engineer:_____

CS ~~6.8~~ STOP Sump Pump P-302C-3 with the local control switch when the sump pump loses suction.

Test Engineer:_____

APPENDIX A - Instrumentation Requiring Calibration Verification				
Equipment Number	Functional Description	Calibration Date and Number	Due Date	Sig. Date
LIT-302C-1 Not Required Done in ATP 05 CS 11-21-97	Water Flush Tank level indicatingtransmitter	NA		
TE-302C-1 00	Water Flush Tank temperature element	NA		
PI-302C-1	Flush Pump discharge pressure indicator	799-31-04-035 5-21-97	5-21-97	
FT-302C-1	Water Flush System flow transmitter	Cascade Auto 11-14-97 0-142 gpm		
TE-302C-4A	Circulation Heater #12* outlet temperature element	11-18-97 Cal # 97-120	11-18-98	Craig Shaw
TIC-302C-4A	Circulation Heater #12* outlet temperature indicating controller	97102 Cal. 8-29-97	8-27-98	CS
FSL-302C-4A	Circulation Heater #12* inlet low flow switch	N/A FUNCTIONAL TEST - STE-009 5.6→5.8 1-22-98		
TE-302C-4B	Circulation Heater #11* outlet temperature element	11-18-97 Cal # 97-119		
302C-4B TIC	Circulation Heater #11* outlet temperature indicating controller	8-24-97 97-98	8-24-98	
FSL-302C-4B	Circulation Heater #11* inlet low flow switch	N/A FUNCTIONAL TEST 5.6→5.8 STE-009 1-22-98		
TE-302C-3 Combined	Water Flush Tank recirc header temperature element	11-18-97 Cal # 97-121	11-18-98	CS
TI-302C-3	Water Flush Tank recirc header temperature indicator	11-18-97 Cal # 97-121	11-18-98	CS
TE-302C-2	Water Flush Tank recirc header temperature element	11-18-97 Cal # 97118	11-18-98	Craig Shaw
PI-302C-2	Water Flush Tank recirc header pressure indicator	799-31-04-036 5-27-97	5-27-98	Craig Shaw
PI-302C-3	Chemical Addition Pump discharge pulsation dampener pressure indicator	9-24-97		Craig Shaw 11-21-97
PI-302C-4	Chemical Addition Pump discharge pressure indicator	9-24-97	/	Craig Shaw 11-21-97
FE/FT-302C-2	Water Flush Tank fill line flow transmitter	Cascade Automation 11-14-97 0-350 gpm	11-14-97	Craig Shaw 11-21-97
PRV 302C-3	Chem Injec. Backpressure valve	FIELD SET PER STEP 1.5 1-22-98		

* per ECN W058-340 EP

See ~~Back of~~ Page next

HNF 1552 ATTACHMENT 'A'
APPENDIX 'A'

		Cal #		
TIC-302C-4F	Sheath High Limit Control	97-96	8-29-97 8-29-98	CS
TIC-302C-4D	Process High Limit Controlle	97-98	8-29-97 8-29-98	CS
TIC-302C-4E	Sheath High Limit Controller	97-99	8-29-97 8-29-98	CS
TIC-302C-4C	Process High Limit Controller	97-103	8-29-97 8-29-98	CS
TPI-1	Pump Suction Pressure	97-117	11-17-97 11-17-98	CS

added per (27) W-058-378 JCL 1/12/98

APPENDIX A - Instrumentation Requiring Calibration Verification				
Equipment Number	Functional Description	Calibration Date and Number	Due Date	Sig. Date
PRV-302C-1	Heater relief	Lead Sealed		CS
PRV-302C-2	Heater Relief	Lead Sealed		CS

APPENDIX B -Cross Site Transfer Flush System Valve Initial Alignment				12/8
VALVE NUMBER	VALVE NAME	REQUIRED POSITION	INITIALS	
2" drain valve	Water Flush Tank drain valve	CLOSED	CS	✓
V-3188A	Flush Pump suction valve	CLOSED	CS	✓
V-3188B	Flush Pump discharge line drain valve	CLOSED	CS	✓
V-3188C	Circulation Heater #2* bypass valve	OPEN	CS	✓
V-3188D	Circulation Heater #1* bypass valve	OPEN	CS	✓
V-3188E	Circulation Heater #2* outlet valve	CLOSED	CS	✓
V-3188F	Circulation Heater #2* inlet valve	CLOSED	CS	✓
V-3188G	Circulation Heater #1* outlet valve	CLOSED	CS	✓
V-3188H	Circulation Heater #1* inlet valve	CLOSED	CS	✓
V-3187A	Flush System recirc header isolation to Water Flush Tank	CLOSED & LOCKED	CS	✓
V-3187B	Flush System recirc header isolation valve to transfer headers	CLOSED	CS	✓
~~V-3187C~~ 11-21-97 OK (CS)	~~Flush System recirc header isolation valve to transfer headers~~ in err Ste (CS) 11-21-97	~~CLOSED~~	CS	✓
SW-V-3130	Service water isolation to transfer headers (28) W058-378	CLOSED	CS	✓
SW-V-3115 95 (CS) 11-21-97	Service water main isolation valve	OPEN	CS	✓
SW-V-3131	Flush Water Tank fill line flow transmitter FE/FT-302C-2 inlet isolation valve	OPEN	CS	✓
V-3186C	Flush Water Tank fill line drain valve	CLOSED	CS	✓
V-3186B	Flush Water Tank fill line flow transmitter FE/FT-302C-2 outlet isolation valve	OPEN	CS	✓
V-3186A	Flush Water Tank fill line isolation valve	CLOSED	CS	✓
SW-V-3198	SW Pressure gage isolation valve	open	CS	✓

* per ECN W058-340 EP

APPENDIX B -Cross Site Transfer Flush System Valve Initial Alignment

VALVE NUMBER	VALVE NAME	REQUIRED POSITION	INITIALS		12/B
V-302C-~~1~~ 7 (CS) 11-21-97 Removed for Test	Chemical Addition System injection line vent valve	OPEN Removed	NA	/	NA
V-302C-3	Chemical Addition System injection line drain valve	CLOSED	CS	/	NA
V-302C-5	Chemical Addition Pump discharge line drain valve.	CLOSED	CS	/	NA
V-302C-4	Chemical Addition Pump discharge pressure gauge PI-302C-4 isolation valve	OPEN	CS	/	N/A
TV-1	Temporary Flush Pump Suction Valve	CLOSED	CS	✓	✓
TV-2	Temporary Tank fill/Recirc. Valve	CLOSED	CS	✓	✓
TV-3	Temporary Block valve	Closed	CS	✓	✓
TV-4	Temporary Vent Valve for Chem Add.	Closed	CS	✓	✓
TV-5	Temp Block Valve for Chem Pump (CS) 11-20-97	Closed	CS	✓	✓
V-302C-4	Chemical Addition Pump discharge pressure gauge PI-302C-4 isolation valve	OPEN	CS	/	NA

~~INSERT VALUES~~ ~~Per (29) W058-378~~ ~~[illegible] 1/12/98~~

Performed By: Craig Shaw (PRINT NAME) CS (INITIALS) 11-24-97 (DATE)

Verified BY: C. Reichmuth (PRINT NAME) CR (INITIALS) 11-24-97 (DATE)

1 per ECN W058-340 EP

V 302C-2	Heater #~~2~~ 1 Drain Valve	Closed	CS	✓	✓
No Tag	Heater #~~1~~ 2 Drain Valve	Closed	CS	✓	✓
V-302C-8	Chem Supply Valve	Open	CS	✓	N/A
~~[illegible]~~ SW-V-3196	Water Supply	Open			

APPENDIX A - Instrumentation Requiring Calibration Verification

Equipment Number	Functional Description	Calibration Date and Number	Due Date	Sig. Date
HV-302C-1	Heater relief	see page 46		
		see page 46		
HV-302C-2	Heater Relief			

APPENDIX B -Cross Site Transfer Flush System Valve Initial Alignment

VALVE NUMBER	VALVE NAME	REQUIRED POSITION	INITIALS 12/9/97	12/10/97	12/11/97
2" drain valve	Water Flush Tank drain valve	CLOSED	NA	NA	NA
V-3188A	Flush Pump suction valve	CLOSED	NA	NA	NA
V-3188B	Flush Pump discharge line drain valve	CLOSED	CS	CS	CS
V-3188C	Circulation Heater #1 bypass valve*	OPEN	CS	CS	CS
V-3188D	Circulation Heater #2 bypass valve*	OPEN	CS	CS	CS
V-3188E	Circulation Heater #2 outlet valve*	CLOSED	CS	CS	CS
V-3188F	Circulation Heater #2 inlet valve*	CLOSED	CS	CS	CS
V-3188G	Circulation Heater #1 outlet valve*	CLOSED	CS	CS	CS
V-3188H	Circulation Heater #1 inlet valve*	CLOSED	CS	CS	CS
V-3187A	Flush System recirc header isolation to Water Flush Tank	CLOSED & LOCKED	CS	CS	CS
V-3187B	Flush System recirc header isolation valve to transfer headers	CLOSED	CS	CS	CS
V-3187C	Flush System recirc header isolation valve to transfer headers	CLOSED	CS	CS	CS
SW-V-3130	Service water isolation to transfer headers.	CLOSED	CS	CS	CS
SW-V-3195	Service water main isolation valve	OPEN	CS	CS	CS
SW-V-3131	Flush Water Tank fill line flow transmitter FE/FT-302C-2 inlet isolation valve	OPEN	CS	CS	CS
V-3186C	Flush Water Tank fill line drain valve	CLOSED	CS	CS	CS
V-3186B	Flush Water Tank fill line flow transmitter FE/FT-302C-2 outlet isolation valve	OPEN	CS	CS	CS
V-3186A	Flush Water Tank fill line isolation valve	CLOSED	CS	CS	CS
SW-V-3198	Sw Pressure gage isolation	open	CS	CS	CS

* per ECN W058-340 E.D

APPENDIX B -Cross Site Transfer Flush System Valve Initial Alignment

VALVE NUMBER	VALVE NAME	REQUIRED POSITION	INITIALS 12-9-97		12-11-97
V-302C-1	Chemical Addition System injection line vent valve	OPEN	NA	NA	NA
V-302C-3	Chemical Addition System injection line drain valve	CLOSED	NA	NA	CS
V-302C-5	Chemical Addition Pump discharge line drain valve.	CLOSED	NA	NA	CS
V-302C-4	Chemical Addition Pump discharge pressure gauge PI-302C-4 isolation valve	OPEN	NA	NA	CS
TV-1	Temporary Flush Pump Suction Valve	CLOSED	CS	CS	CS
TV-2	Temporary Tank fill/Recirc. Valve	CLOSED	CS	CS	CS
TV-3	Temporary Block valve	Closed	CS	CS	CS
TV-4	Temporary Vent Valve for Chem Add.	Closed	CS	CS	CS
TV-5					CS
V-302C-4	Chemical Addition Pump discharge pressure gauge PI-302C-4 isolation valve	OPEN	NA		CS

erformed

PRINT NAME	INITIALS	DATE	Verified BY PRINT NAME	INITIALS	DATE
V-302C-2	Heater #1 Drain Valve (1 per ECN W058-340)		Closed	CS	CS CS
No Tag	Heater #2 Drain Valve		Closed	CS	CS CS
V-302C-8	Chem Supply Valve		open	CS	NA CS
SW-V-3196	Water Supply		open	CS	CS CS
TV-5	Vent		closed	CS	CS CS

(29) W058 -378 11/24/98

APPENDIX C -Cross Site Transfer Flush System Electrical Alignment			
BREAKER NUMBER	BREAKER NAME AND LOCATION	REQUIRED POSITION	INITIALS
3B	Flush Tank Feeder Breaker in Switchgear SWG-E-001, Bus #1	CLOSED/ON	
5B	Flush Tank Feeder Breaker in Switchgear SWG-E-001, Bus #2	CLOSED/ON	
?	Circulation Heater #1 local ON/OFF switch labeled "Control Circuit" on heater control panel	OPEN/OFF	
?	Circulation Heater #2 local ON/OFF switch labeled "Control Circuit" switch on heater control panel	OPEN/OFF	
?	Flush Pump P-3100A local disconnect on pump control panel	OPEN/OFF	
?	Panelboard PP-1 main feeder breaker in PP-1	CLOSED/ON	
Breaker #3	Panelboard PP-1 feeder breaker to the Chemical Addition Pump skid	OPEN/OFF	
Breaker #5	Panelboard PP-1 feeder breaker to FE/FT-302C-1	CLOSED/ON	
Breaker #7	Panelboard PP-1 feeder breaker to FE/FT-302C-1	CLOSED/ON	
Breaker #2	Panelboard PP-1 feeder breaker to pipe heat trace	CLOSED/ON	
Breaker #4	Panelboard PP-1 feeder breaker to drum heater	OPEN/OFF	
Breaker #6	Panelboard PP-1 feeder breaker to double pipe heat trace	CLOSED/ON	

Performed 11/21/97 Verified BY 11.21.97

PRINT NAME	INITIALS	DATE	PRINT NAME	INITIALS	DATE

APPENDIX D-1
OPERATION DATA SHEET

Equipment Name: CROSS SITE TRANSFER FLUSH SYSTEM PUMP

EQUIPMENT I.D. NO. : P3100A

PUMP NAMEPLATE DATA: NA GOULDS PUMP - IMP ϕ 7.62 - 140 gpm - MODEL Nº 3196 - SERIAL Nº 715E671 - MAX DESIGN Psi 250 at 100°F - MOTOR CONST DI - SIZE 6.5' x 3-8' - RPM 3600 - FOOT HEAD 240

MOTOR NAMEPLATE DATA
D/EK 9804
Frame Nº 256T
Serial Nº U3970205839
Insulation: ambient 40°C EMC-TE
HP 20
RPM 3510
Voltage 230/460 V
Amps 47/230 29.5/460 60 Hz
Code C SF 1.15 DES V NEMA 90.5
DUTY continuous
BEARINGS: 40BC02 45BC03
XPPX30X
CIC

Attach four targets to the pump to establish the locations for vibration measurements. Attach target number 1 to the top of the motor end bearing housing, and target number 2 pump end bearing housing. Attach target number 3 to the discharge flange inline with the suction. Attach target number 4 on the discharge flange 90° from target number 3.

SEE EXCEPTION TE-003 2/22/98

Flow to be within +/- 10%

Flow gpm FI 302C-1	0 0	50 50	100 105	140 139	200	OPEN FLOW	
Target 1 mils P-P	0.18	0.08	0.12	0.13			
Target 2 mils P-P	0.11	0.06	0.09	0.08			
Target 3 mils P-P	0.13	0.09	0.11	0.11			
Target 4 mils P-P	0.20	0.12	0.12	0.10			
Suction psig TPI-1	5.0 psig	4.0 psig	-1.0 "Hg	-9.0 "Hg			
A phase amps	17	18	20	22			
B phase amps	17	18	20	22			
C phase amps	17	17	19	21			

Voltage A-B	503	504	503	503			
Flow gpm FI-302C-1	0	50 50	100 105	~~150~~ 140 139	~~200~~	~~OPEN FLOW~~	140
Voltage A-C	503	502	501	501			
Voltage B-C	499	500	501	499			
Discharge psig (PI-302C-1)	120	120	100	100			
Static correction (ft)	NA	NA	NA	NA			

Record Bearing Housing temperature after completing last vibration measurement. ~~at 200 gpm~~

Temperature: 73.4 °F (amb 45°F)

REMARKS: FLOW, ~~STATIC~~ SUCTION AND DISCHARGE PRESSURES REQUIRED TO ESTABLISH PUMP PERFORMANCE. VIBRATION LESS THAN 1.5 mils P-P ACCEPTABLE. OTHER DATA COLLECTED TO BENCHMARK PUMP PERFORMANCE [initials]

Performed by : Craig Shaw Date 12/8/97

Verified by : [signature] Date 12/8/97

(EXAMPLE) 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
Craig Shaw	Test Engineer	Craig Shaw	CS
C R REICHMUTH	~~TEST~~ DIR.	C R Reichmuth	CR
PJ ELMENDORF	LMHC QC	PJ Elmendorf	PJE
KEN WILLOUGHBY	LMHC QC	K. Willoughby	KW
J.E. DUNKS	TEST ENGINEER	J.E. Dunks	JED
D. GREENAWAY	TEST DIR	D. Greenaway	DG
L.R. HALL	PROJECTS QE	Larry R. Hall	LRH
E.A. PACQUET	TRB CHAIRMAN	E.A. Pacquet	EP

TEST LOG	TEST NUMBER:	TEST LOG PAGE NUMBER: 1 of 4

TEST TITLE:

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
11-21-97	FE/FT 302C-1 calibrated 0-142 gpm
11-21-97	add instrument cal date to back of 38/51 for TIC-302C-4F, TIC-302C-4D, TPI-1, TIC-302C-4E, TIC-302C-4C
11-21-97	added to page 39/51 Valve SW-V-3198 (isolation valve for SW-PI-3128 press. gage.
11-24-97	V-3196 is dripping into Pit.
11-24-97	"Manually" setting Chem Pump was done by injecting 20 ma.
11-24-97	FE/FT-302C-2 local & MCS did not agree - wires were reversed.
11-24-97	Flange water leak at Tee before TV-1 & TV-2
11-24-97	Broke for lunch at 3.15. The Chem Pump wasn't putting signal from MCS. Turned off water.
11-24-97	Lifted Relief Valve on the Chem Pump and it did not reseat.
	Removed valve to see if clean water would clean it out.
	Blow out relief valve and re-installed. It seats and doesn't leak.
11-25-97	Stopped Sec 3.0 because the chem pump didn't work. Move to Sec. 4.0 after filling tank.
11-25-97	Steps 4.1 → 4.3 were done via Software

TEST LOG

TEST NUMBER:

TEST LOG PAGE NUMBER: 2 of 4

ST TITLE:

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
11-26-97	Modified step 4.17 to bump P3100A and check rotation. added step 4.17.1 to run P3100A to purge air from loop.
11-26-97	P3100A Starter Kept tripping out. Millwright rotated by hand and pump opens free. Elec. checked mtr. phases, all OK. Electrician checked breaker and would hold ~~not~~ no power setting. Concluded faulty breaker. Notified van Katwijk (VHC) and "Miner Mike at FDNW. Gave "Miner Mike" catalog # PN of breaker.
12-1-97	Replaced breaker for P3100A. Kept tripping. Finally determined motor was wired for low voltage. Wired for high voltage. Set Breaker at 300 because that was where original breaker was set.
12-1-97	Punched hole in pump discharge rubber bellows due to oversized washers. Stopped test pending replacement of bellows due to unsafe condition.

TEST LOG

TEST NUMBER:

TEST LOG PAGE NUMBER: 3 of 4

ST TITLE:

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
12-8-97	Deleted step 4.18. The system was not designed to show a "Pump ON" status when pump started locally.
12-9	5.4.1 When pump stopped locally the pump P3100A stopped but the "off" light didn't turn on.
	5.4.2 Remote restart after local stop on P3100A didn't Work.
12-9-97	5.5.2 Turned on power and control circuit - Low flow indicated at 138 gpm. Troubleshooting
12-9-97	The VNCS will not reliably stop P3100A
12-10-97	Heater #1 per ECN W058-340 EP. Swapped T3T4 with T4T5 Sheath and power contacts were swapped.
12-10-97	Measured heater ON/OFF by amps rather than contactor open/closed.

SEE T.E.-007 JDD 1.22.98

TEST LOG	TEST NUMBER:	TEST LOG PAGE NUMBER: 4 of 4

ST TITLE:

TIME/DATE	EVENT DESCRIPTION/SIGNATURE
12-10-97	Unable to run new chem pump because of no oil
	for operation under 50°F. Obtained oil of
	correct viscosity for < 50°F.
12-10-97	Had to start/stop P3100A to get suction line
	cleared and all air purged
12-11-97	Swapped ~~Red/Blk & B~~ was Blk/Org, Red/Gr now Red/Org, Blk/Gr
	leads to chem pump control.
1-22-98	RE: INJECTION PUMP "MANUAL" SETTING. THE TESTED PUMP WAS NOT CAPABLE OF
	~~OPERABLE IN~~ "MANUAL" MODE. THIS WAS RESOLVED BY CONNECTING A
	PROCESS INSTRUMENT CALIBRATOR AND MANUALLY INPUTTING THE
	DESIRED SETTING. (REF. SEC 2.

TEST EXCEPTION LOG

TE #	DATE	DESCRIPTION	DISPOSITIONED	DATE CLOSED
1	11-21-97	Redlines dated 11-20-97 were identified in walkdown and reflect field conditions	This is not an Exception Correct via ECN	NA
2	11-21-97	Calculation of metering pump gph based on formula provided on hardcore. Formula entered at step 2.9	This is not an exception. cs ~~Test will be reran when proper~~ Correct via ECN	NA
3	11-21-97	Pump P-3100B will be replaced by proper pump	This is not an exception. cs	NA
4	11-21-97	FE/FT-302C-1 was found calibrated 0-142 gpm	Yes	12-1-97
5	11-26-97	Bumping P3100A, (4.17) tripped breaker	Yes	12-1-97
6	12-1-97	Pump discharge bellows failed.	Yes	12-8-97
7	12-8-97	unable to do step 4.18 because design not run wires to MCS to show status	Yes	12-17-97
8	12-8-97	Step 4.41 did not execute.	Yes	12-17-97

TEST EXCEPTION LOG

TE #	DATE	DESCRIPTION	DISPOSITIONED	DATE CLOSED
9	12/10	Step 5.6 - 5.8 Flow switch on heater #2 didn't work per ECN W058-340EP	YES	12-4-97
10	12/11	Step 3.13 Chem Pump delivered no flow	YES	12-11-97

TEST EXCEPTION REPORT

SEE TEST EX. LOG

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
HNF-1552 SEC. 4.27-4.31		4

DESCRIPTION OF PROBLEM:
DELETE STEPS 4.27 THROUGH 4.31 (FE/FT-302-C-1 WAS CALIBRATED 0-142)

ORIGINATOR: 11/21/97 12/
ORG: DATE:

IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION ☒ CONTINUE
Craig Shaw 11-21-97
Test Engineer DATE

DISPOSITION:
DURING NORMAL OPERATION OF THIS SYSTEM FLOW SHOULD NOT EXCEED 140 gpm. FE/FT-302-C-1 WILL BE RECALIBRATED TO 0-200 gpm AT A [redacted] LATER DATE AND ACCEPTED WITHOUT FURTHER TESTING.

DISPOSITION AND ~~RETEST~~ REQUIREMENTS BY:
12/1/97
DATE

DISPOSITION ACTIONS COMPLETE:
Verified N/A
By: DATE

QAE CONCURRENCE WITH DISPOSITION (if required):
Larry R. Hall 12/1/97
DATE

RETEST COMPLETE:
N/A
Test Engineer
DATE

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME: X-SITE FLUSH SYSTEM	T.E. NUMBER:
SEC 4.17	HNF-1552	5

DESCRIPTION OF PROBLEM:

PUMP P3100A WOULD NOT BUMP TO CHECK ROTATION AND KEPT TRIPPING BREAKER.

ORIGINATOR:

ORG: DATE: 11/26/97

IMPACT ON TESTING: ☒ HOLD FOR RESOLUTION ☐ CONTINUE

Craig Shaw 11/26/97
Test Engineer DATE

DISPOSITION:

REPLACE MAIN PUMP BREAKER INSIDE FS107NE. AFTER BREAKER IS REPLACED RECHECK PUMP WIRING. RESUME TESTING @ STEP 3.43

BREAKER FOUND TO BE OK. PUMP FOUND TO BE WIRED FOR 230. PUMP WAS REWIRED FOR 480 AND TESTING RESUMED.

DISPOSITION AND RETEST REQUIREMENTS BY:

N/A 1.22.98
DATE

DISPOSITION ACTIONS COMPLETE:

Verified By: 12/1/97
DATE

QAE CONCURRENCE WITH DISPOSITION (if required):

N/A 1/27/98
DATE

RETEST COMPLETE:

Craig Shaw 12/1/97
Test Engineer
DATE

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
4.17.1	Flush Pump P3100A	6

DESCRIPTION OF PROBLEM:
Discharge bellows of Pump P3100A failed as it expanded under pressure and cut a hole in the rubber as it contacted oversized washers on the flange.

ORIGINATOR:
ORG: DATE: 12/1/97

IMPACT ON TESTING: ☒ HOLD FOR RESOLUTION ☐ CONTINUE
Craig Shaw 12-1-97
Test Engineer DATE

DISPOSITION:
Replace bellows and reassemble with proper size washers.

DISPOSITION AND RETEST REQUIREMENTS BY:
NA 1-22-98
DATE

DISPOSITION ACTIONS COMPLETE:
Verified By: TEST Director 12/8/97
DATE

QAE CONCURRENCE WITH DISPOSITION (if required):
Larry R. Hall
NA 1/27/98
DATE

RETEST COMPLETE:
Craig Shaw 12/8/97
Test Engineer
DATE

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
4.17.1		7

DESCRIPTION OF PROBLEM:

MCS DID NOT RESPOND to STEP # 4.17.1 (LOCAL START)
UNABLE to complete STEP # 4.18

ORIGINATOR: [signature] 12/8/97
ORG: DATE:

IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION ☒ CONTINUE
Craig Shaw 12-8-97
Test Engineer DATE

DISPOSITION: Run wires from Aux contacts at FS107NE (P3100A Disconnect/Local Control) to PCU#1. This is to be completed per LOI from D. Nunamaker (operations) to C. van Katwijk Dated 12-11-97 Prior to system turnover to Lockheed Martin Operations.

INSTALL MODIFICATION IN ACCORDANCE WITH ECN W058-376. DISCONNECT P3100A MOTOR LEADS AT STARTER. VERIFY APPROPRIATE MCS DISPLAY FOR MOTOR STARTER AT EACH STEP.

SIMULATE TANK LEVEL BY CONNECTING PIC AND SETTING OUTPUT TO 16 MA (LI-302C1) AT PCU-1-TB1 TERMINALS 37 & 38.

① LOCAL START / LOCAL STOP
② MCS START / MCS STOP
③ LOCAL START / MCS STOP
④ MCS START / LOCAL STOP

RETERMINATE MOTOR LEADS.

⑤ AFTER TEST REMOVE 4-20MA SIMULATOR FROM TERMINALS 37 & 38

DISPOSITION AND RETEST REQUIREMENTS BY:
[signature] 1.12.98
DATE

DISPOSITION ACTIONS COMPLETE:
Verified By: [signature] 12/17/97
DATE

QAE CONCURRENCE WITH DISPOSITION (if required):
Larry R. Hall 2/18/98
DATE

RETEST COMPLETE:
PJ Elmundry 1.27.98
Doug [signature] 1/27/98
Test Engineer
DATE

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
4.41		8

DESCRIPTION OF PROBLEM:

Step 4.41 did not execute.

ORIGINATOR: _____ 12/8/97
ORG: DATE:

IMPACT ON TESTING: ☐ HOLD FOR RESOLUTION ☒ CONTINUE

Craig Shaw 12-8-97
Test Engineer DATE

DISPOSITION:

See Resolution to exception #7

DISPOSITION AND RETEST REQUIREMENTS BY:

_____
DATE

DISPOSITION ACTIONS COMPLETE:

Verified _____
By: DATE

QAE CONCURRENCE WITH DISPOSITION (if required):

_____
DATE

RETEST COMPLETE:

_____
Test Engineer
DATE

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
5.6 to 5.8		9

DESCRIPTION OF PROBLEM:
Flow switch on Heater #1 would not clear at 138 gpm 2 per ECN W058-340 E.P

ORIGINATOR: _____ 12/9/97
ORG: DATE:

IMPACT ON TESTING: ☒ HOLD FOR RESOLUTION ☐ CONTINUE
Craig Shaw 12/9/97
Test Engineer DATE

DISPOSITION:
Troubleshoot and Repair:
Disassembled flow switch and determined the 3rd vane on the paddle was hanging up. Removed 3rd vane per manufacturer instructions, re-installed switch with 2 vanes and it operated properly. Reinstalled and test per steps 5.6 – 5.8. Both flow switches functioned O.K.

DISPOSITION AND RETEST REQUIREMENTS BY:
_____ 12/9/97
DATE

DISPOSITION ACTIONS COMPLETE:
Verified By: _____ 12/9/97
DATE

QAE CONCURRENCE WITH DISPOSITION (if required):
Larry R. Hall
_____ 1/29/98
DATE

RETEST COMPLETE:
Craig Shaw 12/9/97
Test Engineer
DATE

TEST EXCEPTION REPORT

TEST PROCEDURE NO. & SECTION:	TEST NAME:	T.E. NUMBER:
3.13		10

DESCRIPTION OF PROBLEM:

Chem Pump P3100B delivered no flow

ORIGINATOR: [signature] 12/9/97
ORG: DATE:

IMPACT ON TESTING: ☒ HOLD FOR RESOLUTION ☐ CONTINUE

Craig Shaw 12-11-97
Test Engineer DATE

DISPOSITION: Troubleshoot & Repair;

Control signal wires were reversed; corrected and pump operated properly.

Wiring as found: Black/Orange and Red/Green

as left: Red/Orange and Black/Green

RE-TEST Pump For Sec. #3.

DISPOSITION AND RETEST REQUIREMENTS BY:

[signature] 12/9/97
DATE

DISPOSITION ACTIONS COMPLETE:

Verified By: [signature] 12/9/97
DATE

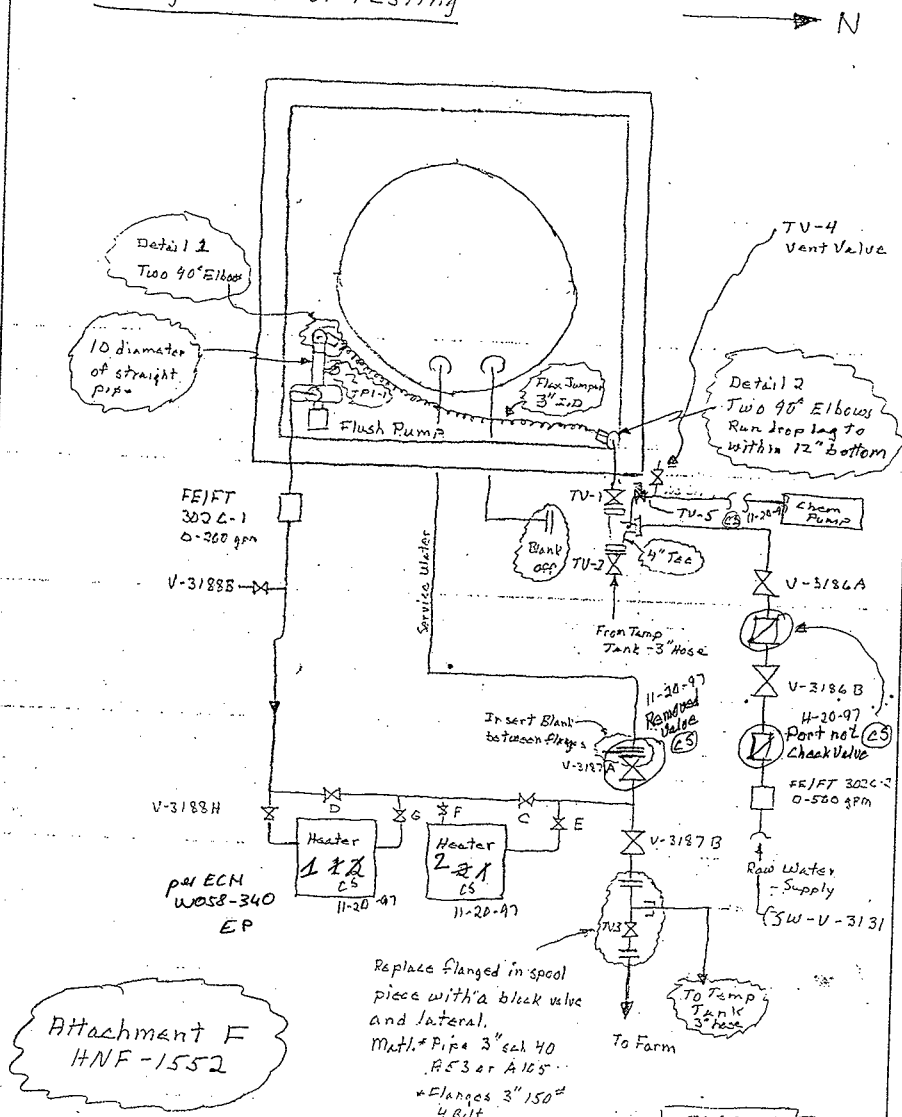
QAE CONCURRENCE WITH DISPOSITION (if required):

Larry R. Hall 1/29/98
DATE

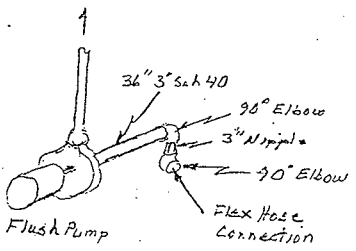
RETEST COMPLETE:

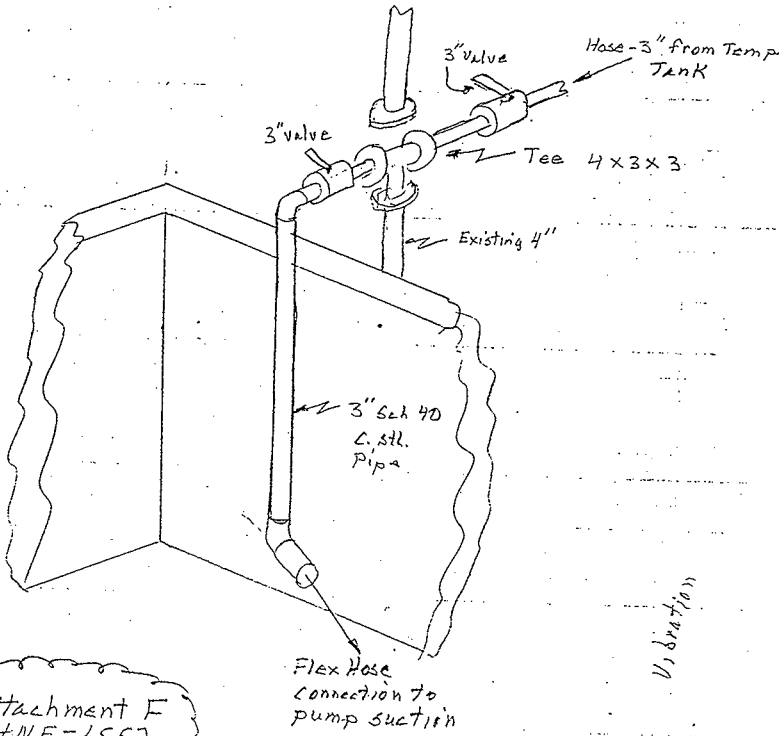
Craig Shaw 12/19/97
Test Engineer
DATE

Configuration for Testing



Detail 1





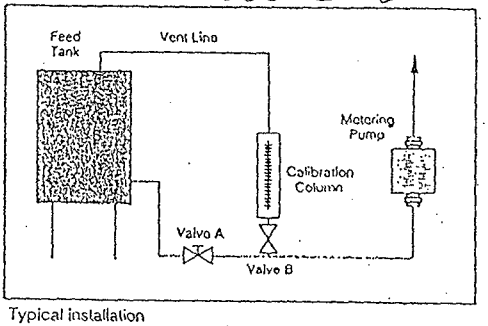
Attachment F
HNF-1552

ATTACHMENT F
HNF-1552

Installation

1. Install the calibration column vertically in the suction line between the metering pump and the feed tank as shown. Since the calibration column is filled by gravity, the feed tank must have sufficient volume in order to perform an accurate calibration test.
2. Two customer supplied full-port ball valves must be installed as shown. (These are available from Hydroflo.)
3. Install a vent/overflow line to feed tank as shown. This line must *not* be valved.

Note: Never use a calibration column on the discharge side of a pump. This is not a pressure vessel -- maximum pressure is 20 psig. This unit must be vented to atmosphere when in use.



Typical installation

Operating Instructions

A stopwatch (or a wristwatch with an accurate second hand) and a calibration column sized to a minimum of a 15 second run are required for the procedure below.

1. With sufficient fluid level in the feed tank, valve A open, and the pump operating normally, open valve B to fill the calibration column.
2. Close valve A when liquid level in calibration column reaches zero mark and start stopwatch. Allow liquid level in column to drop for a minimum of 15 seconds before opening valve A.
3. Divide the number of increments that the fluid has dropped by the number of seconds of the test, and multiply by the factor shown on the calibration column data plate to calculate the flow rate.
4. When the calibration column is not in use it should be free of process liquid and valve B should be kept closed. Valve A should remain open at all times -- except while performing calibration tests.

Hydroflo Delivers.

At Hydroflo, customer satisfaction has always been our first concern. It's why we've designed all of our products to give you trouble-free performance, low maintenance, and extreme accuracy. And it's why we offer fast delivery -- nearly all of our products can be delivered within a week, with one-day delivery available when needed.

- Metering Pumps
- Tanks
- Agitators
- Dissolving Baskets
- Gauge Glasses
- Pulsation Dampeners
- Safety Relief Valves
- Back Pressure Valves
- Pressure Gauges
- Calibration Columns
- Valves
- Strainers

Your representative is...

PennProcess
HYDROFLO
Penn Process Technologies, Inc.
6100 Easton Road, P.O. Box 427
Plumsteadville, PA 18949-0427
Phone: (215) 766-7766
Fax: (215) 766-8280

ATTACHMENT F
HNF-1552

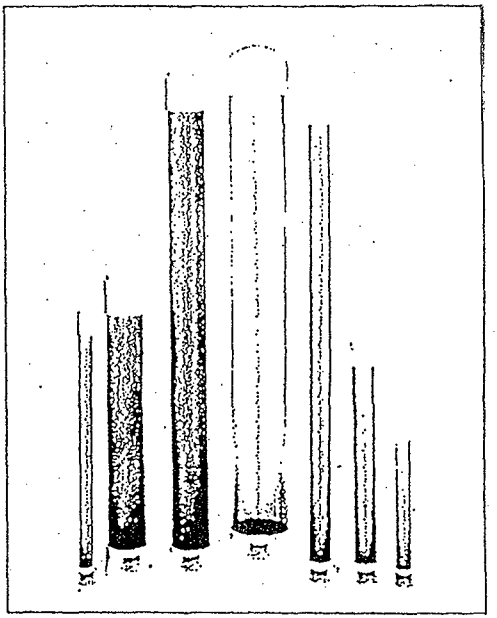
Hydroflo
Calibration Columns

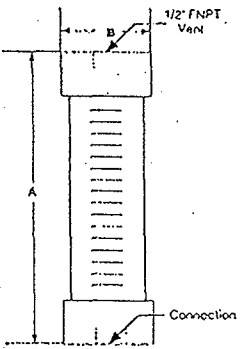
Features

- *Full transparent view of fluid level.*
- *Easy to size and install.*
- *Rugged PVC construction.*
- *Easy to clean.*
- *Sizes for most pumping requirements.*

Hydroflo Calibration Columns offer efficient, economical flow verification beyond the range of ordinary columns.

Designed to check the flow rates of chemical metering pumps, Hydroflo Calibration Columns provide fast, reliable performance, easy operation, and easy installation.





Sizing Chart

Model Number	Column Capacity	Maximum* Pump Capacity	Connection FNPT	A ±1"	B
14303-1	250 ml	8.5 GPH	1/2"	20-1/4"	2"
14303-2	500 ml	17 GPH	1/2"	32-1/4"	2"
14304-1	1000 ml	32 GPH	3/4"	29"	2-3/4"
14304-2	2500 ml	78 GPH	3/4"	56-3/4"	2-3/4"
14305-1	5 liter	150 GPH	2"	38"	5-1/8"
14305-2	10 liter	300 GPH	3"	61-1/4"	5-1/8"
14306-1	25 liter	750 GPH	4"	63-1/4"	7-1/2"

* Maximum pump capacities shown are based on thirty second test. If one minute test is desired, decrease listed capacities by 1/2. Calibration column sizing based on usable scale length.

ENGINEERING CHANGE NOTICE

1. ECN 644610
Proj. ECN W058-378

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 []	Craig Shaw, 08E00, R3-47, 372-1757	[] Yes [x] No	12/22/97
	6. Project Title/No./Work Order No. W-058 Flush System	7. Bldg./Sys./Fac. No. 302C	8. Approval Designator SQ
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) Preoperational Testing, POTP001, Water Flush System HNF-1552, Rev 0	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

Revise HNF-1552, Rev 0 as shown on pages 3 to 6

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

This ECN corrects errors/omissions in the test procedure uncovered during testing.

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

Craig Shaw	R3-47	MJ Sutey	T4-08
Dave Greenaway	T4-08	Proj. File	R1-29
Curt Reichmuth	T4-07		
Eric Pacquet	R3-47		
Greg Parsons	R3-47		
Lanny Hall	R3-47		
C. van Katwijk	R3-47		

RELEASE STAMP
DATE: JAN 20 1998
STA: 4
HANFORD RELEASE
ID: 2

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

HNF-1917 PG 71 Rev 0

A-7900-013-1
ATTACH 2

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) ~~644610~~ W-058-378

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

21. Approvals

Signature	Date	Signature	Date
Design Authority NA	NA	Design Agent for C. Shaw	1.12.98
~~Cog.~~ Eng. for C. Shaw	1.12.98	PE N/A	N/A
~~Cog.~~ Mgr.	1-19-98	QA	
QA L.R. HALL (FOR)	1/20/98	Safety	
Safety	1/19/98	Design for C. Shaw	1.12.98
Environ.		Environ. N/A	N/A
Other		Other	
DESIGN AUTHORITY	1/20/98		
TWRS OPS.	1-20-98	DEPARTMENT OF ENERGY	
ENGINEERING	1-20-98	Signature or a Control Number that tracks the Approval Signature	
		ADDITIONAL	

HNF-1917 PG72 Rev 0 ATTACH 2

1) Delete section 4.10.10 *(thermometer not needed, delta T across heaters not required)*

2) Section 6.3: replace the word ..."flowing"... with ..."in the test tank"..., and ..140... with ...140+/-5 *("flowing" does not describe the test objective which was to raise the tank temperature)*

3) Section 6.4: change the word ..."service"... to ..."raw"... *(changed to match field labels)*

ATTACHMENT A

1) In section 1.8 change "water drum" to "bucket"

2) Delete section 1.10 *(discharge attached to piping per sketch)*

3) In section 1.11 change "PRV-302C-4" to "PRV-302C-3"

4) Between section 2.0 and 2.1 insert section 2.01 that reads: "Manually set pump P-3100B to 100% capacity by using a PIC to supply a 20ma signal" *(without raw water flow the pump would stay at 0%)*

5) Between section 2.5 and 2.6 insert section 2.05 that reads: "Remove PIC and reconnect pump P-3100B"

6) In section 2.9 change "239/sec" to read "(No. of increments)/(Time(sec))x8.91". *(equation changed to that provided on the Hydroflo calibration column)*

7) In section 2.13 change "239/sec" to read "(No. of increments)/(Time(sec))x8.91".

8) In section 2.17 change "239/sec" to read "(No. of increments)/(Time(sec))x8.91".

9) In section 2.21 change "239/sec" to read "(No. of increments)/(Time(sec))x8.91".

10) Section 3.0: Delete paragraph in italics *(equation changed to that provided on the Hydroflo calibration column, explanation in this paragraph no longer needed)*

11) Section 3.1, change "823:1" to 163% *(the MCS does not recognize the volume ratio of water to caustic, but rather ma from flowmeter to ma into caustic pump)*

12) Section 3.6, delete line "Service Water Totalizer....." *(not needed, total flow measured at MCS)*

13) Section 3.8: delete the line with "Service Water Pressure..."

14) Section 3.9, change "MCS" to "FIC-302C-2"

15) Section 3.15.2, delete "Empty Cal. column___Sec" and "ratio". Add: "(No. of increments)/(Time(sec))x8.91 =_____gph" *(equation changed to that provided on the Hydroflo calibration column)*

16) Section 3.17: delete the line with "Service Water Pressure..."

17) Section 3.18, change "MCS" to "FIC-302C-2"

18) Section 3.18: change FE/FT-302C to FE/FT-302C-2

19) Section 3.24.2, delete "Empty Cal. column___Sec" and "ratio". Add: "(No. of increments)/(Time(sec))x8.91 =_____gph"

20) Section 3.25: change 150 to 170.

21) Section 3.33.2, delete "Empty Cal. column___Sec" and "ratio". Add: "(No. of increments)/(Time(sec))x8.91 =_____gph"

22) Delete section 3.34 to 3.42. *(these steps would have tested the caustic addition pump beyond its capacity)*

23) Delete section 4.10.1 *(not consistent with MCS operation)*

24) Change section 4.17 to read: "Bump the flush pump P-3100A by pressing local START button and verify correct rotation". *(rotation had not been checked prior to test)*

25) Insert section 4.17.1 that reads: "Start pump P-3100A by pressing local START button and operate until air is purged from test loop".

26) Delete sections 4.27 thru 4.31. *(these steps were beyond calibration range of flowmeter)*

27) Appendix A - add the following instruments:

TIC-302C-4F	Sheath High Limit Control
TIC-302C-4D	Process High Limit Control
TIC-302C-4E	Sheath High Limit Control
TIC-302C-4C	Process High Limit Control
TPI-1	Pump Suction Pressure

28) Appendix B - change SW-V-3115 to SW-V-3195

29) Appendix B - add the following valves:

SW-V-3198	SW Pressure Gage Isolation Valve	OPEN
TV-5	Temp Chem Pump Block Valve	CLOSED
V-302C-2	Heater #2 drain valve	CLOSED
NO TAG	Heater #1 drain valve	CLOSED
V-302C-8	Chem Pump Supply valve	OPEN

30) Change 4.1 to read "Adjust software to by pass tank 302C low level input from LIT-302C-1." *(simplified testing)*

31) Delete 4.2, 4.3, 4.18 *(4.18 deleted for same reaason as 4.10.1)*

32) Sec 4.37 - delete "Refer back to Sec 4.1,4.2,4.3 where the PIC was set at 16mA to allow pump P-3100A to operate." add "Remove software by pass from sec 4.1". *(simplified testing)*

33) Sec 5.0 - Delete the following words from the paragraph....."45 gpm latch-22 gpm unlatch". *(not consistent with flow switch final configuration, see exception 9)*

34) Change 5.1 to read "Adjust software to by pass tank 302C low level input from LIT-302C-1." *(simplify testing)*

35) Add sec - " 5.2.13Close disconnect for pump P-3100A"

36) Add sec - " 5.4.1 Stop pump locally"

37) Add sec - " 5.4.2 Start pump remotely"

38) Add sec - " 5.5.1 Energize Heaters"

39) Add sec - " 5.5.2 Turn on heater control circuit"

40) Add sec - " 5.6.1 Verify heaters de-energize"

41) In sec 5.7 delete ....(22 gpm+/-5)...*(not consistent with flow switch final configuration, see exception 9)*

42) Add sec - "5.8.1 Verify heaters de-energize"

43) In sec 5.9 delete ....(45 gpm+/-5)...*(not consistent with flow switch final configuration, see exception 9)*

44) Add sec - "5.14.1 Reset sheath and process over temperature"

45) Change 5.16 to read: "VERIFY circulation heater #1 DOES NOT ENERGIZE by observing that no amperes are drawn."

46) Change 5.18 to read: "VERIFY circulation heater #1 ENERGIZES by observing amperes are drawn."

47) Delete the following sections: 5.19, 5.20, 5.21, 5.22, 5.23 *(simplify testing, these were actually verified in steps 5.6 thru 5.9)*

48) Change 5.25 to read: "VERIFY circulation heater #1 ENERGIZES by observing amperes are drawn."

49) Change 5.32 to read: "VERIFY circulation heater #1 ENERGIZES by observing amperes are drawn."

50) In sec 5.13.2 change TI-302C-~~1~~3 to TE-302C-2 JK 1/20/98

51) In sec 5.34.1 change TAH-302-1B to TAH-302C-1A

52) In sec 5.39.1 change TAH-302-1B to TAH-302C-1A

53) Add sec - " 5.43.1 Reset sheath and process over temperature"

54) Change 5.46 to read: "VERIFY circulation heater #1 ENERGIZES by observing amperes are drawn." JK 1/20/98

55) In sec 5.48.1 change ...TAH-~~302~~-1B... to ...TAH-302C-1A... 302C

HNF-1917 PG75 Rev 0 ATTACH 2

56) Delete the following sections: 5.54, 5.55, 5.56 *(error in original test plan, steps not needed)*

57) Add sec - " 5.59.1 Reset Alarms"

58) Add sec - " 5.59.2 Turn on heater control circuit"

59) Change 5.62 to read: "VERIFY circulation heater #2 DOES NOT ENERGIZE by observing that no amperes are drawn."

60) Change 5.64 to read: "VERIFY circulation heater #2 ENERGIZES by observing amperes are drawn."

61) Delete the following sections: 5.65 to 5.69 *(simplify testing, these were actually verified in steps 5.6 thru 5.9)*

62) Change 5.71 to read: "VERIFY circulation heater #2 ENERGIZES by observing amperes are drawn."

63) Change 5.78 to read: "VERIFY circulation heater #2 ENERGIZES by observing amperes are drawn."

EP 1/20/98

64) In sec 5.80.1 change TAH-302C-1~~B~~A to...-1A~~B~~B

65) In sec 5.85.1 change ...-1A to ...-1B

66) Change 5.92 to read: "VERIFY circulation heater #2 ENERGIZES by observing amperes are drawn."

67) In sec 5.94.1 change ...-1A to ...-1B

68) In sec 5.99.1 change ...-1A to ...-1B

69) Delete 5.100 *(error in original test plan, step not needed)*

70) In sec 5.101.1 change TI-302C-~~3~~2 to TE-302C-2 EP 1/20/98

71) Change 5.104: Operate heaters until water reaches 140 F +/-10 on temporary water tank.

72) Delete 5.107 *(step not needed, afterheat removal not a problem)*

73) Change 6.~~2~~1 to read: VERIFY Sump Pump P-302C-3 transfers water in its final approved configuration.

74) Delete sec 6.2 to 6.8 *(change in step 6.1 made them unnecessary)*

HNF-1917 PG 76 Rev 0 ATTACH 2

ENGINEERING CHANGE NOTICE

1. ECN ~~640110~~

Proj. ECN W-058-376

2. ECN Category (mark one) Supplemental [x] Direct Revision [] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	3. Originator's Name, Organization, MSIN, and Telephone No. GJ KUBINSKI, FLUOR DANIEL NORTHWEST, G3-14, 376-2669	4. USQ Required? [] Yes [] No	5. Date 1-5-98
	6. Project Title/No./Work Order No. REPLACEMENT OF CROSS-SITE TRANSFER SYSTEM/W-058/C12300	7. Bldg./Sys./Fac. No. 6241-A, 242-S, 252-S	8. Approval Designator /SC-1 (SC)
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) SEE BLOCK 13	10. Related ECN No(s). NONE	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 [] No

SC-3 (GENERAL SAFETY)

DOCUMENTS AFFECTED:

H-2-822409, SH 1, REV 2
H-2-822430, SH 1, REV 3
H-2-822502, SH 1, REV 1
H-2-822503, SH 1, REV 1

DESCRIPTION OF CHANGE:

REVISE DRAWINGS AS SHOWN ON PAGES 3 THROUGH 6.

NOTE: WIRE RUN #FT111 - DETERMINATE BOTH ENDS, PULL OUT 4/C #12 CABLE AND SCRAP, PULL IN NEW 8/C #12 CABLE AND TERMINATE BOTH ENDS.

ELLIOTT LYNN AHOLA
STATE OF WASHINGTON
32840
REGISTERED PROFESSIONAL ENGINEER
1/5/98
EXPIRES: 3/15/99

14a. Justification (mark one)

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

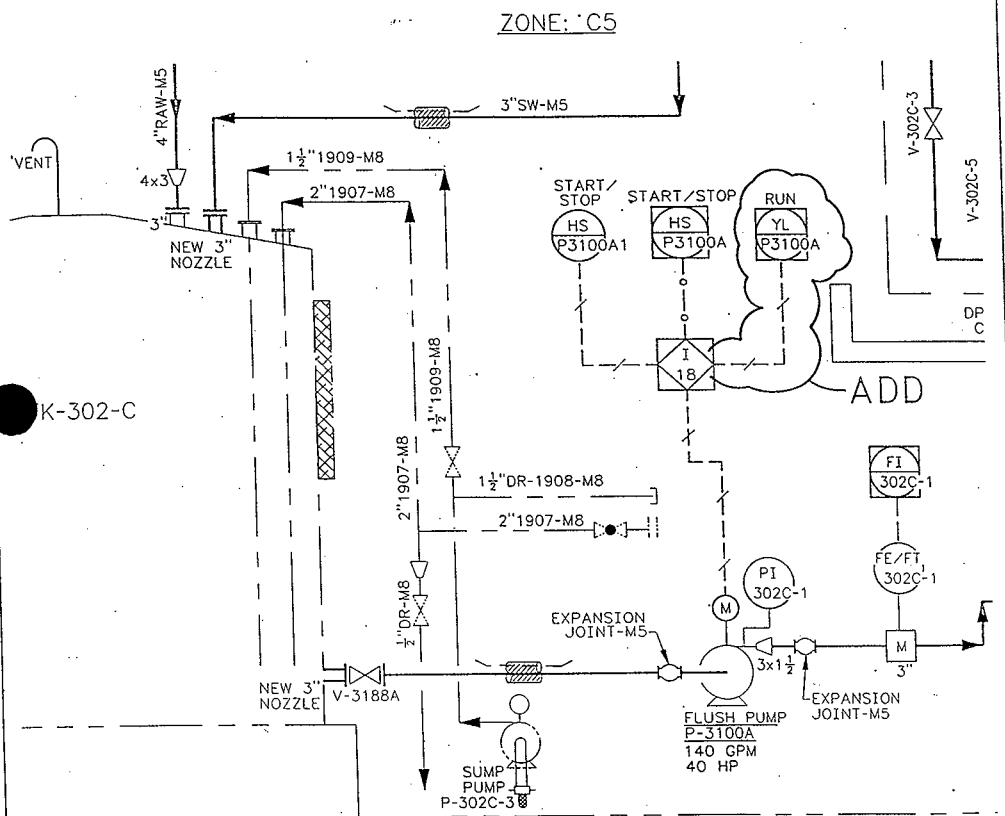
14b. Justification Details

ADD LOCAL RUN STATUS FOR FLUSH PUMP P3100A PER CUSTOMER REQUEST.

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

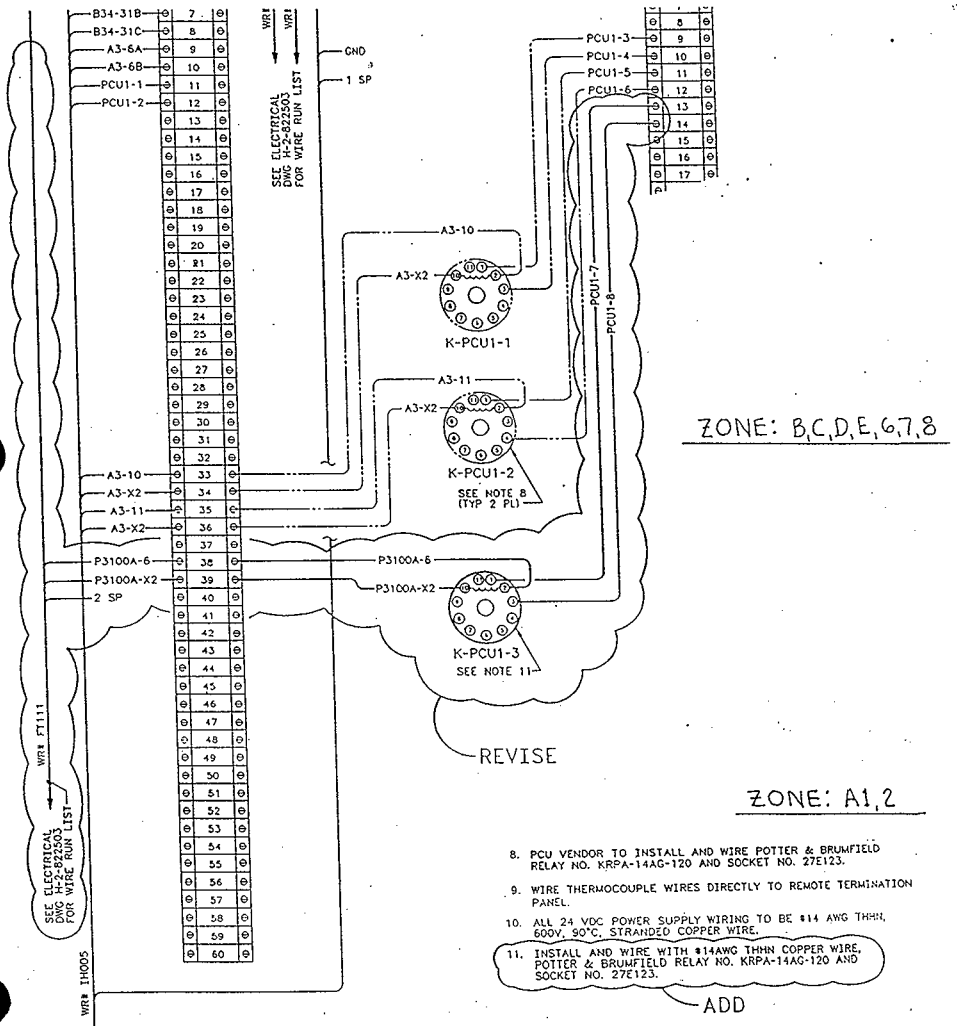
RELEASE STAMP

FLUOR DANIEL NORTHWEST, INC.			ENGINEERING CHANGE NOTICE SKETCH			
Dwg. H-2-822409	Sh. 1	Rev. 2	Prepared By GJ KUBINSKI	Checked By Mark Fincland	ECN No. W-058-376	Page 3/6



ANF-1917 Pg78 Rev 0 ATTACH 3

FLUOR DANIEL NORTHWEST, INC.			ENGINEERING CHANGE NOTICE SKETCH			
wg. H-2-822430	Sh. 1	Rev. 3	Prepared By GJ KUBINSKI	Checked By EFH 1/6/98	ECN No. W-058-376	Page 4/6

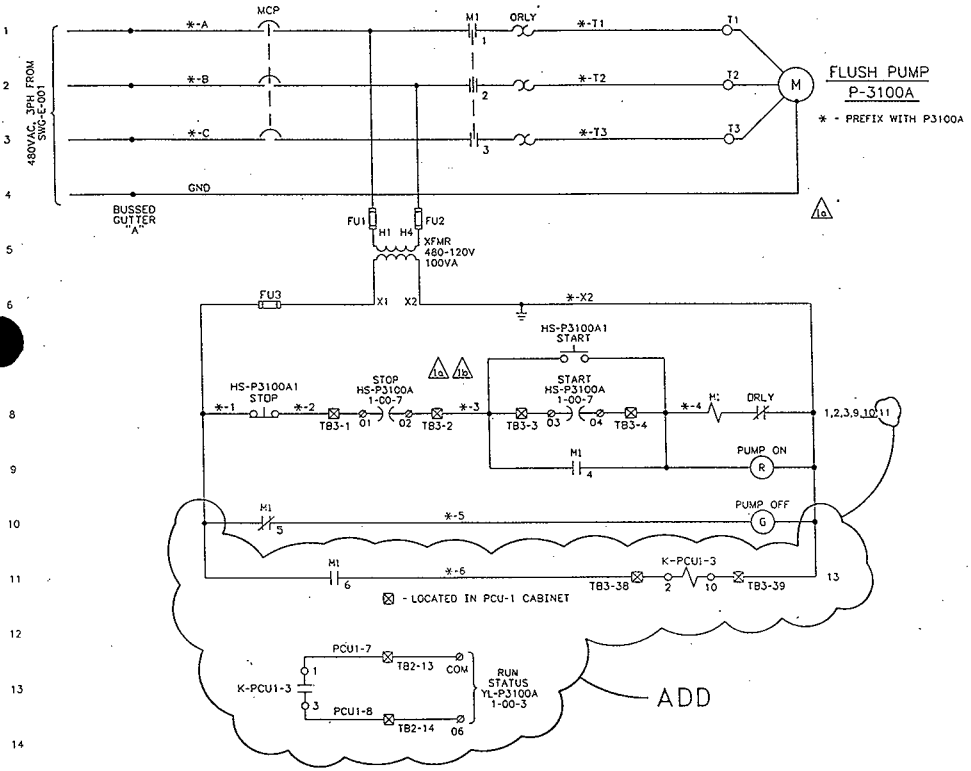


8. PCU VENDOR TO INSTALL AND WIRE POTTER & BRUMFIELD RELAY NO. KRPA-14AG-120 AND SOCKET NO. 27E123.
9. WIRE THERMOCOUPLE WIRES DIRECTLY TO REMOTE TERMINATION PANEL.
10. ALL 24 VDC POWER SUPPLY WIRING TO BE #14 AWG THHN, 600V, 90°C, STRANDED COPPER WIRE.
11. INSTALL AND WIRE WITH #14AWG THHN COPPER WIRE, POTTER & BRUMFIELD RELAY NO. KRPA-14AG-120 AND SOCKET NO. 27E123.

ADD

FLUOR DANIEL NORTHWEST, INC.			ENGINEERING CHANGE NOTICE SKETCH			
Dwg. H-2-822502	Sh. 1	Rev. 1	Prepared By GJ KUBINSKI	Checked By 1/6/95	ECN No. W-058-376	Page 5/6

ZONE: D6, D7



HNF-1917 Pg 80 Rev0 ATTACH 3

FLUOR DANIEL NORTHWEST, INC. | ENGINEERING CHANGE NOTICE SKETCH

Dwg.	Sh.	Rev.	Prepared By	Checked By	ECN No.	Page
H-2-822503	1	1	GJ KUBINSKI	[signature] 1/6/98	W-058-376	6/6

ZONE: E4,E5,E8

[illegible]	3 1	350 kcmils 1/0	1 1	BUSSED GUTTER "A"	FS106NE	HEATER #1, HTR-302C-1	302C1-L1BA, -L1BB, -L1BC GND
[illegible]	4	2	1	BUSSED GUTTER "A"	FS107NE	FLUSH PUMP MTR START	P3100A-A, -B, -C, GND
[illegible]	3 1	8 10	1 1	FLUSH PUMP MTR START	FS115NE, JB-3, FS116NE	FLUSH PUMP P-3100A	P3100A-T1, -T2, -T3 GND
[illegible]	8	12	3	FLUSH PUMP MTR START	FS141NK, JB-4, FS140NK, HH #7(FLEX CND), FS143NK, MH #1(FLEX CND), FS144NK	PCU-1	P3100A-2, -3, -4, -6, -X2, GND, 2 SP
[illegible]	3	12	3	PP-1 (MINI POWER CENTER)	FS117NE	JUNCTION BOX JB-6	PP1-2H, -2N, GND (SPLICE WIRES WIT
[illegible]	3	12	3	JUNCTION BOX JB-6	FS142NK	PIPING HEAT TRACE THERMOSTAT TH-1	PP1-2H, -21A, GND (SPLICE WIRES WIT
[illegible]	3	12	3	JUNCTION BOX JB-6	FS127NE, FS128NE	PIPING HEAT TRACE CABLE HT-1	PP1-21A, -2N, GND (SPLICE WIRES WIT
[illegible]	3	12	3	JUNCTION BOX JB-6	FS125NE	PIPING HEAT TRACE CABLE HT-2	PP1-21A, -2N, GND (SPLICE WIRES WIT

REVISE

REVISE

HNF 1917 - Pg 81 Rev 0 ATTACH3

ATTACHMENT - 4

MCS CAUSTIC RAW WATER FLOW RATIO SETTING

1) Reference # 3 (Calculation No. W058-P-050, *pH Adjustment of Water Using Sodium Hydroxide/Pump Injection rate.*), on page 4, specifies that at raw water flow rate of 170 gpm the required caustic flow is 12.4 gph to raise the pH to 11.

2) The MCS receives a 4-20mA signal from raw water flowmeter (FE/FT-302C-2) and sends a 4-20mA signal to caustic pump (P3100B)

In order to obtain the desired raw water to caustic flow ratio the corresponding mA signal ratio must be entered at the MCS.

	DEVICE	FLOW RANGE	SIGNAL RANGE
Raw water	FE/FT-302C-2	0-350 gpm	4-20mA
Caustic	P3100B	0-13 gph	4-20mA

To obtain a caustic flow of 12.4 gph for a raw water flow of 170 gpm in order to raise the pH to 11, the MCS ratio setting is calculated as follows:

R= [(12.4/13)x16+4]/[(170/350)x16+4]
R=19.3ma/11.8ma

R= 1.63

R= 163%

ATTACHMENT - 5

PUMP P3100A PERFORMANCE DESIGN POINT

The required performance of pump P3100A: @140 gpm TDH >240 ft.

From Appendix D-1 data, @139gpm: suction pressure = -9.0"Hg and discharge pressure = 100 psig.

TDH is the difference between suction pressure and discharge pressure measured in feet of fluid flowing.

Discharge: 100psi x 2.31 ft-H_2O/psi = 231 ft-H_2O

Suction: 14.7 psi/29.92"hg x -9.0"hg x 2.31 ft-H_2O/psi = -10.2 ft-H_2O

TDH: 231 - (-10.2) = 241.2 ft-H_2O

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)

HNF-19174 Pg 84 Rev 0 ATTACH 6

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	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	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
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

W-058 Interlock Test Listing (1/14/98)

IL	SYS	DEVICE	P&ID	ALARM	IL ACTION/(HW or SW)	FUNCTION	LOCATION	TESTED	COMMENTS
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
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

LINE 19 IT PG 86 Rev 0 ATTACH 6

IL	SYS	DEVICE	P&ID	ALARM	IL ACTION/(HW or SW)	FUNCTION	LOCATION	TESTED	COMMENTS
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	LDK3150	403	LEAK	STOP P 3125A&B/H	SUMP LD	DB PUMP RM	POTP-005	8.23/8.24
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	LDK3150	403	LEAK	STOP P102SY02A/H	SUMP LD	DB PUMP RM	POTP-005	8.19-8.22
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	LDK3150	403	LEAK	INPUT TO 2E & 2W MPS/H	SUMP LD	DB PUMP RM	POTP-005	8.25 (Note 3)
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
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

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IL	SYS	DEVICE	P&ID	ALARM	IL ACTION/(HW or SW)	FUNCTION	LOCATION	TESTED	COMMENTS
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>18PSIG	2W MPS SHUTDOWN/H	SYS. PRESS	241SYA VP	POTP-005	12.34-12.37 (Note 1)
16	SNL	PSH3113A	402	P>18PSIG	2W MPS SHUTDOWN/H	SYS. PRESS	241SYA VP	NEW	NEW (Note 4)
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
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

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ATTACH 6

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.

ATTACHMENT - 7

CAUSTIC TO RAW WATER FLOW MEASUREMENT TOLERANCE

Calculation note W-058-P-050 (Reference number 3), *pH adjustment of water using sodium hydroxide pump injection rate*, on page 4, specifies that at a raw water flow rate of 170 gpm the required caustic flow is 12.4 gph to raise the pH to 11. This criteria however doesn't include any tolerance resulting rom the raw water flow measurement accuracy (FE/FT-302C-2) nor the caustic flow measurement accuracy (calibrated column visual reading/timing).

Hence acceptance criteria 6.4 has been updated to reflect this tolerance as follows:

Criteria: 12.4 gph caustic for 170 gpm raw water (i.e.: 12.47 gph for 171 gpm)

Measurements: 12.21 gph caustic for 171 gpm raw water

Deviation: $\frac{12.47-12.21}{12.47} \times 100 = 2\%$

FLOW	DEVICE	RANGE	FULL SCALE ACCURACY	MEASURE-MENT	MEASURE-MENT ACCURACY
Raw Water	FE/FT-302C-2	0-350 gpm	$\pm$3%=10.5 gpm	171 gpm	R=$\pm$6%
Caustic	Calibrated column visual reading/timing	500 ml	$\pm$1/2 increment =$\pm$5ml	12.21 gpm	C=$\pm$5%

The overall tolerance on the caustic flow measurement is calculated as follows:

$T = \pm\sqrt{R^2 + C^2} = \pm\sqrt{36 + 25} = \pm 7.8\%$

Conservatively a tolerance of $\pm$ 5% has been retained for the acceptance criteria.

Hence the measured caustic to raw water ratio (2%) is within the acceptable tolerance ($\pm$ 5%).

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	E.A. Pacquet - W-058 Testing	Date
Project Title/Work Order		EDT No. 623663
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			
J.E. Dunks, FDNW	R3-47	X			
L.R. Hall, FDNW	R3-47	X			
B.J. Harp, DOE-RL	S7-54	X			
D.A. Greenaway, LMHC	T4-09	X			
J.L. Henderson, FDNW	G3-14	X			
O.M. Jaka, LMHC	S5-12	X			
R.L. Legg, LMHC	R2-50	X			
D.R. Nunamaker, LMHC	T4-07	X			
E.A. Pacquet, NHC	R3-47*	X			
G.L. Parsons, NHC	R3-47*	X			
C.R. Reichmuth, LMHC	T4-07*	X			
M.J. Sutey, LMHC	T4-08	X			
C. van Katwijk, NHC	R3-47	X			
M.D. Gerken, NHC	R3-47*	X			
D.O. Dobson, LMHC	R2-50	X			
M.J. Bailey, LMHC	T4-07	X			
Project Files	R1-29	X			

* Advance Copy