

**S****ENGINEERING CHANGE NOTICE**Page 1 of 21. ECN **659248**Proj.  
ECN

2. ECN Category (mark one)		3. Originator's Name, Organization, MSIN, and Telephone No.		4. USQ Required?	5. Date
Supplemental <input type="checkbox"/>		B. R. Johns, ISE, S7-24, 373-3429		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	06/07/00
Direct Revision <input checked="" type="checkbox"/>		6. Project Title/No./Work Order No.		7. Bldg./Sys./Fac. No.	8. Approval Designator
Change ECN <input type="checkbox"/>		Interim Stabilization,		241-G/200-GEN	SQ
Temporary <input type="checkbox"/>		9. Document Numbers Changed by this ECN (includes sheet no. and rev.)		10. Related ECN No(s).	11. Related PO No.
Standby <input type="checkbox"/>		RPP-6197, REV. 0		N/A	N/A
Supersedure <input type="checkbox"/>		12a. Modification Work		12d. Restored to Original Condition (Temp. or Standby ECNs only)	
Cancel/Void <input type="checkbox"/>		<input type="checkbox"/> Yes (fill out Blk. 12b)		N/A	
		<input checked="" type="checkbox"/> No (NA Blks. 12b, 12c, 12d)		N/A	
12b. Work Package No.		12c. Modification Work Completed		Design Authority/Cog. Engineer Signature & Date	
N/A		N/A		N/A	
13a. Description of Change					
13b. Design Baseline Document? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					
The ATP for PIC skid "T" is being revised to correct various steps. The following corrections are made:					
Page 10: Added valves V-6057T, V-6058T and V-6059T for dip tube drains.					
Pages 13 and 17: Corrected location of circuit 2.					
Page 18: Corrected tolerance on the 32vdc reading from +0 to +3.					
Page 29: Changed steps 5.8.52 and 5.8.53 to allow for either the 8 or 14gpm flowmeter settings.					
Page 30: Clarify connection points in step 5.8.63.					
Page 32: Corrected typo in step 5.8.85 changing TE-6003T to TE-6001T.					
Page 39: Added to check amber light OFF in step 5.9.53.					
Page 44: Added step after 5.9.120 to remove temperature simulator from Intrinsic safe panel.					
Page 49: Added step 5.11.7 to install dummy fuses should the skid be used in the field on a "B-phase" grounded system. Added valves V-6054T, V-6055T, V-6056T, V-6057T, V-6058T and V-6059T for CGM, remote water and dip tube drains.					
14a. Justification (mark one)		14b. Justification Details			
Criteria Change <input checked="" type="checkbox"/>		These ECN changes correct skid "T" ATP.			
Design Improvement <input type="checkbox"/>		Design verification by Informal review per HNF-IP-0842, volume IV, section 4.24. USQ tracking #TF-00-0407, revision 0. This direct revision will not change collective dose since it has no impact on radiological sources, contamination control or shielding. A NEPA review screening is not required as this is an administrative change.			
Environmental <input type="checkbox"/>					
Facility Deactivation <input type="checkbox"/>					
As-Found <input type="checkbox"/>					
Facilitate Const. <input type="checkbox"/>					
Const. Error/Omission <input type="checkbox"/>					
Design Error/Omission <input type="checkbox"/>					
15. Distribution (include name, MSIN, and no. of copies)				RELEASE STAMP	
B. R. Johns S7-24					
M. R. Koch S7-24					
T. J. Volkman S7-34					
W. F. Zuroff S7-24					

# ENGINEERING CHANGE NOTICE

Page 2 of 2

1. ECN (use no. from pg. 1)

659248

**16. Design Verification Required**

Yes  
 No

**17. Cost Impact**

**ENGINEERING**

Additional  \$ N/A  
Savings  \$ N/A

**CONSTRUCTION**

Additional  \$ N/A  
Savings  \$ N/A

**18. Schedule Impact (days)**

Improvement  N/A  
Delay  N/A

**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.

<p>SDD/DD <input type="checkbox"/></p> <p>Functional Design Criteria <input type="checkbox"/></p> <p>Operating Specification <input type="checkbox"/></p> <p>Criticality Specification <input type="checkbox"/></p> <p>Conceptual Design Report <input type="checkbox"/></p> <p>Equipment Spec. <input type="checkbox"/></p> <p>Const. Spec. <input type="checkbox"/></p> <p>Procurement Spec. <input type="checkbox"/></p> <p>Vendor Information <input type="checkbox"/></p> <p>OM Manual <input type="checkbox"/></p> <p>FSAR/SAR <input type="checkbox"/></p> <p>Safety Equipment List <input type="checkbox"/></p> <p>Radiation Work Permit <input type="checkbox"/></p> <p>Environmental Impact Statement <input type="checkbox"/></p> <p>Environmental Report <input type="checkbox"/></p> <p>Environmental Permit <input type="checkbox"/></p>	<p>Seismic/Stress Analysis <input type="checkbox"/></p> <p>Stress/Design Report <input type="checkbox"/></p> <p>Interface Control Drawing <input type="checkbox"/></p> <p>Calibration Procedure <input type="checkbox"/></p> <p>Installation Procedure <input type="checkbox"/></p> <p>Maintenance Procedure <input type="checkbox"/></p> <p>Engineering Procedure <input type="checkbox"/></p> <p>Operating Instruction <input type="checkbox"/></p> <p>Operating Procedure <input type="checkbox"/></p> <p>Operational Safety Requirement <input type="checkbox"/></p> <p>IEFD Drawing <input type="checkbox"/></p> <p>Cell Arrangement Drawing <input type="checkbox"/></p> <p>Essential Material Specification <input type="checkbox"/></p> <p>Fac. Proc. Samp. Schedule <input type="checkbox"/></p> <p>Inspection Plan <input type="checkbox"/></p> <p>Inventory Adjustment Request <input type="checkbox"/></p>	<p>Tank Calibration Manual <input type="checkbox"/></p> <p>Health Physics Procedure <input type="checkbox"/></p> <p>Spares Multiple Unit Listing <input type="checkbox"/></p> <p>Test Procedures/Specification <input type="checkbox"/></p> <p>Component Index <input type="checkbox"/></p> <p>ASME Coded Item <input type="checkbox"/></p> <p>Human Factor Consideration <input type="checkbox"/></p> <p>Computer Software <input type="checkbox"/></p> <p>Electric Circuit Schedule <input type="checkbox"/></p> <p>ICRS Procedure <input type="checkbox"/></p> <p>Process Control Manual/Plan <input type="checkbox"/></p> <p>Process Flow Chart <input type="checkbox"/></p> <p>Purchase Requisition <input type="checkbox"/></p> <p>Tickler File <input type="checkbox"/></p> <p><u>NONE</u> <input checked="" type="checkbox"/></p>
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**20. Other Affected Documents:** (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

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

**21. Approvals**

	Signature	Date		Signature	Date
Design Authority <u>WF ZUROFF</u>		<u>6/12/00</u>	Design Agent	_____	_____
Cog. Eng. <u>BR JOHNS</u>		<u>6/7/00</u>	PE	_____	_____
Cog. Mgr. <u>MR KOCH</u>		<u>6/7/00</u>	QA	_____	_____
QA <u>TJ VOLKMAN</u>		<u>6/19/00</u>	Safety	_____	_____
Safety <u>LA Flowers</u>		<u>6-19-00</u>	Design	_____	_____
Environ. <u>N/A</u>	_____	_____	Environ.	_____	_____
Other	_____	_____	Other	_____	_____
Informal Review: <u>DK DEFORD</u>			DEPARTMENT OF ENERGY		
<u>D. DeFord</u>			Signature or a Control Number that tracks the Approval Signature		
<u>6/7/00</u>			_____		
_____			ADDITIONAL		
_____			_____		
_____			_____		
_____			_____		
_____			_____		

# ACCEPTANCE TEST PROCEDURE FOR NEW PUMPING INSTRUMENTATION AND CONTROL SKID "T"

M. R. KOCH

CH2MHILL HANFORD GROUP, INC

Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-99RL14047

EDT/ECN: 624922

UC:

Cost Center: 74D00

Charge Code: 103361

B&R Code: EW3120071

Total Pages: 58

Key Words: PICS, SALT WELL, SKID, INTERIM STABILIZATION, ACCEPTANCE TEST

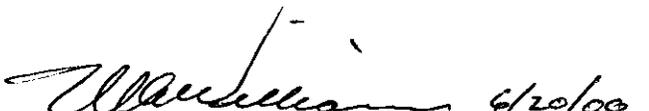
## Abstract:

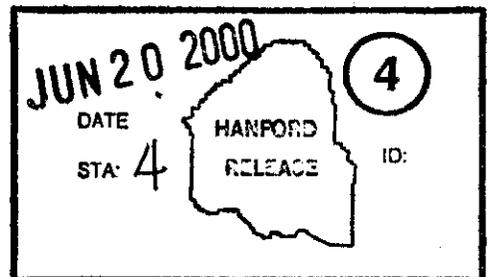
This Acceptance Test Procedure (ATP) provides for the inspection and testing of the new Pumping Instrumentation and Control (PIC) skid designated as "T". The ATP will be performed after the construction of the PIC skid in the fabrication shop.

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Release Approval 6/20/00  
Date



Release Stamp

Approved For Public Release



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## **ACCEPTANCE TEST PROCEDURE FOR NEW PUMPING INSTRUMENTATION AND CONTROL SKID "T"**

### **1.0 PURPOSE**

This Acceptance Test Procedure (ATP) verifies proper construction per the design drawings and tests for proper functioning of the Pumping Instrumentation and Control (PIC) skid "T". The scope section lists the systems and functions to be checked. This ATP will be performed at the Site Fabrication Services (SFS) shop upon completion of the construction of the PIC skid.

### **2.0 INFORMATION**

#### **2.1 SCOPE**

This Acceptance Test Procedure verifies and/or tests the following items or systems:

- 2.1.1 Drawing verification (Prerequisites)
- 2.1.2 Red-line incorporation
- 2.1.3 Code Inspections (Prerequisites)
- 2.1.4 Instrument calibrations
- 2.1.5 Continuity, megger and voltage checks
- 2.1.6 Programmable Logic Controller (PLC) and Data Table Access Module (DTAM) programming
- 2.1.7 Air system
- 2.1.8 Water system
- 2.1.9 PLC inputs and outputs
- 2.1.10 Alarms and interlocks
- 2.1.11 Heaters, air conditioner and lights

## **2.2 TERMS AND DEFINITIONS**

- 2.2.1 DOV - Diaphragm Operated Valve
- 2.2.2 GPM - Gallons Per Minute
- 2.2.3 IA - Instrument Air
- 2.2.4 LDE - Leak Detector Element
- 2.2.5 PRV - Pressure Relief Valve
- 2.2.6 SGT - Specific Gravity Transmitter
- 2.2.7 WFT - Weight Factor Transmitter
- 2.2.8 LT - Level Transmitter
- 2.2.9 WFIE - Weight Factor Instrument Enclosure
- 2.2.10 PLC - Programmable Logic Controller
- 2.2.11 DTAM - Data Table Access Module
- 2.2.12 PSPT - Pump Suction Pressure Transducer
- 2.2.13 PDPT - Pump Discharge Pressure Transducer
- 2.2.14 PXPT - Pump Transfer Pressure Transducer
- 2.2.15 JFPT - Jumper Flush Pressure Transducer
- 2.2.16 RFPT - Recirculation Flush Pressure Transducer
- 2.2.17 PIC - Person In Charge

## **2.3 RESPONSIBILITIES**

- 2.3.1 CHG Quality Assurance is responsible for:
  - 2.3.1.1 Witnessing and signing steps as identified in the Acceptance Test Procedure.
  - 2.3.1.2 Verifying that the ATP sections were performed correctly.
  - 2.3.1.3 Approving Exception resolution and exception closure.
- 2.3.2 Test Engineer (or representative) and/or PIC are responsible for:
  - 2.3.2.1 Identifying the equipment required for the ATP.
  - 2.3.2.2 Recording equipment status and data per this ATP.
  - 2.3.2.3 Conducting pre-job system walk-down.
  - 2.3.2.4 Recording data and other notes during the ATP performance.
  - 2.3.2.5 Providing technical support during the ATP.
  - 2.3.2.6 Providing PLC/DTAM programming support during the ATP.
  - 2.3.2.7 Acting as Test Director during the ATP.
  - 2.3.2.8 Approving Exception resolution and exception closure.

## 2.4 SAFETY

**Warning:** 120vac energized circuits and leads may be encountered during testing when accessing PLC input/output terminals. Observe appropriate electrical precautions as directed by RPP-PRO-088, Electrical Work Safety.

**Warning:** Cabinets on the PIC skid contain circuits energized with 480vac and 120vac. Comply with RPP-PRO-088, Electrical Work Safety.

## 2.5 QUALITY ASSURANCE

CHG Quality Assurance Inspector is to ensure that testing is performed per this ATP document. The Quality Assurance Inspector shall sign and date each ATP section verifying the data obtained and that the section was performed correctly.

## 2.6 GENERAL INFORMATION

- 2.6.1 All data entries recorded in this procedure shall be made in black or blue ink.
- 2.6.2 Editorial changes required to this ATP shall be made by redlining the affected section by the engineer as long as the changes do not impact the personnel safety or the technical aspects of this ATP. These changes shall be recorded on the ATP log sheet.
- 2.6.3 Unexpected results during testing shall be logged in the Acceptance Test Procedure "Exception Log" and documented on an Acceptance Test Procedure "Exception Record."
- 2.6.4 Technical changes to this ATP shall be logged as "Exceptions and documented on the "Exception Record."
- 2.6.5 Do not perform any part of this ATP on faulty equipment. If faulty equipment is discovered, STOP the execution of that section of the ATP and resolve the problem OR continue with another section until the problem is repaired.
- 2.6.6 If the performance of the ATP is suspended for any reason, ensure the equipment is left in a safe condition per the direction of the test engineer and/or PIC and any Lock and Tag system requirements are met before leaving the test site.
- 2.6.7 This ATP DOES NOT contain separate data/verification sheets. Verification of the ATP steps and validity of data is recorded in this ATP next to each step as required.
- 2.6.8 A Job Hazard Analysis for shall be used in conjunction with the Pre-job safety meeting form when any unusual hazards are identified. The Pre-job meeting form (attached to this ATP) shall be used to document all attendees. NOTE: No unusual hazards are expected during the performance of this ATP.
- 2.6.9 An ATP log shall be used to record comments concerning the ATP performance such as each day's testing activities.

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- 2.6.10 The engineer or PIC may deviate from test steps if necessary to ensure safe equipment configuration during testing or suspension of testing. Configuration shall be noted so the equipment may be restored at the resumption of testing.
- 2.6.11 Alarms may be acknowledged during testing at the direction of the test engineer or PIC if specific instructions are not given in the test steps.
- 2.6.12 Sections 4.2, 4.3, 4.4, 5.4 and 5.5 can be performed out of sequence in order to facilitate the completion of this ATP.
- 2.6.13 Sections 5.8 through 5.10 can be performed out of order as directed by the test engineer and/or PIC as necessary to facilitate ATP performance.
- 2.6.14 All personnel performing, initialing and/or signing this ATP shall enter their signature and initials on the Procedure Performer Signature Sheet on the last page of this document.

## **2.7 LIMITS AND PRECAUTIONS**

NONE

## **3.0 RECORDS**

### **3.1 RECORD COPY**

The record copy of this ATP when completed shall be kept with the fabrication work package.

### **3.2 TEST RESULTS**

A test report, RPP-6198 shall be issued with the final test results upon completion of this ATP.

#### 4.0 PREREQUISITES

##### 4.1 DRAWING VERIFICATION

A check of the constructed skid is to be compared to either the redlined drawings or the final unreleased skid drawings. Engineering shall verify the accuracy of the essential and support drawings. Engineering shall determine a resolution for all discrepancies by either correcting the drawings or changing the equipment.

The following drawings shall be walked down for verification of proper construction of the skid:

- 4.1.1 Wire terminations and wiring labels on drawings H-14-103812, sheets 7 through 12 and H-14-103815, sheet 5.
- 4.1.2 Panel board arrangement on drawing H-14-103818.
- 4.1.3 Flow diagram on drawing H-14-103817.

Drawing verification completed. (Final drawing release is not required to continue with this ATP.)

---

Engineer Signature

Date

##### 4.2 REDLINE INCORPORATION

- 4.2.1 \_\_\_\_\_ Ensure the relines identified on the construction drawings in the fabrication work package are incorporated on the final drawings for skid "T" prior to the drawings being released. NOTE: Redlines must meet the intent of the markups and may not be exactly the same in order to meet drafting standards or for clarity.
- 4.2.2 Engineer to verify the redline incorporation is completed by signing below.

---

Engineer Signature

Date

### 4.3 PRESSURE VESSEL INSPECTION

A pressure vessel inspection by a third party inspector is required for the air compressor receiver tank and relief valves located in the air compressor cabinet and the water tank and relief valves located in the water cabinet. The inspection is to verify that the equipment meets National Codes for pressure vessels. An outside-certified inspector shall perform this inspection. (This inspection shall be completed prior to testing the air compressor and water systems.)

Pressure vessel inspection report received. (The ATP can continue before the report is received, but must be received prior to performing sections 5.6 and 5.7.)

Report #'s: (Inspection #'s on tanks)

---

---

Engineer Signature

Date

Information has been supplied to the PMS database to add relief valve inspection for the air compressor and water tanks. Completion of the database update will be tracked by the Acceptance for Beneficial Use documentation.

---

Engineer Signature

Date

### 4.4 NATIONAL ELECTRICAL CODE (NEC) INSPECTION

- 4.4.1 An NEC inspection shall be performed to verify compliance to NFPA 70, latest version.
- 4.4.2 Areas in particular to be inspected are the 480vac and 120vac wiring and grounding.
- 4.4.3 An NEC inspection sticker is to be placed on the inside or the outside of the panel board door upon the NEC inspector's acceptance of the electrical portion of the skid.

The NEC inspection sticker is placed on the panel board door. (This needs to be completed prior to the section 5.0 functional checks.) Report # (from sticker) \_\_\_\_\_

---

Engineer Signature

Date

**4.5 SUPPLIES**

The following supplies are required for this ATP.

NOTE: Test sections may commence prior to assembly of all the test equipment. Engineer and/or PIC are to ensure test equipment is available prior to the start of each section.

4.5.1 Volt/ohm meter (VOM): Portable, 0-600vac

Calibration No. \_\_\_\_\_ Exp. Date \_\_\_\_\_ QA \_\_\_\_\_

Calibration No. \_\_\_\_\_ Exp. Date \_\_\_\_\_ QA \_\_\_\_\_

Calibration No. \_\_\_\_\_ Exp. Date \_\_\_\_\_ QA \_\_\_\_\_

4.5.2 Transmation current (milliamp) simulator or equivalent

Calibration No. \_\_\_\_\_ Exp. Date \_\_\_\_\_ QA \_\_\_\_\_

4.5.3 Manometer capable of a minimum of 5 inches water gauge to a maximum of 125 inches water gauge for this ATP and a read-out of variable test pressure.

Calibration No. \_\_\_\_\_ Exp. Date \_\_\_\_\_ QA \_\_\_\_\_

Calibration No. \_\_\_\_\_ Exp. Date \_\_\_\_\_ QA \_\_\_\_\_

Calibration No. \_\_\_\_\_ Exp. Date \_\_\_\_\_ QA \_\_\_\_\_

4.5.4 Megaohm meter, at least 500vac range.

Calibration No. \_\_\_\_\_ Exp. Date \_\_\_\_\_ QA \_\_\_\_\_

4.5.5 Temperature simulator capable of 100 to 150 degrees F.

Calibration No. \_\_\_\_\_ Exp. Date \_\_\_\_\_ QA \_\_\_\_\_

Calibration No. \_\_\_\_\_ Exp. Date \_\_\_\_\_ QA \_\_\_\_\_

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- 4.5.6 \_\_\_\_\_ 480vac, 3 phase, 30-ampere power supply for PIC skid.
- 4.5.7 \_\_\_\_\_ Selector switches (3 each) with at least one contact.
- 4.5.8 \_\_\_\_\_ Proximity switches (for simulating LS-1 and LS-2), 2 each.
- 4.5.9 \_\_\_\_\_ Leak detector probes (2 each) not required to be green tagged.
- 4.5.10 \_\_\_\_\_ Heat gun to warm thermocouple probes.
- 4.5.11 \_\_\_\_\_ Two thermocouple simulators for testing the thermocouples for the pump and jumper.
- 4.5.12 \_\_\_\_\_ Buckets or pans for water for leak detector test and catching water from DIP tubes and relief valves.
- 4.5.13 \_\_\_\_\_ Water supply and hose to fill water tank.
- 4.5.14 \_\_\_\_\_ Ice water or cold air spray to cool thermocouple probes.

#### 4.6 PRESTART CONDITIONS

- 4.6.1  Fill the water tank at least one-third to half full of water. Operate the appropriate valves in the water cabinet to accomplish this task.
- 4.6.2  Ensure the PIC skid is grounded in preparation for ATP testing.
- 4.6.3  Ensure the following PIC skid valves in the WFIE cabinet are OPEN prior to starting this ATP.

NOTE: All valves, electrical equipment and instruments are prefixed with "SALW".

V-6035T (EQUALIZING)  
 V-6036T (EQUALIZING)

- 4.6.4  Ensure the following PIC skid valves are CLOSED prior to starting this ATP.

##### Air Compressor Cabinet

V-6025T  
 V-6026T  
 V-6034T  
 V-6043T  
 V-6044T  
 V-6046T  
 V-6047T  
 V-6048T  
 V-6049T  
 V-6050T  
 V-6051T  
 V-6053T

##### Water Cabinet

V-6027T  
  
 V-6029T  
 V-6030T  
 V-6031T  
 V-6032T  
 V-6037T  
 V-6052T  
 V-6054T  
 V-6055T

##### WFIE Cabinet

V-6001T  
 V-6002T  
 V-6003T  
 V-6004T  
 V-6005T  
 V-6006T  
 V-6007T  
 V-6008T  
 V-6011T  
 V-6012T  
 V-6013T  
 V-6014T  
 V-6015T  
 V-6016T

V-6017T  
 V-6018T  
 V-6019T  
 V-6020T  
 V-6021T  
 V-6056T  
 V-6057T  
 V-6035T(LOW)  
 V-6035T(HIGH)  
 V-6036T(LOW)  
 V-6036T(HIGH)  
 V-6058T  
 V-6059T

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4.6.5 \_\_\_\_\_ Ensure the following PIC skid circuit disconnects, breakers and fuses are OPEN or OFF prior to starting this ATP.

\_\_\_\_\_ DS-6002T                      \_\_\_\_\_ DS-6003T  
\_\_\_\_\_ DS-6004T                      \_\_\_\_\_ DS-6005T

(The following breakers are located in distribution panel DP-6001T.)

\_\_\_\_\_ Breaker "MAIN"                      \_\_\_\_\_ Breaker 2  
\_\_\_\_\_ Breaker 1                                      \_\_\_\_\_ Breaker 4  
\_\_\_\_\_ Breaker 3                                      \_\_\_\_\_ Breaker 6  
\_\_\_\_\_ Breaker 5                                      \_\_\_\_\_ Breaker 8  
\_\_\_\_\_ Breaker 7                                      \_\_\_\_\_ Breaker 10  
\_\_\_\_\_ Breaker 9                                      \_\_\_\_\_ Breaker 12  
\_\_\_\_\_ Breaker 11                                     \_\_\_\_\_ Breaker 14  
\_\_\_\_\_ Breaker 13

(The following fuses are located in the Instrument Enclosure.)

\_\_\_\_\_ FA                                      \_\_\_\_\_ FB                                      \_\_\_\_\_ FC  
\_\_\_\_\_ FD                                      \_\_\_\_\_ LD                                      \_\_\_\_\_ HT

4.6.6 Check for loose electrical connections at the following locations:

- \_\_\_\_\_ Terminal boards in the Instrument Enclosure.
- \_\_\_\_\_ Motor starters and disconnect switches.
- \_\_\_\_\_ Terminal board in junction box inside the WFIE cabinet.
- \_\_\_\_\_ Terminal board in heat trace splice box outside WFIE cabinet.
- \_\_\_\_\_ Terminal board in junction box for FGM outside WFIE cabinet.
- \_\_\_\_\_ Distribution panel board.

4.6.7 \_\_\_\_\_ Ensure desiccant and filters are installed in the air compressor dryer and filters prior to performing sections 5.6 and 5.7.

4.6.8 \_\_\_\_\_ Ensure check valves in the air compressor and water cabinet are installed in the proper direction. Reference H-14-103810, sheets 1 and 2.

4.6.9 \_\_\_\_\_ A pre-job safety meeting shall be held prior to performing section 5.0. Attendees shall sign the Pre-job Brief Signature and Performer Signature pages at the back of this document.

## 5.0 PROCEDURE

### 5.1 CONTINUITY CHECKS

Continuity checks shall be performed with a calibrated VOM. Perform the checks as identified below. Readings are to be less than 1 ohm. Record ohm readings on the line(s) provided. Out of tolerance readings must be corrected and rechecked prior to going to the next section. NOTE: NEC inspection must be completed prior to proceeding with this section.

NOTE: All valves, electrical equipment and instruments labels are prefixed with "SALW".

- 5.1.1 480vac main power plug to the line side of the main disconnect switch (DS-6002T). Check all three phases and ground.

\_\_\_\_(RED) \_\_\_\_ (YELLOW) \_\_\_\_ (BLUE) \_\_\_\_ (GND)

- 5.1.2 Load side of main disconnect switch (DS-6002T) to the line side of transformer disconnect switch (DS-6003T). Check the two phases used and ground.

\_\_\_\_(RED) \_\_\_\_ (YELLOW OR BLUE) \_\_\_\_ (GND)

- 5.1.3 Load side of main disconnect switch (DS-6002T) to the line side of the jet pump motor starter (DS-6005T). Check all three phases and ground.

\_\_\_\_(RED) \_\_\_\_ (YELLOW) \_\_\_\_ (BLUE) \_\_\_\_ (GND)

- 5.1.4 Load side of main disconnect switch (DS-6002T) to the line side of the air compressor motor starter (DS-6004T). Check all three phases and ground.

\_\_\_\_(RED) \_\_\_\_ (YELLOW) \_\_\_\_ (BLUE) \_\_\_\_ (GND)

- 5.1.5 Load side of the transformer disconnect switch (DS-6003T) through the primary of the transformer (XFMR-6001T). Check between the two phase wires going to the transformer.

\_\_\_\_ Continuity through the transformer primary.

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5.1.6 Line side of the main breaker in panel board (DP-6001T) through the secondary of transformer (XFMR-6001T). Check between the two phases and between each phase and neutral going to the transformer secondary.

\_\_\_\_\_ Phase A to phase C, continuity through transformer secondary.

\_\_\_\_\_ Phase A to neutral, continuity through transformer secondary.

\_\_\_\_\_ Phase C to neutral, continuity through transformer secondary.

5.1.7 Load side of breakers in distribution panel (DP-6001T) to terminal point identified.

\_\_\_\_\_ Circuit 3 to TB10 in Instrument Enclosure (CKT3-H, CKT3-N)

\_\_\_\_\_ Circuit 5 to TB13 in Instrument Enclosure (CKT5H, CKT5N)

\_\_\_\_\_ Circuit 2 to TB10 in Instrument Enclosure (CKT2-H, CKT2-N)

\_\_\_\_\_ Circuit 12 to Air Conditioner/Heater receptacle in Instrument Enclosure

\_\_\_\_\_ Circuit 6 to safe side terminal block in Intrinsic Safe panel

\_\_\_\_\_ Circuit 1 to terminal block in FGM power junction box

\_\_\_\_\_ Circuit 11 to terminal block in FGM power junction box

\_\_\_\_\_ Circuit 13 to terminal block in FGM power junction box

\_\_\_\_\_ Circuit 14 to terminal block in FGM power junction box

\_\_\_\_\_ Circuit 10 to terminal block in FGM heat trace splice box

\_\_\_\_\_ Circuit 4 to receptacle in air compressor cabinet

\_\_\_\_\_ Circuit 7 to receptacles in WFIE cabinet

\_\_\_\_\_ Circuit 8 to receptacle in water cabinet

\_\_\_\_\_ Circuit 9 to outside receptacle below panel board

5.1.8 Section 5.1 completed and all recorded readings within tolerance.

---

Quality Assurance Inspector Signature

Date

## 5.2 MEGGERING OF POWER WIRES

The power wires shall be checked for resistance to ground and phase to phase. A 500-volt megger shall be used for this check. Minimum acceptable readings are greater than 1000 megaohm or infinity. Test the circuits listed below. Record readings on the lines provided. Out of tolerance readings must be corrected and rechecked prior to going to the next section.

- 5.2.1 Each of the three phases at the pins of the power plug to ground and phase to phase. (Ensure main disconnect DS-6002T is OPEN.)

A-GND\_\_\_\_; B-GND\_\_\_\_; C-GND\_\_\_\_; A-B\_\_\_\_; A-C\_\_\_\_;  
B-C\_\_\_\_\_

- 5.2.2 Each of the three phases at the load side of the main disconnect switch (DS-6002T) to ground and phase to phase. (Ensure switches DS-6003T, DS-6004T and DS-6005T are OPEN.)

A-GND\_\_\_\_; B-GND\_\_\_\_; C-GND\_\_\_\_; A-B\_\_\_\_; A-C\_\_\_\_;  
B-C\_\_\_\_\_

- 5.2.3 Each of the two phases on the load side of the transformer disconnect switch (DS-6003T) to ground.

A-GND\_\_\_\_; B-GND\_\_\_\_\_

- 5.2.4 Each of the three phases on the load side of the air compressor motor to ground.

A-GND\_\_\_\_; B-GND\_\_\_\_; C-GND\_\_\_\_\_

- 5.2.5 \_\_\_\_\_ Disconnect the neutral at the distribution panel from ground.

- 5.2.6 Each of the two phases and neutral to ground at the distribution panel.

A-GND\_\_\_\_; B-GND\_\_\_\_; NEUTRAL-GND\_\_\_\_\_

- 5.2.7 \_\_\_\_\_ Reconnect the neutral back to ground at the distribution panel.

- 5.2.8 \_\_\_\_\_ Disconnect the circuit 6 wire at the safe side terminal block in the Intrinsic Safe panel.

- 5.2.9 \_\_\_\_\_ Disconnect the circuit 5 wire at TB13 for the Instrument Enclosure light.

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- 5.2.10 \_\_\_\_\_ Ensure all the heaters, lights and air conditioner are disconnected or unplugged from the 120vac circuits. Ensure the fan thermostat switch in the air compressor cabinet is set high enough for the switch contacts to be open.
- 5.2.11 Megger each of the 14 circuits from the load side of the breaker or from the wire disconnected at the load side of the breaker to ground in the distribution panel.

NOTE: Disconnect each wire from the load side of the breaker on all the ground fault breakers prior to performing the megger check. This will prevent damage to the ground fault circuitry in the breaker. Reconnect the wire after meggering.

CKT #1 to GND _____	CKT #2 to GND _____
CKT #3 to GND _____	CKT #4 to GND _____
CKT #5 to GND _____	CKT #6 to GND _____
CKT #7 to GND _____	CKT #8 to GND _____
CKT #9 to GND _____	CKT #10 to GND _____
CKT #11 to GND _____	CKT #12 to GND _____
CKT #13 to GND _____	CKT #14 to GND _____

- 5.2.12 \_\_\_\_\_ Ensure the load-side wire at each breaker where disconnected is reconnected.
- 5.2.13 \_\_\_\_\_ Reconnect the circuit 6 wire to the safe side terminal block in the Intrinsic safe panel.
- 5.2.14 \_\_\_\_\_ Reconnect the circuit 5 wire at TB13 for the Instrument Enclosure light.
- 5.2.15 \_\_\_\_\_ Reconnect any wires disconnected in step 5.2.10 above. (Unplugged items do not have to be plugged back in.)
- 5.2.16 Section 5.2 completed and all recorded readings are within tolerance.

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### 5.3 ELECTRICAL POWER CHECKS

The voltage checks are to verify proper voltages throughout the skid at specific termination points. Voltages checked are 480vac, 3 phase; 120vac, single phase; 24vdc; and 32vdc. Out of tolerance readings must be corrected when found before going to the next step in this section.

5.3.1 \_\_\_\_\_ Ensure that all electrical connections are completed. Wires lifted during meggering checks are to be reconnected.

5.3.2 \_\_\_\_\_ Ensure all switches and breakers are open and the six fuses in the Instrument Enclosure are open.

5.3.3 \_\_\_\_\_ Ensure all the fuses are installed in the two safety switches (DS-6002T and DS-6003T) and motor starters (DS-6004T and DS-6005T) including the control transformer fuses.

5.3.4 \_\_\_\_\_ Connect the main power plug on the skid to a three phase, 480vac power source. Source is to be protected by no greater than a 30 ampere over current protection device.

5.3.5 \_\_\_\_\_ Turn ON the power source to the skid.

5.3.6 \_\_\_\_\_ Ensure 480vac +/-20vac on the line side of the main disconnect switch (DS-6002T). Record the voltage readings.

\_\_\_\_\_ vac, A-B                      \_\_\_\_\_ A-C                      \_\_\_\_\_ B-C

5.3.7 \_\_\_\_\_ Close the main disconnect switch (DS-6002T).

5.3.8 \_\_\_\_\_ Ensure 480vac +/-20vac on the line side of the transformer disconnect switch (DS-6003T). Record the voltage readings.

\_\_\_\_\_ vac

5.3.9 \_\_\_\_\_ Ensure 480vac +/-20vac on the line side of the air compressor motor starter (DS-6004T). Record the voltage readings.

\_\_\_\_\_ vac, A-B                      \_\_\_\_\_ vac, A-C                      \_\_\_\_\_ B-C

5.3.10 \_\_\_\_\_ Ensure 480vac +/-20vac on the line side of the pump motor starter (DS-6005T). Record the voltage readings.

\_\_\_\_\_ vac, A-B                      \_\_\_\_\_ vac, A-C                      \_\_\_\_\_ B-C

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- 5.3.11 \_\_\_\_\_ Ensure the dead front on the panel board (DP-6001T) is removed for access to the main breaker for a voltage measurement.
- 5.3.12 \_\_\_\_\_ Close the transformer disconnect switch (DS-6003T).
- 5.3.13 \_\_\_\_\_ Check for 240vac +/-20vac on the line side of the main breaker. Record the voltage reading.  
\_\_\_\_\_ vac
- 5.3.14 \_\_\_\_\_ Open the transformer disconnect switch (DS-6003T).
- 5.3.15 \_\_\_\_\_ Replace the dead front on the panel board (DP-6001T).
- 5.3.16 \_\_\_\_\_ Close the transformer disconnect switch (DS-6003T).
- 5.3.17 \_\_\_\_\_ Close the 100 ampere main breaker in the panel board (DP-6001T).
- 5.3.18 \_\_\_\_\_ Check the voltages for the circuits at the locations designated. Record the voltages in the space provided.

CKT #	Check voltage at	Bkr Open voltage (appr. 0vac)	Bkr Closed voltage (120 +/-10vac)	Open Bkr
1	FGM JUNCTION BOX			
2	TB10, INSTR ENCL			
3	TB10, INSTR ENCL			
4	RCPT, AIR COMPR			
5	TB13, INSTR ENCL			
6	TB, INTRINSIC PNL			
7	RCPT, WFIE CAB.			
8	RCPT, WATER CAB.			
9	OUTSIDE RCPT			
10	FGM HT BOX			
11	FGM JUNCTION BOX			
12	RCPT, INSTR ENCL			
13	FGM JUNCTION BOX			
14	FGM JUNCTION BOX			

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- 5.3.19 \_\_\_\_\_ Ensure fuses FA, FB, FC, FD, LD, and HT are installed in the fuseholders and the fuse switches are closed in the Instrument Enclosure.
- 5.3.20 \_\_\_\_\_ Close breakers 2, 3 and 5 in the distribution panel (DP-6001T).
- 5.3.21 \_\_\_\_\_ Ensure 120vac +/-10vac on the load side at the following fuseholders.  
FA \_\_\_\_\_ vac; FB \_\_\_\_\_ vac; FC \_\_\_\_\_ vac;  
FD \_\_\_\_\_ vac; (LD) \_\_\_\_\_ vac; (HT) \_\_\_\_\_ vac.
- 5.3.22 \_\_\_\_\_ Ensure 24vdc +/-2vdc at the 24volt power supply.  
\_\_\_\_\_ vdc.
- 5.3.23 \_\_\_\_\_ Close breaker 6 in the distribution panel (DP-6001T).
- 5.3.24 \_\_\_\_\_ Ensure 32vdc +/-4vdc at the output of the 3991 power supply in the Intrinsic safe panel (terminals 3 and 4). NOTE: Low voltage reading may indicate the 240/120vac input power switch on the side of the 3991 supply is in the wrong position.) \_\_\_\_\_ VDC
- 5.3.25 \_\_\_\_\_ Open breakers 2, 3, 5, and 6 in the panel board (DP-6001T).
- 5.3.26 \_\_\_\_\_ Open the 100 ampere main breaker in the panel board (DP-6001T).
- 5.3.27 \_\_\_\_\_ Open the transformer disconnect switch (DS-6003T).
- 5.3.28 \_\_\_\_\_ Open the main disconnect switch (DS-6002T).
- 5.3.29 Voltage checks completed and readings within tolerance.

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Quality Assurance Inspector Signature

Date

**5.4 CALIBRATIONS**

Instrumentation equipment on the skid requires calibration prior to the functional testing. Engineering will verify the calibration completion by checking for current calibration stickers on the equipment and checking off the completed calibrations in the table below.

INSTRUMENT	LOCATION	CAL. STICKER ON
SALW-PS-6004T	AIR COMPR. CABINET	
SALW-WFT-6002T	WFIE CABINET	
SALW-LT-6003T	WATER CABINET	
SALW-SGT-6001T	WFIE CABINET	
SALW-CONV-6001T	WFIE CABINET	
SALW-FQIT-6001T	INSTRUMENT ENCL.	
SALW-PI-6006T	AIR COMPR. CABINET	
SALW-PI-6007T	AIR COMPR. CABINET	
SALW-PI-6008T	WATER CABINET	
SALW-PI-6001T	WFIE CABINET	
SALW-PI-6002T	WFIE CABINET	
SALW-PI-6003T	WFIE CABINET	
SALW-PI-6004T	WFIE CABINET	
SALW-PI-6005T	WFIE CABINET	
SALW-PI-6011T	INSTRUMENT ENCL.	
SALW-PI-6012T	INSTRUMENT ENCL.	

Calibrations completed. Work package nos. \_\_\_\_\_

\_\_\_\_\_  
 Engineer Signature Date

**5.5 PLC/DTAM PROGRAMMING**

This section is where the programs for the PLC and DTAM will be entered into the equipment. Power will be required (circuit 5) at the Instrument enclosure to power up the PLC and DTAM and for the GFCI receptacle. Engineering will program the equipment from a laptop computer. Final software programs shall be documented as required by HNF-5034. This documentation is not part of this ATP, but will be documented after the OTP in a software report document.

PLC/DTAM programmed.

\_\_\_\_\_  
 Engineer Signature Date

## 5.6 SKID ELECTRICAL AND PROCESS AIR POWER-UP

NOTE: The pressure vessel inspection report must be received prior to proceeding with this section. Refer to section 4.3. Ensure desiccant is in the air dryer and the filters installed.

5.6.1  Ensure the skid is connected to the 480vac power source and grounded before proceeding with this functional test.

5.6.2  Energize or ensure energized the PIC skid by CLOSING the following disconnect switches in the order listed below.

DS-6002T  
 DS-6003T  
 DS-6004T  
 DS-6005T

5.6.3  Energize or ensure energized the breakers in the panel board (DP-6001T).

<input type="checkbox"/> Breaker "MAIN"	<input type="checkbox"/> Breaker 2
<input type="checkbox"/> Breaker 1	<input type="checkbox"/> Breaker 4
<input type="checkbox"/> Breaker 3	<input type="checkbox"/> Breaker 6
<input type="checkbox"/> Breaker 5	<input type="checkbox"/> Breaker 8
<input type="checkbox"/> Breaker 7	<input type="checkbox"/> Breaker 10
<input type="checkbox"/> Breaker 9	<input type="checkbox"/> Breaker 12
<input type="checkbox"/> Breaker 11	<input type="checkbox"/> Breaker 14
<input type="checkbox"/> Breaker 13	

5.6.4  ACKNOWLEDGE any initial skid alarms.

5.6.5  OPEN valves  V-6034T,  V-6050T, and  V-6053T in the Air compressor cabinet.

5.6.6  START the air compressor by positioning the positioning the switch on DS-6004T to the ON position.

5.6.7  Ensure the air compressor starts and builds up pressure and shuts off at 86 to 94 psig as indicated by pressure gauge PI-6006T. RECORD the shut off pressure: \_\_\_\_\_psig.

5.6.8  CHECK the tubing in the air compressor cabinet using a soap and water test to visually identify any air leaks. Repair as necessary. Deenergize the compressor motor and bleed off air as necessary to make repairs.

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- 5.6.9 \_\_\_\_\_ BLEED off air by slowly opening valve V-6043T until the compressor restarts and note the restart pressure as read on gauge PI-6006T. CLOSE valve V-6043T when the compressor restarts. RECORD the restart pressure reading: \_\_\_\_\_ psig.
- 5.6.10 \_\_\_\_\_ ENSURE the compressor restarts between 58 to 62 psig.
- 5.6.11 Valve in air to the PIC skid water tank by performing the following steps.
- 5.6.12 Check for air leaks as each of the remaining steps in this section are performed.
- 5.6.13 \_\_\_\_\_ SLOWLY OPEN valve V-6025T located in the air compressor cabinet.
- 5.6.14 \_\_\_\_\_ SLOWLY OPEN valve V-6027T located near the water tank.
- 5.6.15 \_\_\_\_\_ SLOWLY OPEN valve V-6052T located near the water tank
- 5.6.16 \_\_\_\_\_ ADJUST pressure regulator valve PCV-6006T to 30psi (+/-3psi) as indicated by pressure gauge PI-6008T on the outside of the water cabinet.  
\_\_\_\_\_ psi
- 5.6.17 \_\_\_\_\_ ACTUATE the lever on relief valve PRV-6004T on the top of the air compressor tank and hold open approximately 5 seconds. (Air system is to be at full pressure of approximately 90psi.)
- 5.6.18 \_\_\_\_\_ ENSURE the relief valve PRV-6004T seats properly when the lever is released.
- 5.6.19 \_\_\_\_\_ ACTUATE the lever on relief valve PRV-6005T on the top of the water tank and hold open approximately 5 seconds. (Water system air pressure is to be at full pressure of approximately 30psi.)
- 5.6.20 \_\_\_\_\_ ENSURE the relief valve PRV-6005T seats properly when the lever is released.
- 5.6.21 VALVE IN air to the WFIE cabinet by performing the following steps.
- 5.6.22 \_\_\_\_\_ SLOWLY OPEN valves \_\_\_\_\_ V-6051T located inside the air compressor cabinet and \_\_\_\_\_ V-6026T located on the outside of the air compressor cabinet.
- 5.6.23 \_\_\_\_\_ SLOWLY OPEN valve V-6001T located in the WFIE cabinet. (NOTE: PRV-6002T may open if pressure through PCV-6001T is too high.)

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- 5.6.24 \_\_\_\_\_ ADJUST pressure control valve PCV-6001T in the WFIE cabinet to 20psi (+/-2.5psi) as indicated by the pressure gauge located on the face of the valve.
- 5.6.25 \_\_\_\_\_ SLOWLY OPEN valve V-6004T located in the WFIE cabinet.
- 5.6.26 \_\_\_\_\_ SLOWLY OPEN valve V-6003T located in the WFIE cabinet.
- 5.6.27 \_\_\_\_\_ SLOWLY OPEN valve V-6005T located in the WFIE cabinet.
- 5.6.28 \_\_\_\_\_ SLOWLY OPEN valve V-6006T located in the WFIE cabinet.
- 5.6.29 \_\_\_\_\_ SLOWLY OPEN valve V-6007T located in the WFIE cabinet.
- 5.6.30 \_\_\_\_\_ SLOWLY OPEN valve V-6020T located in the WFIE cabinet.
- 5.6.31 \_\_\_\_\_ SLOWLY OPEN valve V-6021T located in the WFIE cabinet.
- 5.6.32 \_\_\_\_\_ SLOWLY OPEN valve V-6019T located in the WFIE cabinet.
- 5.6.33 ADJUST the air flow through the diptubes by performing the following steps.

NOTE: Ensure the DIP tubes are not capped on the outside of the WFIE cabinet when performing steps 5.6.34 through 5.6.36.

- 5.6.34 \_\_\_\_\_ ADJUST flow to dip tube to 1.5 CFH (+/-0.5 CFH) as indicated by FIV-6002T.
- 5.6.35 \_\_\_\_\_ ADJUST flow to dip tube to 1.5 CFH (+/-0.5 CFH) as indicated by FIV-6003T.
- 5.6.36 \_\_\_\_\_ ADJUST flow to dip tube to 1.5 CFH (+/-0.5 CFH) as indicated by FIV-6004T.
- 5.6.37 \_\_\_\_\_ ENSURE air flow from pressure regulator PCV-6007T by slowly opening valve V-6044T in the air compressor cabinet and then reclose the valve.
- 5.6.38 \_\_\_\_\_ ENSURE air flow from pressure regulator PCV-6008T by slowly opening valve V-6048T in the air compressor cabinet and then reclose the valve.
- 5.6.39 \_\_\_\_\_ ENSURE air flow from the V-6042T port at the air compressor cabinet by slowly opening valve V-6046T in the air compressor cabinet and then reclose the valve.

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5.6.40 \_\_\_\_\_ ENSURE air flow from the drain line by slowly opening valves V-6047T and V-6046T in the air compressor cabinet and then reclose the two valves.

5.6.41 Engineer to ENSURE section 5.6 is completed and sign below.

\_\_\_\_\_  
Engineer Signature

\_\_\_\_\_  
Date

5.6.42 Quality Assurance Inspector to VERIFY that section 5.6 is complete and sign below.

\_\_\_\_\_  
Quality Assurance Inspector Signature

\_\_\_\_\_  
Date

**5.7 SKID WATER DRIP SYSTEM**

- 5.7.1 \_\_\_\_\_ PROVIDE a container to capture water expelled from the dip tubes and the pressure relief valve PRV-6001T on the outside of the WFIE cabinet.
- 5.7.2 ACTUATE the Dip Tube Drip system by SLOWLY OPENING the following valves in the WFIE cabinet:
- \_\_\_\_\_ V-6016T
  - \_\_\_\_\_ V-6013T
  - \_\_\_\_\_ V-6008T

**CAUTION:** Relief valve PRV-6001T will actuate and relieve pressure at 25psig.

- 5.7.3 \_\_\_\_\_ SLOWLY OPEN V-6018T WHILE CAREFULLY ADJUSTING Pressure Regulator PCV-6005T located in the WFIE cabinet to 20psig (+/- 2psig) as indicated on gauge PI-6001T in the WFIE cabinet. \_\_\_\_\_ psig
- 5.7.4 \_\_\_\_\_ ADJUST valve V-6014T to allow approximately 2 drops/second as indicated by sight glass FG-6001T.
- 5.7.5 \_\_\_\_\_ ADJUST valve V-6015T to allow approximately 2 drops/second as indicated by sight glass FG-6002T.
- 5.7.6 \_\_\_\_\_ OPEN valve V-6056T very slightly to verify water flow from the "Water Supply to Remote Drip Control" port located on the outside of the WFIE cabinet, then CLOSE valve V-6056T when water is observed.
- 5.7.7 VALVE OUT the dip tube drip system by SLOWLY CLOSING or ENSURING CLOSED the following valves located in the WFIE cabinet.

- \_\_\_\_\_ V-6015T
- \_\_\_\_\_ V-6014T
- \_\_\_\_\_ V-6008T
- \_\_\_\_\_ V-6013T
- \_\_\_\_\_ V-6019T
- \_\_\_\_\_ V-6021T
- \_\_\_\_\_ V-6020T
- \_\_\_\_\_ V-6007T
- \_\_\_\_\_ V-6006T
- \_\_\_\_\_ V-6005T

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5.7.8 Engineer to ENSURE section 5.7 is completed and sign below.

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Engineer Signature

Date

5.7.9 Quality Assurance Inspector to VERIFY that section 5.7 is complete and sign below.

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Quality Assurance Inspector Signature

Date

## 5.8 INPUT SIGNALS TO THE PLC AND DTAM

- 5.8.1 \_\_\_\_\_ ENSURE the two leak detector probes are connected to the skid at the Instrument Enclosure.
- 5.8.2 \_\_\_\_\_ ENSURE a normally closed switch is connected to "CGM-AX" and "CKT5H-A" on terminal board TB4 in the Instrument Enclosure. (Can leave existing wires connected.)
- 5.8.3 \_\_\_\_\_ ENSURE a normally closed switch is connected to "CGM-F" and "CKT5H-A" on terminal board TB4 in the Instrument Enclosure. (Can leave existing wires connected.)
- 5.8.4 \_\_\_\_\_ ENSURE a normally closed switch is connected to "DIL-F" and "CKT5H-A" on terminal board TB4 in the Instrument Enclosure.
- 5.8.5 \_\_\_\_\_ ENSURE two proximity switches are connected to the intrinsic safe terminal block in the Intrinsic Safe panel. Connect a normally closed proximity switch temporarily labeled as LS-1 to "LS-1(+)" and "LS-1(-)" and a normally open proximity switch temporarily labeled as LS-2 to "LS-2(+)" and "LS-2(-)". ACTUATE the proximity switches by placing metal in front the switch faces.
- 5.8.6 \_\_\_\_\_ ENSURE the DIP switches for the Pepperl-Fuch module in the Intrinsic Safe panel are set to the correct positions: S1 and S2 in position II; and S3 in position I.

## WATER TANK LEVEL TRANSMITTER

- 5.8.7 \_\_\_\_\_ ENSURE valve V-6029T located in the water tank cabinet is CLOSED.
- 5.8.8 \_\_\_\_\_ ENSURE valve V-6031T located in the water cabinet is CLOSED.
- 5.8.9 \_\_\_\_\_ CONNECT a test manometer pressure source that can output at least 62" water gauge to the HIGH PRESSURE vent/test port of level transmitter LT-6003T.
- 5.8.10 \_\_\_\_\_ ENSURE the LOW PRESSURE vent/test port of level transmitter LT-6003T is OPEN to atmosphere.
- 5.8.11 \_\_\_\_\_ ADJUST the test manometer connected to LT-6003T to a pressure of 31" water gauge (+/-1"). Record reading \_\_\_\_\_

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- 5.8.12 \_\_\_\_\_ RECORD the water tank level reading on the DTAM. \_\_\_\_\_ 31"  
(+/-2")
- 5.8.13 The next step will cause a low water level alarm on the DTAM.
- 5.8.14 \_\_\_\_\_ VERY SLOWLY DECREASE the test manometer pressure until the  
"PIC WATER LEVEL LOW" (alarm 9) occurs on the DTAM. (This alarm  
should occur at 12.25" +/-0.5" water gauge.)
- 5.8.15 \_\_\_\_\_ ACKNOWLEDGE the alarm at the DTAM.
- 5.8.16 \_\_\_\_\_ RECORD the manometer pressure and the DTAM water level readings.  
Pressure on manometer \_\_\_\_\_ Water Level on DTAM \_\_\_\_\_
- 5.8.17 \_\_\_\_\_ SLOWLY INCREASE the manometer pressure until the alarm clears  
on the DTAM. (This should occur at 15.5" +/-0.5" water gauge.)
- 5.8.18 \_\_\_\_\_ RECORD the manometer pressure and the DTAM water level readings.  
Pressure on manometer \_\_\_\_\_ Water Level on DTAM \_\_\_\_\_
- 5.8.19 \_\_\_\_\_ ENSURE the "PIC Water" alarm indicates "norm".
- 5.8.20 \_\_\_\_\_ REMOVE the test manometer from the LT-6003T high pressure  
vent/test port and reinstall the vent plugs on both the high and low sides.
- 5.8.21 \_\_\_\_\_ OPEN valve V-6029T located in the Water Cabinet.
- 5.8.22 \_\_\_\_\_ OPEN valve V-6031T located in the Water Cabinet.
- 5.8.23 \_\_\_\_\_ ENSURE "Water Tank" reading on the DTAM shows a value in inches.  
Record the reading \_\_\_\_\_

**WEIGHT FACTOR TEST**

- 5.8.24 \_\_\_\_\_ CONNECT a test manometer pressure source that can output at least  
125" water gauge to the HIGH PRESSURE dip tube on the side of the WFIE  
Cabinet.
- 5.8.25 \_\_\_\_\_ ENSURE V-6001T is CLOSED.
- 5.8.26 \_\_\_\_\_ ENSURE V-6005T is OPEN.

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- 5.8.27 \_\_\_\_\_ ENSURE V-6006T is OPEN.
- 5.8.28 \_\_\_\_\_ ENSURE adjustment valves on FIV-6002T, FIV-6003T and FIV-6004T are CLOSED.
- 5.8.29 \_\_\_\_\_ ENSURE the LOW and HIGH side isolation valves located on the V-6036T 3-Valve manifold in the WFIE cabinet are OPEN.
- 5.8.30 \_\_\_\_\_ ENSURE the EQUALIZING valve located on the V-6036T 3-Valve manifold in the WFIE cabinet is CLOSED.
- 5.8.31 \_\_\_\_\_ SET the test manometer to 125" (+/-1") water gauge. Record the manometer reading. \_\_\_\_\_
- 5.8.32 \_\_\_\_\_ RECORD the "WFT" reading on the DTAM. The reading is to be 125" (+/- 5"). \_\_\_\_\_
- 5.8.33 \_\_\_\_\_ BLEED off the pressure on the test manometer. Leave connected for testing the specific gravity transmitter.
- 5.8.34 \_\_\_\_\_ CLOSE V-6006T.
- 5.8.35 \_\_\_\_\_ OPEN the EQUALIZING valve located on V-6036T 3-Valve manifold in the WFIE cabinet.
- 5.8.36 \_\_\_\_\_ CLOSE the LOW and HIGH side isolation valves located on the V-6036T 3-Valve manifold in the WFIE cabinet.

**SPECIFIC GRAVITY TRANSMITTER**

- 5.8.37 \_\_\_\_\_ ENSURE V-6007T is OPEN.
- 5.8.38 \_\_\_\_\_ ENSURE V-6005T is OPEN.
- 5.8.39 \_\_\_\_\_ ENSURE the LOW and HIGH side isolation valves located on V-6035T 3-Valve manifold in the WFIE cabinet are OPEN.
- 5.8.40 \_\_\_\_\_ ENSURE the specific gravity transmitter equalizing valve located on the V-6035T 3-Valve manifold located in the WFIE cabinet is CLOSED.
- 5.8.41 \_\_\_\_\_ SET the test manometer to 5" water gauge (+/- 0.3"). \_\_\_\_\_
- 5.8.42 \_\_\_\_\_ RECORD the "SGT" reading on the DTAM. Reading to be 5" +/- 0.35". \_\_\_\_\_

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- 5.8.43 \_\_\_\_\_ BLEED off pressure on the manometer.
- 5.8.44 \_\_\_\_\_ ENSURE "SGT LOW" alarm occurs (alarm 13).
- 5.8.45 \_\_\_\_\_ ACKNOWLEDGE the alarm.
- 5.8.46 \_\_\_\_\_ DISCONNECT the test manometer.
- 5.8.47 \_\_\_\_\_ CLOSE V-6007T.
- 5.8.48 \_\_\_\_\_ CLOSE V-6005T.
- 5.8.49 \_\_\_\_\_ OPEN the EQUALIZING valve located on V-6035T 3-Valve manifold in the WFIE cabinet.
- 5.8.50 \_\_\_\_\_ CLOSE the LOW side and HIGH side isolation valves located on V-6035T 3-Valve manifold in the WFIE cabinet.

**FLOW METER SIGNAL CHECK**

- 5.8.51 \_\_\_\_\_ Prepare the flow converter FQIT-6001T located in the Instrument Enclosure to simulate a flow either using the buttons on the front face or using a "brain terminal".
- 5.8.52 \_\_\_\_\_ SIMULATE a flow signal of 50% (4 or 7gpm) with the hand-held brain terminal or from the flow converter face switches.
- 5.8.53 \_\_\_\_\_ RECORD the flow readings on the front of the flow converter and on the DTAM (PMP FLOW). Readings to be +/- 0.1gpm of each other.

Flow converter \_\_\_\_\_ DTAM (PMP FLOW) \_\_\_\_\_

- 5.8.54 \_\_\_\_\_ RESTORE the flow converter, FQIT-6001T to its original configuration.

**SUCTION AND DISCHARGE PRESSURE SIGNAL**

- 5.8.55 \_\_\_\_\_ ENSURE a current source is connected to PSPT+ and PSPT- on the intrinsic side terminal board in the Intrinsic Safe panel. Set the source to “transmitter simulate.”
- 5.8.56 \_\_\_\_\_ SET the current source to approximately 4mA and record the suction pressure reading on PI-6012T. Reading to be approximately zero.  
\_\_\_\_\_ psi
- 5.8.57 \_\_\_\_\_ SET the current source to approximately 20mA and record the suction pressure reading on PI-6012T. Reading to be approximately 100psi.  
\_\_\_\_\_ psi
- 5.8.58 \_\_\_\_\_ DISCONNECT the current source.
- 5.8.59 \_\_\_\_\_ ENSURE a current source is connected to PDPT+ and PDPT- at the intrinsic side terminal board in the Intrinsic Safe panel. Set the source to transmitter simulate.
- 5.8.60 \_\_\_\_\_ SET the current source to approximately 4mA and record the discharge pressures on PI-6011T and on the DTAM. Readings should be approximately zero.  
PI-6011T \_\_\_\_\_ psi    DTAM (PMP DISC) \_\_\_\_\_ psi
- 5.8.61 \_\_\_\_\_ SET the current source to approximately 20mA and record the discharge pressures on PI-6011T and on the DTAM. Readings should be approximately 300psi.  
PI-6011T \_\_\_\_\_ psi    DTAM (PMP DISC) \_\_\_\_\_ psi
- 5.8.62 \_\_\_\_\_ DISCONNECT the current source.

**COMBUSTIBLE GAS MONITOR ANALOG SIGNAL TO PLC**

- 5.8.63 \_\_\_\_\_ ENSURE a current source is connected to the CGM loop by lifting the CGM 0(+) wire going to the CGM transmitter at terminal board TB1 in the Instrument Enclosure, and connecting the current source between CGM 0(+) and CGM 0(-) at TB1.
- 5.8.64 \_\_\_\_\_ SET the current source to approximately 4mA.

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- 5.8.65 \_\_\_\_ RECORD the "CGM" percent reading from the DTAM. Reading is to be approximately zero. \_\_\_\_\_%
- 5.8.66 \_\_\_\_ SET the current source to approximately 12mA.
- 5.8.67 \_\_\_\_ RECORD the "CGM" percent reading from the DTAM. Reading is to be approximately 50%. \_\_\_\_\_%
- 5.8.68 \_\_\_\_ SET the current source to approximately 20mA.
- 5.8.69 \_\_\_\_ RECORD the "CGM" percent reading from the DTAM. Reading is to be approximately 100%. \_\_\_\_\_%
- 5.8.70 \_\_\_\_ DISCONNECT the current source and reconnect the CGM 0(+) wire to TB1.

**DOMESTIC SPACE FLAMMABLE GAS MONITOR ANALOG SIGNAL TO PLC**

- 5.8.71 \_\_\_\_ ENSURE a current source is connected to terminal board TB1 in the Instrument Enclosure, points FGM 1(+) and FGM 1(-)
- 5.8.72 \_\_\_\_ SET the current source to approximately 4mA.
- 5.8.73 \_\_\_\_ RECORD the "FGM" percent reading from the DTAM. Reading is to be approximately zero. \_\_\_\_\_%
- 5.8.74 \_\_\_\_ SET the current source to approximately 12mA.
- 5.8.75 \_\_\_\_ RECORD the "FGM" percent reading from the DTAM. Reading is to be approximately 50%. \_\_\_\_\_%
- 5.8.76 \_\_\_\_ SET the current source to approximately 20mA.
- 5.8.77 \_\_\_\_ RECORD the "FGM" percent reading from the DTAM. Reading is to be approximately 100%. \_\_\_\_\_%
- 5.8.78 \_\_\_\_ DISCONNECT the current source.

**THERMOCOUPLE INPUTS TO THE PLC**

- 5.8.79 \_\_\_\_ WARM thermocouple TE-6004T located in the Instrument Enclosure.

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- 5.8.80 \_\_\_\_\_ ENSURE the “PLC CAB temp” on the DTAM displays a temperature change.
- 5.8.81 \_\_\_\_\_ CONTINUE to warm the thermocouple until “PLC Enclosure HI” (alarm 10) occurs. This will be approximately 130 degrees F.
- 5.8.82 \_\_\_\_\_ ACKNOWLEDGE the alarm.
- 5.8.83 \_\_\_\_\_ ENSURE “PLC CAB temp” on the DTAM shows a temperature DECREASE after the heat source is removed from the TE-6004T thermocouple.
- 5.8.84 \_\_\_\_\_ ENSURE the “PLC temp” alarm returns to “norm” when the temperature decreases below 125 degrees F.
- 5.8.85 \_\_\_\_\_ WARM thermocouple TE-6001T located in the Air Compressor Cabinet.
- 5.8.86 \_\_\_\_\_ ENSURE the “COMPRS temp” on the DTAM displays a temperature change.
- 5.8.87 \_\_\_\_\_ CONTINUE to warm the thermocouple until “Air Compressor Temp HI” (alarm 11) occurs. This will be approximately 130 degrees F.
- 5.8.88 \_\_\_\_\_ ACKNOWLEDGE the alarm.
- 5.8.89 \_\_\_\_\_ ENSURE “COMPRS temp” on the DTAM shows a temperature DECREASE after the heat source is removed from the TE-6003T thermocouple.
- 5.8.90 \_\_\_\_\_ ENSURE the “COMPRS temp” alarm returns to “norm” when the temperature decreases below 125 degrees F.
- 5.8.91 \_\_\_\_\_ COOL the thermocouple probe in the WFIE cabinet using ice water or cool air spray. Temperature needs to drop below 35 degrees F.
- 5.8.92 \_\_\_\_\_ ENSURE alarm 50, “WFIE CAB Temp Low” occurs at the DTAM.
- 5.8.93 \_\_\_\_\_ WARM or ALLOW to warm the thermocouple probe in the WFIE cabinet and ENSURE the “WFIE CAB Temp” alarm is “norm” when the temperature goes above 40 degrees F.
- 5.8.94 \_\_\_\_\_ COOL the thermocouple probe in the Water cabinet using ice water or cool air spray. Temperature needs to drop below 35 degrees F.
- 5.8.95 \_\_\_\_\_ ENSURE alarm 49, “WATER CAB Temp Low” occurs at the DTAM.

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- 5.8.96 \_\_\_\_\_ WARM or ALLOW to warm the thermocouple probe in the Water cabinet and ENSURE the "WATER CAB Temp" alarm is "norm" when the temperature goes above 40 degrees F.
- 5.8.97 \_\_\_\_\_ CONNECT two temperature simulators to the intrinsic side of the two thermocouple modules (MTL 3081) in the Intrinsic Safe panel.
- 5.8.98 \_\_\_\_\_ SET the motor temperature alarm setpoints at the DTAM to 125 degrees F for the high and 135 degrees F for the high high. NOTE: The security code is 11 for the restricted screen for entry.
- 5.8.99 \_\_\_\_\_ SET both temperature simulators to approximately 120 degrees F.
- 5.8.100 \_\_\_\_\_ ENSURE the "PUMP temp" and the "JMPER TEMP" each read approximately 120 degree at the DTAM. \_\_\_\_\_ (Pump) \_\_\_\_\_ (Jumper)
- 5.8.101 \_\_\_\_\_ ENSURE the "Jmp Htr" is ON at the DTAM.
- 5.8.102 \_\_\_\_\_ DECREASE the temperature simulator on the top module to approximately 39 degrees or lower until alarm 8 "Pump/Jumper Temp Trouble" alarms on the DTAM.
- 5.8.103 \_\_\_\_\_ ACKNOWLEDGE the alarm.
- 5.8.104 \_\_\_\_\_ ENSURE the "PUMP TEMP" reads approximately 39 degree at the DTAM. \_\_\_\_\_
- 5.8.105 \_\_\_\_\_ INCREASE the temperature simulator on the top module to approximately 120 degrees. \_\_\_\_\_
- 5.8.106 \_\_\_\_\_ ENSURE the "JMPR HT" alarm on the DTAM reads "norm".
- 5.8.107 \_\_\_\_\_ ENSURE the "Jmp Htr" is ON at the DTAM.
- 5.8.108 \_\_\_\_\_ ENSURE the switches installed on TB4 between points "CGM-AX" and "CKT5H-A"; and "CGM-F" and "CKT5H-A" are in the CLOSED position.
- 5.8.109 \_\_\_\_\_ ENSURE approximately 120vac between HT-1 and CKT3-N at TB12.  
\_\_\_\_\_ vac
- 5.8.110 \_\_\_\_\_ WHILE MONITORING the voltage at TB12, INCREASE the temperature on the second module to 206 degrees F or higher until the voltage at TB12 goes to approximately zero. DTAM temp. \_\_\_\_\_

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- 5.8.111 \_\_\_\_\_ WHILE MONITORING the voltage at TB12, decrease the temperature on the second module to 194 degrees F or lower until the voltage at TB12 goes to approximately 120vac. DTAM temp. \_\_\_\_\_
- 5.8.112 \_\_\_\_\_ OPEN the switch on TB4 that is across “CGM-AX” and “CKT5H-A”.
- 5.8.113 \_\_\_\_\_ ENSURE alarm “25” occurs and ACKNOWLEDGE.
- 5.8.114 \_\_\_\_\_ ENSURE the voltage at TB12 goes to approximately zero.
- 5.8.115 \_\_\_\_\_ CLOSE the switch on TB4 that is across “CGM-AX” and “CKT5H-A”.
- 5.8.116 \_\_\_\_\_ ENSURE the voltage at TB12 returns to approximately 120vac.
- 5.8.117 \_\_\_\_\_ OPEN the switch on TB4 that is across “CGM-F” and “CKT5H-A”.
- 5.8.118 \_\_\_\_\_ ENSURE alarm “31” occurs and ACKNOWLEDGE.
- 5.8.119 \_\_\_\_\_ ENSURE the voltage at TB12 goes to approximately zero.
- 5.8.120 \_\_\_\_\_ CLOSE the switch on TB4 that is across “CGM-F” and “CKT5H-A”.
- 5.8.121 \_\_\_\_\_ ENSURE the voltage at TB12 returns to approximately 120vac.
- 5.8.122 \_\_\_\_\_ TURN OFF the heat trace from the DTAM.
- 5.8.123 \_\_\_\_\_ ENSURE the voltage at TB12 goes to approximately zero.
- 5.8.124 \_\_\_\_\_ TURN ON the heat trace from the DTAM.
- 5.8.125 \_\_\_\_\_ ENSURE the voltage at TB12 returns to approximately 120vac.
- 5.8.126 \_\_\_\_\_ INCREASE the temperature simulator on the second module to approximately 226 degrees or higher until alarm 8 “Pump/Jumper Temp Trouble” alarms on the DTAM.
- 5.8.127 \_\_\_\_\_ ACKNOWLEDGE the alarm.
- 5.8.128 \_\_\_\_\_ DECREASE the temperature simulator on the second module to less than 225 degrees.
- 5.8.129 \_\_\_\_\_ ENSURE the “JMPR HT” alarm 8 returns to “norm” on the DTAM.
- 5.8.130 \_\_\_\_\_ REMOVE the temperature simulator from the bottom module, but leave the top temperature simulator connected for the interlock checks in section 5.9.



## 5.9 JET PUMP INTERLOCK CIRCUITS

- 5.9.1 \_\_\_\_\_ ENSURE the LS-1 and LS-2 proximity switches at the Intrinsic safe panel; the two leak detector probes; the two CGM, the Dilution, and the AX101 switches at TB4 in the Instrument Enclosure are in place as per steps 5.8.1 to 5.8.6.
- 5.9.2 \_\_\_\_\_ IF POSSIBLE, CONNECT three current sources to the following points. One to JFPT+ and JFPT- in the Intrinsic Safe panel at the intrinsic terminal board; one to RFPT+ and RFPT- in the Instrument Enclosure at TB2; and one to PXPT+ and PXPT- at the intrinsic terminal board in the Intrinsic safe panel. Set the current sources to "transmitter simulate" and at 6mA.  
NOTE: If three current sources are not available, then software forces will be used during this section to bypass the inputs not being tested.
- 5.9.3 \_\_\_\_\_ SET the temperature simulator at the Intrinsic Safe panel to 120 degrees F.
- 5.9.4 \_\_\_\_\_ ENSURE the temperature setpoint for the motor-bearing temperature high-alarm is set to 125 degrees F and the high-high-alarm is set to 135 degrees F.
- 5.9.5 \_\_\_\_\_ ENSURE the laptop computer is connected to the PLC to set forces and observe logic when required.
- 5.9.6 \_\_\_\_\_ RECORD the reading of the Hourmeter on the front of the Instrument Enclosure. \_\_\_\_\_

### RECIRCULATION FLUSH PRESSURE SIGNAL TO PLC

- 5.9.7 \_\_\_\_\_ ENSURE a current source is connected to points RFPT+ and RFPT- in the Instrument Enclosure at TB2 and is set to approximately 6mA.
- 5.9.8 \_\_\_\_\_ ENSURE the green light on the Instrument Enclosure and on the Jet Pump motor starter are ON.
- 5.9.9 \_\_\_\_\_ APPLY software forces to allow the jet pump to start. (Engineering will apply the forces from the laptop computer connected to the PLC. Normally this will be the COMM Failure and any leak station interlocks. These can be forced out by setting the timers to a high set value such as 7200 seconds with the laptop on-line. If the timers need to be reset to start counting, this is done by turning the key switch on the PLC from "RUN" to "PROGRAM" and then back to "RUN".)
- 5.9.10 \_\_\_\_\_ TURN the selector switch on the Jet Pump Motor Starter to ON.

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- 5.9.11 \_\_\_\_\_ START the jet pump from the DTAM and OBSERVE that the red lights at the Instrument Enclosure and motor starter come ON and the green lights at both locations turn OFF.
- 5.9.12 \_\_\_\_\_ SLOWLY INCREASE the current source output to approximately 12.5mA or until the pump shuts down after a 3 second delay. OBSERVE the following: (Acknowledge the alarms as necessary to observe all the alarms.)  
NOTE: The horn sound can be adjusted by turning the set screw on the front of the horn for sound level as directed by the engineer or PIC.
- \_\_\_\_\_ Record current reading on current source. \_\_\_\_\_ mA  
\_\_\_\_\_ The strobe light flashes and the horn sounds.  
\_\_\_\_\_ Alarm 12 occurs, "JET PUMP SHUTDOWN".  
\_\_\_\_\_ Alarm 39 occurs, "RECIRC FLUSH PRESS HI".  
\_\_\_\_\_ Red lights at the motor starter and Instrument Enclosure are OFF.  
\_\_\_\_\_ Green lights at the motor starter and Instrument Enclosure are ON.  
\_\_\_\_\_ The "RECR FL PR" is approximately 15psi. \_\_\_\_\_ psi  
\_\_\_\_\_ Ensure addresses N20:32/2 and N20:32/6 are actuated as observed on the laptop computer in ladder 5.
- 5.9.13 \_\_\_\_\_ DECREASE the current source to approximately 4mA.
- 5.9.14 \_\_\_\_\_ ENSURE the "Recirc Press" alarm at the DTAM returns to "norm".
- 5.9.15 \_\_\_\_\_ ENSURE address N20:32/6 clears as observed on the laptop.
- 5.9.16 \_\_\_\_\_ START the jet pump from the DTAM and OBSERVE that the red lights at the Instrument Enclosure and motor starter come ON and the green lights at both locations turn OFF.
- 5.9.17 \_\_\_\_\_ DECREASE the current source to zero.
- 5.9.18 \_\_\_\_\_ ENSURE the jet pump shuts down.
- 5.9.19 \_\_\_\_\_ ENSURE alarm 14, "RFPT SIGNAL LOSS ALARM" occurs.
- 5.9.20 \_\_\_\_\_ ACKNOWLEDGE the alarm.
- 5.9.21 \_\_\_\_\_ ENSURE address N20:32/7 is actuated as observed on the laptop.
- 5.9.22 \_\_\_\_\_ INCREASE the current source to approximately 6mA.
- 5.9.23 \_\_\_\_\_ ENSURE the "RFPT SIGNAL" alarm returns to "norm" on the DTAM.
- 5.9.24 \_\_\_\_\_ ENSURE address N20:32/7 clears as observed on the laptop.

## JUMPER FLUSH PRESSURE SIGNAL TO PLC

- 5.9.25 \_\_\_\_\_ ENSURE a current source is connected to points JFPT+ and JFPT- in the Intrinsic Safe panel intrinsic terminal board and is set to approximately 6mA.
- 5.9.26 \_\_\_\_\_ ENSURE the green light on the Instrument Enclosure and on the Jet Pump motor starter are ON.
- 5.9.27 \_\_\_\_\_ APPLY software forces as necessary to allow the jet pump to start. (Engineering will apply the forces from the laptop computer connected to the PLC.)
- 5.9.28 \_\_\_\_\_ START the jet pump from the DTAM and OBSERVE that the red lights at the Instrument Enclosure and motor starter come ON and the green lights at both locations turn OFF.
- 5.9.29 \_\_\_\_\_ ENSURE address N20:32/2 is clear as observed on the laptop.
- 5.9.30 \_\_\_\_\_ SLOWLY INCREASE the current source output to approximately 12.5mA or until the pump shuts down after a 3 second delay. OBSERVE the following: (Acknowledge the alarms as necessary to observe all the alarms.)
- \_\_\_\_\_ The jet pump shuts down.
  - \_\_\_\_\_ Record current reading on current source. \_\_\_\_\_ mA
  - \_\_\_\_\_ Alarm 3 occurs, "Flush Pressure HI".
  - \_\_\_\_\_ Alarm 12 occurs, "JET PUMP SHUTDOWN".
  - \_\_\_\_\_ Blue light at the Instrument Enclosure is ON.
  - \_\_\_\_\_ The "PS2 FL PR" is approximately 15psi. \_\_\_\_\_ psi
  - \_\_\_\_\_ Ensure address N20:32/5 is actuated as observed on the laptop.
- 5.9.31 \_\_\_\_\_ DECREASE the current source to approximately 4mA.
- 5.9.32 \_\_\_\_\_ ENSURE the "Flush Press" alarm at the DTAM returns to "norm".
- 5.9.33 \_\_\_\_\_ ENSURE the blue light at the Instrument Enclosure turns OFF.
- 5.9.34 \_\_\_\_\_ ENSURE address N20:32/5 clears as observed on the laptop.
- 5.9.35 \_\_\_\_\_ START the jet pump from the DTAM.
- 5.9.36 \_\_\_\_\_ DECREASE the current source to zero.
- 5.9.37 \_\_\_\_\_ ENSURE the jet pump shuts down.
- 5.9.38 \_\_\_\_\_ ENSURE alarm 16, "JFPT SIGNAL LOSS ALARM" occurs.

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- 5.9.39 \_\_\_\_\_ ACKNOWLEDGE the alarm.
- 5.9.40 \_\_\_\_\_ ENSURE address N20:32/8 actuates as observed on the laptop.
- 5.9.41 \_\_\_\_\_ INCREASE the current source to approximately 6mA.
- 5.9.42 \_\_\_\_\_ ENSURE the “JFPT SIGNAL” alarm returns to “norm” on the DTAM.
- 5.9.43 \_\_\_\_\_ ENSURE address N20:32/8 clears as observed on the laptop.

**TRANSFER PRESSURE INTERLOCK INPUT**

- 5.9.44 \_\_\_\_\_ ENSURE a current source is connected to points PXPT+ and PXPT- in the Intrinsic Safe panel intrinsic terminal board and is set to approximately 6mA.
- 5.9.45 \_\_\_\_\_ ENSURE the laptop computer is connected to the PLC and is “on-line”.
- 5.9.46 \_\_\_\_\_ ENSURE the green light on the Instrument Enclosure and on the Jet Pump motor starter are ON.
- 5.9.47 \_\_\_\_\_ APPLY software forces to allow the jet pump to start. (Engineering will apply the forces from the laptop computer connected to the PLC.)
- 5.9.48 \_\_\_\_\_ START the jet pump from the DTAM.
- 5.9.49 \_\_\_\_\_ DECREASE the current source to approximately 4.8mA or until Timer 4.1 on the ladder logic of the PLC (rung 0 of ladder 5) starts timing.
- 5.9.50 \_\_\_\_\_ ENSURE the amber light on the Instrument Enclosure turns ON immediately after the timer starts.
- 5.9.51 \_\_\_\_\_ ENSURE after 30 seconds, the following occurs: (Acknowledge alarms as necessary to view all the alarms.)
  - \_\_\_\_\_ The jet pump shuts down.
  - \_\_\_\_\_ “XFR Pressure LOW” (alarm 1) occurs at the DTAM.
  - \_\_\_\_\_ “JET PUMP SHUTDOWN” (alarm12) occurs at the DTAM.
- 5.9.52 \_\_\_\_\_ INCREASE the current source to approximately 6mA.
- 5.9.53 \_\_\_\_\_ ENSURE the “XFR Pressure” alarm is “norm” on the DTAM and the amber light is OFF on the Instrument Enclosure.
- 5.9.54 \_\_\_\_\_ START the pump from the DTAM.

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5.9.55 \_\_\_\_\_ INCREASE the current source to approximately 11.5mA or until Timer 4.2 on rung 2 of ladder 5 starts timing as observed on the laptop computer.

5.9.56 \_\_\_\_\_ ENSURE after a 3 second delay, the following occurs: (Acknowledge alarms as necessary to view all the alarms.)

\_\_\_\_\_ The jet pump shuts down.

\_\_\_\_\_ "XFR Pressure HIGH" (alarm 2) occurs at the DTAM.

\_\_\_\_\_ "JET PUMP SHUTDOWN" (alarm12) occurs at the DTAM.

5.9.57 \_\_\_\_\_ DECREASE the current source to approximately 6mA.

5.9.58 \_\_\_\_\_ ENSURE the "XFR Pressure" alarm indicates "norm" on the DTAM.

**JR-1 VALVE POSITION INPUT (LS-1 AND LS-2)**

5.9.59 \_\_\_\_\_ START the pump from the DTAM.

5.9.60 \_\_\_\_\_ REMOVE the metal from the front face of LS-1.

5.9.61 \_\_\_\_\_ ENSURE the following occurs immediately: (Acknowledge alarms as necessary to view all the alarms.)

\_\_\_\_\_ The jet pump shuts down.

\_\_\_\_\_ "JR-1 Position NON-PROCESS" (alarm 5) occurs at the DTAM.

\_\_\_\_\_ "JET PUMP SHUTDOWN" (alarm12) occurs at the DTAM.

\_\_\_\_\_ Address N20:32/0 on ladder 5 is actuated as observed on the laptop.

5.9.62 \_\_\_\_\_ REMOVE the metal form the front face of LS-2.

5.9.63 \_\_\_\_\_ ENSURE the "JR-1" still indicates "NON-PROCESS" at the DTAM.

5.9.64 \_\_\_\_\_ ENSURE address N20:32/1 is actuated on ladder 5 as observed on the laptop.

5.9.65 \_\_\_\_\_ REPLACE the metal in front of LS-1 and LS-2.

5.9.66 \_\_\_\_\_ ENSURE the "JR-1" indicates "norm" on the DTAM and addresses N20:32/0 and N20:32/1 are clear on ladder 5 as observed on the laptop.

**COMBUSTIBLE GAS MONITOR INTERLOCK INPUTS**

5.9.67 \_\_\_\_\_ START the pump from the DTAM.

5.9.68 \_\_\_\_\_ OPEN the CGM-AX switch at TB4.

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5.9.69 \_\_\_\_\_ ENSURE the following occurs immediately: (Acknowledge alarms as necessary to view the alarms.)

\_\_\_\_\_ The jet pump shuts down.

\_\_\_\_\_ "JET PUMP SHUTDOWN" (alarm 12) occurs at the DTAM.

\_\_\_\_\_ "HIGH LFL ON CGM" (alarm 25) occurs at the DTAM.

5.9.70 \_\_\_\_\_ CLOSE the CGM-AX switch at TB4.

5.9.71 \_\_\_\_\_ ENSURE the "HI LFL CGM" alarm indicates "norm" at the DTAM.

5.9.72 \_\_\_\_\_ START the pump from the DTAM.

5.9.73 \_\_\_\_\_ OPEN the CGM-F switch at TB4.

5.9.74 \_\_\_\_\_ ENSURE the following occurs after a 3-second delay: (Acknowledge alarms as necessary to view the alarms.)

\_\_\_\_\_ The jet pump shuts down.

\_\_\_\_\_ "JET PUMP SHUTDOWN" (alarm 12) occurs at the DTAM.

\_\_\_\_\_ "CGM TROUBLE" (alarm 31) occurs at the DTAM.

5.9.75 \_\_\_\_\_ CLOSE the CGM-F switch at TB4.

5.9.76 \_\_\_\_\_ ENSURE the "CGM TROUBLE" alarm indicates "norm" at the DTAM.

5.9.77 \_\_\_\_\_ START the pump from the DTAM.

5.9.78 \_\_\_\_\_ OPEN the dilution switch at TB4 in the Instrument Enclosure.

5.9.79 \_\_\_\_\_ ENSURE the following occurs after a 5-minute delay: (Acknowledge alarms as necessary to view the alarms.)

\_\_\_\_\_ The jet pump shuts down.

\_\_\_\_\_ "JET PUMP SHUTDOWN" (alarm 12) occurs at the DTAM.

\_\_\_\_\_ "DILUTION TANK NO FLOW" (alarm 35) occurs at the DTAM.

5.9.80 \_\_\_\_\_ CLOSE the dilution switch.

5.9.81 \_\_\_\_\_ ENSURE the "Dilution tk" alarm indicates "norm" on the DTAM.

**MOTOR HIGH TEMPERATURE**

5.9.82 \_\_\_\_\_ START the pump from the DTAM.

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- 5.9.83 \_\_\_\_\_ INCREASE the temperature on the temperature simulator to approximately 126 degrees F or greater until alarm 58, "MOTOR TEMP HIGH" actuates.
- 5.9.84 \_\_\_\_\_ INCREASE the temperature on the temperature simulator to approximately 136 degrees F or greater until the following occurs:
- \_\_\_\_\_ The jet pump shuts down.
  - \_\_\_\_\_ "JET PUMP SHUTDOWN" (alarm 12) occurs at the DTAM.
  - \_\_\_\_\_ "Motor Temp Hi Shutdown" (alarm 59) occurs at the DTAM.
- 5.9.85 \_\_\_\_\_ DECREASE the temperature simulator to approximately 125 degrees F or lower until alarm "PMP HIHI TEMP" indicates "norm" at the DTAM.
- 5.9.86 \_\_\_\_\_ ENSURE the "PMP HI TEMP" alarm indicates "norm" at the DTAM.

**LEAK DETECTION INTERLOCK**

- 5.9.87 \_\_\_\_\_ ENSURE there is a water supply and bucket available to actuate the leak detector probes.
- 5.9.88 \_\_\_\_\_ START the pump from the DTAM.
- 5.9.89 \_\_\_\_\_ PLACE the primary leak detector probe in a bucket of water.
- 5.9.90 \_\_\_\_\_ ENSURE the following occurs after a 3-second delay: (Acknowledge alarms as necessary to view the alarms.)
- \_\_\_\_\_ The jet pump shuts down.
  - \_\_\_\_\_ "PUMP PIT LEAK" (alarm 6) occurs at the DTAM.
  - \_\_\_\_\_ "JET PUMP SHUTDOWN" (alarm 12) occurs at the DTAM.
  - \_\_\_\_\_ The red light for the "Primary" leak detector is ON at the Instrument Enclosure.
  - \_\_\_\_\_ Ensure address N20:32/3 in ladder 5 actuates as observed on the laptop.
- 5.9.91 \_\_\_\_\_ REMOVE the leak detector probe from the bucket and allow the water to drain off.
- 5.9.92 \_\_\_\_\_ ENSURE the "Pump Pit" leak alarm returns to "norm".
- 5.9.93 \_\_\_\_\_ ENSURE the red light for the "Primary" leak detector is OFF.
- 5.9.94 \_\_\_\_\_ ENSURE address N20:32/3 clears as observed on the laptop.

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- 5.9.95 \_\_\_\_ START the pump from the DTAM.
- 5.9.96 \_\_\_\_ DISCONNECT one of the “SD” wires going to the primary leak detector probe.
- 5.9.97 \_\_\_\_ ENSURE the following occurs after a 3-second delay: (Acknowledge alarms as necessary to view the alarms.)
- \_\_\_\_ The jet pump shuts down.
  - \_\_\_\_ “PUMP PIT LEAK TROUBLE” (alarm 7) occurs at the DTAM.
  - \_\_\_\_ “JET PUMP SHUTDOWN” (alarm12) occurs at the DTAM.
  - \_\_\_\_ The red light for the “Primary” leak detector at the Instrument Enclosure is ON.
  - \_\_\_\_ Ensure address N20:32/3 actuates as observed on the laptop.
- 5.9.98 \_\_\_\_ RECONNECT the “SD” wire.
- 5.9.99 \_\_\_\_ ENSURE the “Pump Pit” trouble alarm indicates “norm” on the DTAM.
- 5.9.100 \_\_\_\_ ENSURE the red light for the “Primary” leak detector is OFF.
- 5.9.101 \_\_\_\_ ENSURE address N20:32/3 clears as observed on the laptop.
- 5.9.102 \_\_\_\_ START the pump from the DTAM.
- 5.9.103 \_\_\_\_ PLACE the leak detector 1 probe in a bucket of water.
- 5.9.104 \_\_\_\_ ENSURE the following occurs after a 3-second delay: (Acknowledge alarms as necessary to view the alarms.)
- \_\_\_\_ The jet pump shuts down.
  - \_\_\_\_ “JET PUMP SHUTDOWN” (alarm12) occurs at the DTAM.
  - \_\_\_\_ “LEAK DETECTOR NO 1 LEAK DETECTED” (alarm 18) occurs at the DTAM.
  - \_\_\_\_ The red light for “Leak Detector 1” at the Instrument Enclosure is ON.
  - \_\_\_\_ Ensure address N20:32/4 actuates in ladder 5 as observed on the laptop.
- 5.9.105 \_\_\_\_ REMOVE the leak detector probe from the bucket and allow the water to drain off.
- 5.9.106 \_\_\_\_ ENSURE the “Leak 1” alarm returns to “norm”.
- 5.9.107 \_\_\_\_ ENSURE the red light for “Leak Detector 1” is OFF.
- 5.9.108 \_\_\_\_ ENSURE address N20:32/4 clears as observed on the laptop.

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- 5.9.109 \_\_\_\_\_ START the pump from the DTAM.
- 5.9.110 \_\_\_\_\_ DISCONNECT one of the “SD” wires going to the leak detector 1 probe.
- 5.9.111 \_\_\_\_\_ ENSURE the following occurs after a 3-second delay: (Acknowledge alarms as necessary to view the alarms.)
- \_\_\_\_\_ The jet pump shuts down.  
\_\_\_\_\_ “JET PUMP SHUTDOWN” (alarm12) occurs at the DTAM.  
\_\_\_\_\_ “LEAK DETECTOR NO 1 TROUBLE” (alarm 19) occurs at the DTAM.  
\_\_\_\_\_ The red light for “Leak Detector 1” at the Instrument Enclosure is ON.  
\_\_\_\_\_ Ensure address N20:32/4 actuates as observed by the laptop.
- 5.9.112 \_\_\_\_\_ RECONNECT the “SD” wire.
- 5.9.113 \_\_\_\_\_ ENSURE the “Leak 1 ck” alarm indicates “norm” on the DTAM.
- 5.9.114 \_\_\_\_\_ ENSURE the red light for “Leak Detector 1” is OFF.
- 5.9.115 \_\_\_\_\_ ENSURE address N20:32/4 clears as observed on the laptop.
- 5.9.116 \_\_\_\_\_ RECORD the hourmeter reading. \_\_\_\_\_
- 5.9.117 \_\_\_\_\_ VERIFY by comparing the readings in steps 5.9.6 and 5.9.108 that the hourmeter is recording time.
- 5.9.118 \_\_\_\_\_ REMOVE the software forces and disconnect the laptop computer from the PLC.
- 5.9.119 \_\_\_\_\_ TURN OFF breakers 2, 3, 5, and 6 in the distribution panel.
- 5.9.120 \_\_\_\_\_ DISCONNECT the current sources from the PXPT, RFPT and JFPT termination points.
- 5.9.121 \_\_\_\_\_ DISCONNECT the temperature simulator from the temperature module in the Intrinsic safe panel.
- 5.9.122 \_\_\_\_\_ DISCONNECT the test switches from the CGM and Dilution termination points.
- 5.9.123 \_\_\_\_\_ DISCONNECT the proximity switches from the Intrinsic Safe panel.
- 5.9.124 \_\_\_\_\_ DISCONNECT the leak detector probes from the Instrument Enclosure.

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5.9.125 \_\_\_\_\_ TURN ON breakers 2, 3, 5, and 6 at the distribution panel.

5.9.126 Engineer to ENSURE section 5.9 is completed and sign below.

\_\_\_\_\_  
Engineer Signature Date

5.9.127 Quality Assurance Inspector to VERIFY that section 5.9 is completed and sign below.

\_\_\_\_\_  
Quality Assurance Inspector Signature Date

## 5.10 HEATERS, AIR CONDITIONER AND LIGHTS

- 5.10.1 \_\_\_\_\_ TURN the heater ON in the air compressor cabinet. Set the thermostat high enough to allow the unit to operate.
- 5.10.2 \_\_\_\_\_ RESET the thermostat to approximately 40 degrees F to allow the heat to turn OFF. Then unplug the heater.
- 5.10.3 \_\_\_\_\_ TURN the fan thermostat switch to allow the fan in the air compressor cabinet to run.
- 5.10.4 \_\_\_\_\_ RESET the fan switch to approximately 90 degrees F to allow the fan to turn OFF.
- 5.10.5 \_\_\_\_\_ TURN the heater ON in the WFIE cabinet. Set the thermostat high enough to allow the unit to operate.
- 5.10.6 \_\_\_\_\_ RESET the thermostat to approximately 40 degrees F to allow the heat to turn OFF. Then unplug the heater.
- 5.10.7 \_\_\_\_\_ TURN the heater ON in the Water cabinet. Set the thermostat high enough to allow the unit to operate.
- 5.10.8 \_\_\_\_\_ RESET the thermostat to near the "LO" setting to allow the heat to turn OFF. Then unplug the heater.
- 5.10.9 \_\_\_\_\_ TURN the heater ON in the Instrument Enclosure. Set the thermostat high enough to allow the unit to operate.
- 5.10.10 \_\_\_\_\_ RESET the thermostat to approximately 40 degrees F to allow the heat to turn OFF. Then unplug the heater.
- 5.10.11 \_\_\_\_\_ TURN the heater ON in the Locker. Set the thermostat high enough to allow the unit to operate.
- 5.10.12 \_\_\_\_\_ RESET the thermostat to approximately 40 degrees F to allow the heat to turn OFF. Then unplug the heater.
- 5.10.13 \_\_\_\_\_ TURN ON the air conditioner in the Instrument Enclosure. If necessary, remove the front grill on the unit and adjust the temperature setting to get the unit to operate.
- 5.10.14 \_\_\_\_\_ RESET the temperature setting on the air conditioner to between 90 to 95 degrees F. Remove the grill and filter on the front of the air conditioner for access to the adjustment. Then unplug the air conditioner.

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5.10.15 \_\_\_\_\_ ENSURE the light in the WFIE cabinet operates.

5.10.16 \_\_\_\_\_ ENSURE the light in the Instrument Enclosure operates.

5.10.17 Engineer to ENSURE that section 5.10 is completed and sign below.

\_\_\_\_\_  
Engineer Signature

\_\_\_\_\_  
Date

5.10.18 Quality Assurance Inspector to VERIFY that section 5.10 is completed and sign below.

\_\_\_\_\_  
Quality Assurance Inspector Signature

\_\_\_\_\_  
Date

## 5.11 SKID PREPARATION FOR SHIPPING

5.11.1.  Ensure the following PIC skid circuit disconnects, breakers and fuses are OPEN or OFF.

DS-6002T  
 DS-6003T  
 DS-6004T  
 DS-6005T

The breakers below are located in the distribution panel DP-6001T:

<input type="checkbox"/> Breaker "MAIN"	<input type="checkbox"/> Breaker 2
<input type="checkbox"/> Breaker 1	<input type="checkbox"/> Breaker 4
<input type="checkbox"/> Breaker 3	<input type="checkbox"/> Breaker 6
<input type="checkbox"/> Breaker 5	<input type="checkbox"/> Breaker 8
<input type="checkbox"/> Breaker 7	<input type="checkbox"/> Breaker 10
<input type="checkbox"/> Breaker 9	<input type="checkbox"/> Breaker 12
<input type="checkbox"/> Breaker 11	<input type="checkbox"/> Breaker 14
<input type="checkbox"/> Breaker 13	

5.11.2.  Disconnect the power plug from the 480vac power source.

5.11.3.  ENSURE the power plug on the power cable is a Crouse-Hinds model APJ3475.

5.11.4.  Bleed the air pressure off the air system by OPENING the following valves:

V-6043T  
 V-6046T  
 V-6047T  
 V-6037T

NOTE: After the air system has bled down, proceed with the following valve positioning.

5.11.5.  Ensure the following PIC skid valves in the WFIE cabinet are OPEN.

V-6035T (EQUALIZING)  
 V-6036T (EQUALIZING)

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5.11.6. \_\_\_\_\_ Ensure the following valves are CLOSED.

Air Compressor

\_\_\_\_\_ V-6025T  
\_\_\_\_\_ V-6026T  
\_\_\_\_\_ V-6034T  
\_\_\_\_\_ V-6043T  
\_\_\_\_\_ V-6044T  
\_\_\_\_\_ V-6046T  
\_\_\_\_\_ V-6047T  
\_\_\_\_\_ V-6048T  
\_\_\_\_\_ V-6049T  
\_\_\_\_\_ V-6050T  
\_\_\_\_\_ V-6051T  
\_\_\_\_\_ V-6053T

Water Cabinet

\_\_\_\_\_ V-6027T  
\_\_\_\_\_ V-6029T  
\_\_\_\_\_ V-6030T  
\_\_\_\_\_ V-6031T  
\_\_\_\_\_ V-6032T  
\_\_\_\_\_ V-6037T  
\_\_\_\_\_ V-6052T  
\_\_\_\_\_ V-6054T  
\_\_\_\_\_ V-6055T

WFIE Cabinet

\_\_\_\_\_ V-6001T  
\_\_\_\_\_ V-6002T  
\_\_\_\_\_ V-6003T  
\_\_\_\_\_ V-6004T  
\_\_\_\_\_ V-6005T  
\_\_\_\_\_ V-6006T  
\_\_\_\_\_ V-6007T  
\_\_\_\_\_ V-6008T  
\_\_\_\_\_ V-6011T  
\_\_\_\_\_ V-6012T  
\_\_\_\_\_ V-6013T  
\_\_\_\_\_ V-6014T  
\_\_\_\_\_ V-6015T  
\_\_\_\_\_ V-6016T  
\_\_\_\_\_ V-6017T  
\_\_\_\_\_ V-6018T  
\_\_\_\_\_ V-6019T  
\_\_\_\_\_ V-6020T  
\_\_\_\_\_ V-6021T  
\_\_\_\_\_ V-6056T  
\_\_\_\_\_ V-6057T  
\_\_\_\_\_ V-6035T LOW  
\_\_\_\_\_ V-6035T HIGH  
\_\_\_\_\_ V-6036T LOW  
\_\_\_\_\_ V-6036T HIGH  
\_\_\_\_\_ V-6058T  
\_\_\_\_\_ V-6059T

5.11.7. Engineer to determine if the skid will be used on a "B-phase grounded" system. (Yes/No) \_\_\_\_\_ If yes, perform the following: (Otherwise N/A these steps.)

5.11.7.1. \_\_\_\_\_ Replace the "B-phase" fuse in disconnects DS-6002T, DS-6004T and DS-6005T with a dummy fuse per H-14-103812, sheets 1, 4 and 5.

5.11.7.2. \_\_\_\_\_ Install the "B-phase grounded" label per H-14-103812, sheets 1 and 4.

5.11.7.3. \_\_\_\_\_ Ensure the "B-phase" wires are white or taped white at disconnects DS-6002T, DS-6004T and DS-6005T.

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5.11.8 Engineer to ENSURE that section 5.11 is completed and sign below.

\_\_\_\_\_  
Engineer Signature

\_\_\_\_\_  
Date

5.11.9. Quality Assurance Inspector to VERIFY that section 5.11 is completed and sign below.

\_\_\_\_\_  
Quality Assurance Inspector Signature

\_\_\_\_\_  
Date





# ACCEPTANCE TEST PROCEDURE EXCEPTION RECORD

This page may be reproduced as necessary.

<b>ATP step number:</b>	<b>ATP Exception Log Number</b>
<b>Description of Exception:</b>	
<b>Resolution of Exception:</b>	
<b>Date of Resolution:</b>	
<b>Cognizant Engineer signature:</b>	
<b>Quality Assurance signature:</b>	
<b>Design Authority:</b>	
<b>RESOLUTION COMPLETED: (date)</b>	
<b>Quality Assurance:</b>	
<b>Cognizant Engineer:</b>	

# ACCEPTANCE TEST PROCEDURE ACCEPTANCE RECORD

Section 5.0 of the Acceptance Test Procedure has been completed including completion of all exceptions. The test results are accepted by the undersigned:

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**Cognizant Engineer (Signature)**

**(Print Name)**

**Date**

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**Quality Assurance (Signature)**

**(Print Name)**

**Date**



