ATTACHED IS AN ACCEPTANCE TEST PLAN (ATP) FOR THE NEW PUMPING INSTRUMENTATION AND CONTROL (PIC) SKIDS BEING FABRICATED BY SITE FABRICATION SERVICES.
ACCEPTANCE TEST PROCEDURE FOR NEW PUMPING INSTRUMENTATION AND CONTROL SKID "P"

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Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-99RL14047

Abstract:
This Test Plan provides a test method to dedicate the leak detection relays used on the new Pumping Instrumentation and Control (PIC) skids. The new skids are fabricated on-site. The leak detection system is a safety class system per the Authorization Basis.

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Approved For Public Release

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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 “P”. 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.

2.3.2 Engineering personnel 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, exceptions 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.
2.4 SAFETY

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

Warning: Cabinets on the PIC skid contain circuits energized with 480vac and 120vac. Comply with HNF-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.
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-5773 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 and Quality Assurance 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-14-103791, sheets 7 through 12 and H-14-103794, sheet 5.
4.1.2 Panel board arrangement on drawing H-14-103797.
4.1.3 Flow diagram on drawing H-14-103796.

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

<table>
<thead>
<tr>
<th>Engineer Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality Assurance Inspector Signature</td>
<td>Date</td>
</tr>
</tbody>
</table>

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 “P” 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.

<table>
<thead>
<tr>
<th>Engineer Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality Assurance Inspector Signature</td>
<td>Date</td>
</tr>
</tbody>
</table>
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-certifies 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 final sign-off.)

Report #’s: (Inspection #’s on tanks)

<table>
<thead>
<tr>
<th>Quality Assurance Inspector Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Engineer Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4 NATIONAL ELECTRICAL CODE (NEC) INSPECTION

4.3.1 An NEC inspection shall be performed to verify compliance to NFPA 70, latest version.

4.3.2 Areas in particular to be inspected are the 480vac and 120vac wiring and grounding.

4.3.3 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) ________

<table>
<thead>
<tr>
<th>Quality Assurance Inspector Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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.

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

Calibration No. Exp. Date QA

4.4.2 Transmation current (milliamp) simulator or equivalent

Calibration No. Exp. Date QA

4.4.3 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

4.4.4 Megaohm meter, at least 500vac range.

Calibration No. Exp. Date QA

4.4.5 480vac, 3 phase, 30-ampere power supply for PIC skid.
4.4.6 Selector switches (4 each) with at least one NO and one NC contact.
4.4.7 Proximity switches (for simulating LS-1 and LS-2), 2 each.
4.4.8 Leak detector probes (2 each) not required to be green tagged.
4.4.9 Heat gun to warm thermocouple probes.
4.4.10 Two thermocouple simulators for testing the thermocouples for the pump and jumper.

4.4.11 Buckets or pans for water for leak detector test and catching water from DIP tubes and relief valves.

4.4.12 Water supply and hose to fill water tank.

4.4.13 Ice water or cold air spray to cool thermocouple probes.
4.6 PRESTART CONDITIONS

4.5.1 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.

4.5.2 Ensure the PIC skid is grounded in preparation for ATP testing.

4.5.3 Ensure the following PIC skid valves in the WFIE cabinet are OPEN prior to starting this ATP.

- SALW-V-6035P (EQUALIZING)
- SALW-V-6036P (EQUALIZING)

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

<table>
<thead>
<tr>
<th>Air Compressor Cabinet</th>
<th>Water Cabinet</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALW-V-6025P</td>
<td>SALW-V-6027P</td>
</tr>
<tr>
<td>SALW-V-6026P</td>
<td></td>
</tr>
<tr>
<td>SALW-V-6034P</td>
<td>SALW-V-6029P</td>
</tr>
<tr>
<td>SALW-V-6043P</td>
<td>SALW-V-6030P</td>
</tr>
<tr>
<td>SALW-V-6044P</td>
<td>SALW-V-6031P</td>
</tr>
<tr>
<td>SALW-V-6046P</td>
<td>SALW-V-6032P</td>
</tr>
<tr>
<td>SALW-V-6047P</td>
<td>SALW-V-6037P</td>
</tr>
<tr>
<td>SALW-V-6048P</td>
<td>SALW-V-6052P</td>
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<tr>
<td>SALW-V-6049P</td>
<td></td>
</tr>
<tr>
<td>SALW-V-6050P</td>
<td></td>
</tr>
<tr>
<td>SALW-V-6051P</td>
<td></td>
</tr>
<tr>
<td>SALW-V-6053P</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WFIE Cabinet</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALW-V-6001P</td>
</tr>
<tr>
<td>SALW-V-6002P</td>
</tr>
<tr>
<td>SALW-V-6003P</td>
</tr>
<tr>
<td>SALW-V-6004P</td>
</tr>
<tr>
<td>SALW-V-6005P</td>
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<tr>
<td>SALW-V-6006P</td>
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<tr>
<td>SALW-V-6007P</td>
</tr>
<tr>
<td>SALW-V-6008P</td>
</tr>
<tr>
<td>SALW-V-6011P</td>
</tr>
<tr>
<td>SALW-V-6012P</td>
</tr>
<tr>
<td>SALW-V-6013P</td>
</tr>
<tr>
<td>SALW-V-6014P</td>
</tr>
</tbody>
</table>
4.5.5 Ensure the following PIC skid circuit disconnects, breakers and fuses are OPEN or OFF prior to starting this ATP.

SALW-DS-6002P  SALW-DS-6003P
SALW-DS-6004P  SALW-DS-6005P

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

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

4.5.6 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.

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

4.5.8 A pre-job safety meeting shall be held prior to performing section 5.0.
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.

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

(RED) (YELLOW) (BLUE) (GND)

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

(RED) (YELLOW OR BLUE) (GND)

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

(RED) (YELLOW) (BLUE) (GND)

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

(RED) (YELLOW) (BLUE) (GND)

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

(Continuity through the transformer primary.)
5.1.6 Line side of the main breaker in panel board (SALW-DP-6001P) through the secondary of transformer (SALW-XFMR-6001P). 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 (SALW-DP-6001P) 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 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 2 to terminal block in FGM heat trace splice 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 SALW-DS-6002P 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 (SALW-DS-6002P) to ground and phase to phase. (Ensure switches SALW-DS-6003P, SALW-DS-6004P and SALW-DS-6005P 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 (SALW-DS-6003P) 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.
5.2.10 Ensure all the heaters, lights and air conditioner are disconnected or unplugged from the 120vac circuits.

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.

Quality Assurance Inspector Signature

Date
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 (SALW-DS-6002P and SALW-DS-6003P) and motor starters (SALW-DS-6004P and SALW-DS-6005P) 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 (SALW-DS-6002P). Record the voltage readings.

5.3.7 Close the main disconnect switch (SALW-DS-6002P).

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

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

5.3.10 Ensure 480vac +/-20vac on the line side of the pump motor starter (SALW-DS-6005P). Record the voltage readings.
5.3.11 ____ Remove the dead front on the panel board (SALW-DP-6001P) for access to the main breaker for a voltage measurement.

5.3.12 ____ Close the transformer disconnect switch (SALW-DS-6003P).

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 (SALW-DS-6003P).

5.3.15 ____ Replace the dead front on the panel board (SALW-DP-6001P).

5.3.16 ____ Close the transformer disconnect switch (SALW-DS-6003P).

5.3.17 ____ Close the 100 ampere main breaker in the panel board (SALW-DP-6001P).

5.3.18 ____ Check the voltages for the circuits at the locations designated. Record the voltages in the space provided.

<table>
<thead>
<tr>
<th>CKT #</th>
<th>Check voltage at</th>
<th>Bkr Open voltage (appr. 0vac)</th>
<th>Bkr Closed voltage (120 +/- 10vac)</th>
<th>Open Bkr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FGM JUNCTION BOX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>FGM HT BOX</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>TB10, INSTR ENCL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>RCPT, AIR COMPR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>TB13, INSTR ENCL</td>
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<td>TB, INTRINSIC PNL</td>
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<td>7</td>
<td>RCPT, WIFE CAB.</td>
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<td>8</td>
<td>RCPT, WATER CAB.</td>
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<td>9</td>
<td>OUTSIDE RCPT</td>
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<td>FGM HT BOX</td>
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<td>11</td>
<td>FGM JUNCTION BOX</td>
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<td>12</td>
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<td>13</td>
<td>FGM JUNCTION BOX</td>
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<td>14</td>
<td>FGM JUNCTION BOX</td>
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</tbody>
</table>
5.3.19 Ensure fuses FA, FB, FC, FD, LD, and HT are installed in the fuseholders in the Instrument Enclosure.

5.3.20 Close breakers 3 and 5 in the distribution panel (SALW-DP-6001P).

5.3.21 Ensure 120vac +/-10vac on the line side at the following fuseholder load side points.

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 (SALW-DP-6001P).

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 3, 5 and 6 in the panel board (SALW-DP-6001P).

5.3.26 Open the 100 ampere main breaker in the panel board (SALW-DP-6001P).

5.3.27 Open the transformer disconnect switch (SALW-DS-6003P).

5.3.28 Open the main disconnect switch (SALW-DS-6002P).

5.3.29 Voltage checks completed and readings within tolerance.

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.

<table>
<thead>
<tr>
<th>INSTRUMENT</th>
<th>LOCATION</th>
<th>CAL. STICKER ON</th>
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</thead>
<tbody>
<tr>
<td>SALW-PS-6004P</td>
<td>AIR COMPR. CABINET</td>
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<tr>
<td>SALW-WFT-6002P</td>
<td>WFIE CABINET</td>
<td></td>
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<tr>
<td>SALW-LT-6003P</td>
<td>WATER CABINET</td>
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<tr>
<td>SALW-SGT-6001P</td>
<td>WFIE CABINET</td>
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<tr>
<td>SALW-CONV-6001P</td>
<td>WFIE CABINET</td>
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<tr>
<td>SALW-FQIT-6001P</td>
<td>INSTRUMENT ENCL.</td>
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<tr>
<td>SALW-PI-6006P</td>
<td>AIR COMPR. CABINET</td>
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<tr>
<td>SALW-PI-6007P</td>
<td>AIR COMPR. CABINET</td>
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<tr>
<td>SALW-PI-6008P</td>
<td>WATER CABINET</td>
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<td>SALW-PI-6001P</td>
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<tr>
<td>SALW-PI-6004P</td>
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<td>SALW-PI-6005P</td>
<td>WFIE CABINET</td>
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<tr>
<td>SALW-PI-6011P</td>
<td>INSTRUMENT ENCL.</td>
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<tr>
<td>SALW-PI-6012P</td>
<td>INSTRUMENT ENCL.</td>
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</tbody>
</table>

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 document RPP-5775.

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 4.2. 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.

- SALW-DS-6002P
- SALW-DS-6003P
- SALW-DS-6004P
- SALW-DS-6005P

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

- Breaker “MAIN”
- Breaker 1
- Breaker 2
- Breaker 3
- Breaker 4
- Breaker 5
- Breaker 6
- Breaker 7
- Breaker 8
- Breaker 9
- Breaker 10
- Breaker 11
- Breaker 12
- Breaker 13
- Breaker 14

5.6.4 ACKNOWLEDGE any initial skid alarms.

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

5.6.6 START the air compressor by positioning the switch on SALW-DS-6004P 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 SALW-PI-6006P. 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.
5.6.9 **BLEED** off air by slowly opening valve SALW-V-6043P until the compressor restarts and note the restart pressure as read on gauge SALW-PI-6006P. CLOSE valve SALW-V-6043P 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 SALW-V-6025P located in the air compressor cabinet.

5.6.14 **SLOWLY OPEN** valve SALW-V-6027P located near the water tank.

5.6.15 **SLOWLY OPEN** valve SALW-V-6052P located near the water tank.

5.6.16 **ADJUST** pressure regulator valve SALW-PCV-6006P to 30psi (+/- 3psi) as indicated by pressure gauge SALW-PI-6008P on the outside of the water cabinet. _______psi

5.6.17 **ACTUATE** the lever on relief valve SALW-PRV-6004P 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 SALW-PRV-6004P seats properly when the lever is released.

5.6.19 **ACTUATE** the lever on relief valve SALW-PRV-6005P 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 SALW-PRV-6005P 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 SALW-V-6051P located inside the air compressor cabinet and SALW-V-6026P located on the outside of the air compressor cabinet.

5.6.23 **SLOWLY OPEN** valve SALW-V-6001P located in the WFIE cabinet. (NOTE: SALW-PRV-6002P may open if pressure through SALW-PCV-6001P is too high.)
5.6.24 ADJUST pressure control valve SALW-PCV-6001P 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 SALW-V-6004P located in the WFIE cabinet.

5.6.26 SLOWLY OPEN valve SALW-V-6003P located in the WFIE cabinet.

5.6.27 SLOWLY OPEN valve SALW-V-6005P located in the WFIE cabinet.

5.6.28 SLOWLY OPEN valve SALW-V-6006P located in the WFIE cabinet.

5.6.29 SLOWLY OPEN valve SALW-V-6007P located in the WFIE cabinet.

5.6.30 SLOWLY OPEN valve SALW-V-6020P located in the WFIE cabinet.

5.6.31 SLOWLY OPEN valve SALW-V-6021P located in the WFIE cabinet.

5.6.32 SLOWLY OPEN valve SALW-V-6019P located in the WFIE cabinet.

5.6.33 ADJUST the air flow through the diptubes by performing the following steps.

5.6.34 ADJUST flow to dip tube to 1.5 CFH (+/-0.5 CFH) as indicated by SALW-FIV-6002P.

5.6.35 ADJUST flow to dip tube to 1.5 CFH (+/-0.5 CFH) as indicated by SALW-FIV-6003P.

5.6.36 ADJUST flow to dip tube to 1.5 CFH (+/-0.5 CFH) as indicated by SALW-FIV-6004P.

5.6.37 ENSURE air flow from pressure regulator SALW-PCV-6007P by slowly opening valve SALW-V-6044P in the air compressor cabinet and then reclose the valve.

5.6.38 ENSURE air flow from pressure regulator SALW-PCV-6008P by slowly opening valve SALW-V-6048P in the air compressor cabinet and then reclose the valve.

5.6.39 ENSURE air flow from the SALW-V-6042P port at the air compressor cabinet by slowly opening valve SALW-V-6046P in the air compressor cabinet and then reclose the valve.
5.6.40 ENSURE air flow from the drain line by slowly opening valves SALW-V-6047P and SALW-V-6046P 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 SALW-PRV-6001P 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:

- SALW-V-6016P
- SALW-V-6013P
- SALW-V-6008P

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

5.7.3 **SLOWLY OPEN** SALW-V-6018P WHILE CAREFULLY ADJUSTING Pressure Regulator SALW-PCV-6005P located in the WFIE cabinet to 20 psig (+/- 2 psig) as indicated on gauge SALW-PI-6001P in the WFIE cabinet. __________ psig

5.7.4 **ADJUST** valve SALW-V-6014P to allow approximately 2 drops/second as indicated by sight glass SALW-FG-6001P.

5.7.5 **ADJUST** valve SALW-V-6015P to allow approximately 2 drops/second as indicated by sight glass SALW-FG-6002P.

5.7.6 **VALVE OUT** the dip tube drip system by SLOWLY CLOSING or ENSURING CLOSED the following valves located in the WFIE cabinet.

- SALW-V-6015P
- SALW-V-6014P
- SALW-V-6008P
- SALW-V-6013P
- SALW-V-6019P
- SALW-V-6021P
- SALW-V-6020P
- SALW-V-6007P
- SALW-V-6006P
- SALW-V-6005P
5.7.7 Engineer to ENSURE section 5.7 is completed and sign below.

Engineer Signature

Date

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

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.

5.8.3 ENSURE a normally closed switch is connected to “CGM-F” and “CKT5H-A” on terminal board TB4 in the Instrument Enclosure.

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 a normally closed switch is connected in parallel to the “RECIRC-1” and “RECIRC-2” wires on the Intrinsic safe terminal block in the Intrinsic Safe panel.

5.8.6 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.

5.8.7 ENSURE the DIP switches for the Pepperl-Fuch module in the Intrinsic Safe panel are set to the correct positions per H-14-103791, sheet 7.

WATER TANK LEVEL TRANSMITTER

5.8.8 ENSURE valve SALW-V-6029P located in the water tank cabinet is CLOSED.

5.8.9 ENSURE valve SALW-V-6031P located in the water cabinet is CLOSED.

5.8.10 CONNECT a test manometer pressure source that can output at least 62” water gauge to the HIGH PRESSURE vent/test port of level transmitter SALW-LT-6003P.

5.8.11 ENSURE the LOW PRESSURE vent/test port of level transmitter SALW-LT-6003P is OPEN to atmosphere.
5.8.12 ADJUST the test manometer connected to SALW-LT-6003P to a pressure of 31” water gauge (+/-1”). Record reading ________

5.8.13 RECORD the water tank level reading on the DTAM. ________ 31” (+/-2”)

5.8.14 The next step will cause a low water level alarm on the DTAM.

5.8.15 VERY SLOWLY DECREASE the test manometer pressure until the “PIC WATER LEVEL LOW” (alarm 9) occurs on the DTAM. (This alarm should occur between 11.75” to 12.75” water gauge.)

5.8.16 ACKNOWLEDGE the alarm at the DTAM.

5.8.17 RECORD the manometer pressure and the DTAM water level readings.

Pressure on manometer ________ Water Level on DTAM ________

5.8.18 SLOWLY INCREASE the manometer pressure until the alarm clears on the DTAM. (This should occur at approximately 15.5” water gauge.)

5.8.19 RECORD the manometer pressure and the DTAM water level readings.

Pressure on manometer ________ Water Level on DTAM ________

5.8.20 ENSURE the “PIC Water” alarm indicates “norm”.

5.8.21 REMOVE the test manometer from the SALW-LT-6003P high pressure vent/test port and reinstall the vent plugs on both the high and low sides.

5.8.22 OPEN valve SALW-V-6029P located in the Water Cabinet.

5.8.23 OPEN valve SALW-V-6031P located in the Water Cabinet.

5.8.24 ENSURE “Water Tank” reading on the DTAM shows a value in inches.

Record the reading ________

WEIGHT FACTOR TEST

5.8.25 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.

5.8.26 ENSURE SALW-V-6001P is CLOSED.
5.8.27  ____ENSURE SALW-V-6005P is OPEN.

5.8.28  ____ENSURE SALW-V-6006P is OPEN.

5.8.29  ____ENSURE adjustment valves on SALW-FIV-6002P, SALW-FIV-6003P and SALW-FIV-6004P are CLOSED.

5.8.30  ____ENSURE SALW-WFT-6002P EQUALIZING valve located on the SALW-V-6036P 3-Valve manifold in the WFIE cabinet is CLOSED.

5.8.31  ____ENSURE the LOW and HIGH side isolation valves located on the SALW-V-6036P 3-Valve manifold in the WFIE cabinet are OPEN.

5.8.32  ____SET the test manometer to 125” (+/-1”) water gauge. Record the manometer reading. _________

5.8.33  ____RECORD the “WFT” reading on the DTAM. The reading is to be 125” (+/- 5”). _________

5.8.34  ____BLEED off the pressure on the test manometer. Leave connected for testing the specific gravity transmitter.

5.8.35  ____CLOSE SALW-V-6006P.

5.8.36  ____OPEN SALW-WFT-6002P equalizing valve located on SALW-V-6036P 3-Valve manifold in the WFIE cabinet.

5.8.37  ____CLOSE the LOW and HIGH side isolation valves located on the SALW-V-6036P 3-Valve manifold in the WFIE cabinet.

### SPECIFIC GRAVITY TRANSMITTER

5.8.38  ____ENSURE SALW-V-6007P is OPEN.

5.8.39  ____ENSURE SALW-V-6005P is OPEN.

5.8.40  ____ENSURE the LOW and HIGH side isolation valves located on SALW-V-6035P 3-Valve manifold in the WFIE cabinet are OPEN.

5.8.41  ____ENSURE the specific gravity transmitter equalizing valve located on the SALW-V-6035P 3-Valve manifold located in the WFIE cabinet is CLOSED.

5.8.42  ____SET the test manometer to 5” water gauge (+/- 0.3”). _________
5.8.43 RECORD the “SGT” reading on the DTAM. Reading to be 5” +/- 0.35”.

5.8.44 BLEED off pressure on the manometer.

5.8.45 ENSURE “SGT LOW” alarm occurs (alarm 13).

5.8.46 ACKNOWLEDGE the alarm.

5.8.47 DISCONNECT the test manometer.

5.8.48 CLOSE SALW-V-6007P.

5.8.49 CLOSE SALW-V-6005P.

5.8.50 OPEN SALW-SGT-6001P equalizing valve located on SALW-V-6035P 3-Valve manifold in the WFIE cabinet.

5.8.51 CLOSE the LOW side and HIGH side isolation valves located on SALW-V-6035P 3-Valve manifold in the WFIE cabinet.

FLOW METER SIGNAL CHECK

5.8.52 Prepare the flow converter SALW-FQIT-6001P located in the Instrument Enclosure to simulate a flow either using the buttons on the front face or using a “brain terminal”.

5.8.53 SIMULATE a flow signal of 4.0gpm (50% span) with the hand-held brain terminal or from the flow converter face switches.

5.8.54 RECORD the flow readings on the front of the flow converter and on the DTAM (PMP FLOW). Readings to be 4.0 +/- 0.4 gpm.

Flow converter DTAM (PMP FLOW)

5.8.55 RESTORE the flow converter, SALW-FQIT-6001P to its original configuration.
SUCTION AND DISCHARGE PRESSURE SIGNAL

5.8.56 **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."

5.8.57 **SET** the current source to approximately 4mA and record the suction pressure reading on SALW-PI-6012P. Reading to be approximately zero.

____ psi

5.8.58 **SET** the current source to approximately 20mA and record the suction pressure reading on SALW-PI-6012P. Reading to be approximately 100psi.

____ psi

5.8.59 **DISCONNECT** the current source.

5.8.60 **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.

5.8.61 **SET** the current source to approximately 4mA and record the discharge pressures on SALW-PI-6011P and on the DTAM. Readings should be approximately zero.

SALW-PI-6011P ______ psi DTAM (PMP DISC) ______ psi

5.8.62 **SET** the current source to approximately 20mA and record the discharge pressures on SALW-PI-6011P and on the DTAM. Readings should be approximately 300psi.

SALW-PI-6011P ______ psi DTAM (PMP DISC) ______ psi

5.8.63 **DISCONNECT** the current source.

COMBUSTIBLE GAS MONITOR ANALOG SIGNAL TO PLC

5.8.64 **ENSURE** a current source is connected to terminal board TB1 in the Instrument Enclosure, points CGM 0(+) and 24VDC COM.

5.8.65 **SET** the current source to approximately 4mA.
5.8.66 RECORD the “CGM” percent reading from the DTAM. Reading is to be approximately zero. __________%

5.8.67 SET the current source to approximately 10mA.

5.8.68 RECORD the “CGM” percent reading from the DTAM. Reading is to be approximately 11%. __________%

5.8.69 SET the current source to approximately 20mA.

5.8.70 RECORD the “CGM” percent reading from the DTAM. Reading is to be approximately 30%. __________%

5.8.71 DISCONNECT the current source.

DOME SPACE FLAMMABLE GAS MONITOR ANALOG SIGNAL TO PLC

5.8.72 ENSURE a current source is connected to terminal board TB1 in the Instrument Enclosure, points FGM 1(+) and FGM 1(-)

5.8.73 SET the current source to approximately 4mA.

5.8.74 RECORD the “FGM” percent reading from the DTAM. Reading is to be approximately zero. __________%

5.8.75 SET the current source to approximately 10mA.

5.8.76 RECORD the “FGM” percent reading from the DTAM. Reading is to be approximately 11%. __________%

5.8.77 SET the current source to approximately 20mA.

5.8.78 RECORD the “FGM” percent reading from the DTAM. Reading is to be approximately 30%. __________%

5.8.79 DISCONNECT the current source.

THERMOCOUPLE INPUTS TO THE PLC

5.8.80 WARM thermocouple SALW-TE-6004P located in the Instrument Enclosure.

5.8.81 ENSURE the “PLC CAB temp” on the DTAM displays a temperature change.
5.8.82 CONTINUE to warm the thermocouple until “PLC Enclosure HI” (alarm 10) occurs. This will be approximately 130 degrees F.

5.8.83 ACKNOWLEDGE the alarm.

5.8.84 ENSURE “PLC CAB temp” on the DTAM shows a temperature DECREASE after the heat source is removed from the SALW-TE-6004P thermocouple.

5.8.85 ENSURE the “PLC temp” alarm returns to “norm” when the temperature decreases below 125 degrees F.

5.8.86 WARM thermocouple SALW-TE-6003P located in the Air Compressor Cabinet.

5.8.87 ENSURE the “COMPRS temp” on the DTAM displays a temperature change.

5.8.88 CONTINUE to warm the thermocouple until “Air Compressor Temp HI” (alarm 11) occurs. This will be approximately 130 degrees F.

5.8.89 ACKNOWLEDGE the alarm.

5.8.90 ENSURE “COMPRS temp” on the DTAM shows a temperature DECREASE after the heat source is removed from the SALW-TE-6003P thermocouple.

5.8.91 ENSURE the “CMPRSR temp” alarm returns to “norm” when the temperature decreases below 125 degrees F.

5.8.92 COOL the thermocouple probe in the WFIE cabinet with such as ice water or cool air spray. Temperature needs to drop below 35 degrees F.

5.8.93 ENSURE alarm 50, “WFIE CAB Temp Low” occurs at the DTAM.

5.8.94 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.

5.8.95 COOL the thermocouple probe in the Water cabinet with such as ice water or cool air spray. Temperature needs to drop below 35 degrees F.

5.8.96 ENSURE alarm 49, “WATER CAB Temp Low” occurs at the DTAM.
5.8.97 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.

5.8.98 CONNECT two temperature simulators to the intrinsic side of the two thermocouple modules (MTL 3081) in the Intrinsic Safe panel.

5.8.99 SET both temperature simulators to approximately 140 degrees F.

5.8.100 ENSURE the “PUMP temp” and the “JMPER TEMP” each read approximately 140 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 “JMPER TEMP” reads approximately 39 degree at the DTAM.

5.8.105 INCREASE the temperature simulator on the top module to approximately 140 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.

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.

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”.

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5.8.113 ENSURE the voltage at TB12 goes to approximately zero.

5.8.114 CLOSE the switch on TB4 that is across “CGM-AX” and “CKT5H-A”.

5.8.115 ENSURE the voltage at TB12 returns to approximately 120vac.

5.8.116 OPEN the switch on TB4 that is across “CGM-F” and “CKT5H-A”.

5.8.117 ENSURE the voltage at TB12 goes to approximately zero.

5.8.118 CLOSE the switch on TB4 that is across “CGM-F” and “CKT5H-A”.

5.8.119 ENSURE the voltage at TB12 returns to approximately 120vac.

5.8.120 TURN OFF the heat trace from the DTAM.

5.8.121 ENSURE the voltage at TB12 goes to approximately zero.

5.8.122 TURN ON the heat trace from the DTAM.

5.8.123 ENSURE the voltage at TB12 returns to approximately 120vac.

5.8.124 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.

5.8.125 ACKNOWLEDGE the alarm.

5.8.126 DECREASE the temperature simulator on the second module to less than 225 degrees.

5.8.127 ENSURE the “JMPR HT” alarm 8 returns to “norm” on the DTAM.

5.8.128 REMOVE the two temperature simulators.
5.8.129 Engineer to Ensure section 5.8 is completed and sign below.

________________________  ______________________
Engineer Signature        Date

5.8.130 Quality Assurance Inspector to Verify that section 5.8 is complete and sign below.

________________________  ______________________
Quality Assurance Inspector Signature  Date
5.9 JET PUMP INTERLOCK CIRCUITS

5.9.1 **ENSURE** the two leak detector probes, LS-1 and LS-2 proximity switches, the two CGM switches at TB4, Dilution switch at TB4, and the Recirc switch at the Intrinsic Safe panel 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 **CONNECT** the laptop computer to the PLC to set forces and observe logic when required.

**RECIRCULATION FLUSH PRESSURE SIGNAL TO PLC**

5.9.4 **ENSURE** a current source is connected to points RFPT+ and RFPT- in the Instrument Enclosure at TB2 and is set to approximately 6mA.

5.9.5 **ENSURE** the green light on the Instrument Enclosure and on the Jet Pump motor starter are ON.

5.9.6 **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, Leak Station 4 and Leak Station 5 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”.)

5.9.7 **TURN** the selector switch on the Jet Pump Motor Starter to ON.

5.9.8 **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.
5.9.9 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.

5.9.10 DECREASE the current source to approximately 4mA.

5.9.11 ENSURE the “Recirc Press” alarm at the DTAM returns to “norm”.

5.9.12 ENSURE address N20:32/6 clears as observed on the laptop.

5.9.13 DECREASE the current source to zero.

5.9.14 ENSURE alarm 14, “RFPT SIGNAL LOSS ALARM” occurs.

5.9.15 ACKNOWLEDGE the alarm.

5.9.16 ENSURE address N20:32/7 is actuated as observed on the laptop.

5.9.17 INCREASE the current source to approximately 6mA.

5.9.18 ENSURE the “RFPT SIGNAL” alarm returns to “norm” on the DTAM.

5.9.19 ENSURE address N20:32/7 clears as observed on the laptop.

JUMPER FLUSH PRESSURE SIGNAL TO PLC

5.9.20 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.

5.9.21 ENSURE the green light on the Instrument Enclosure and on the Jet Pump motor starter are ON.
5.9.22 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.)

5.9.23 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.

5.9.24 ENSURE address N20:32/2 is clear as observed on the laptop.

5.9.25 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.)

- 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.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The “PS2 FL PR” is approximately 15psi. _______ psi
- The horn sounded and the strobe light flashed upon pump shutdown.
- Ensure address N20:32/5 is actuated as observed on the laptop.

5.9.26 DECREASE the current source to approximately 4mA.

5.9.27 ENSURE the “Flush Press” alarm at the DTAM returns to “norm”.

5.9.28 ENSURE the blue light at the Instrument Enclosure turns OFF.

5.9.29 ENSURE address N20:32/5 clears as observed on the laptop.

5.9.30 DECREASE the current source to zero.

5.9.31 ENSURE alarm 16, “JFPT SIGNAL LOSS ALARM” occurs.

5.9.32 ACKNOWLEDGE the alarm.

5.9.33 ENSURE address N20:32/8 actuates as observed on the laptop.

5.9.34 INCREASE the current source to approximately 6mA.

5.9.35 ENSURE the “JFPT SIGNAL” alarm returns to “norm” on the DTAM.

5.9.36 ENSURE address N20:32/8 clears as observed on the laptop.
TRANSFER PRESSURE INTERLOCK INPUT

5.9.37 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.

5.9.38 ENSURE the laptop computer is connected to the PLC and is “on-line”.

5.9.31 ENSURE the green light on the Instrument Enclosure and on the Jet Pump motor starter are ON.

5.9.32 APPLY software forces to allow the jet pump to start. (Engineering will apply the forces from the laptop computer connected to the PLC.)

5.9.33 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.

5.9.34 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.

5.9.35 ENSURE the amber light on the Instrument Enclosure turns ON immediately after the timer starts.

5.9.36 ENSURE after 30 seconds, the following occurs: (Acknowledge alarms as necessary to view all the alarms.)

- “XFR Pressure LOW” (alarm 1) occurs at the DTAM.
- “JET PUMP SHUTDOWN” (alarm12) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.

5.9.37 INCREASE the current source to approximately 6mA to clear the low pressure alarm.

5.9.38 ENSURE the “XFR Pressure” alarm is “norm” on the DTAM.

5.9.39 START the pump from the DTAM.

5.9.40 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.
5.9.41 ENSURE after a 3 second delay, the following occurs: (Acknowledge alarms as necessary to view all the alarms.)

- "XFR Pressure HIGH" (alarm 2) occurs at the DTAM.
- "JET PUMP SHUTDOWN" (alarm12) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.

5.9.42 DECREASE the current source to approximately 6mA.

5.9.43 ENSURE the "XFR Pressure" alarm indicates "norm" on the DTAM.

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

5.9.44 START the pump from the DTAM.

5.9.45 REMOVE the metal from the front face of LS-1.

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

- "JR-1 Position NON-PROCESS" (alarm 5) occurs at the DTAM.
- "JET PUMP SHUTDOWN" (alarm12) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.
- Address N20:32/0 on ladder 5 is actuated as observed on the laptop.

5.9.47 REMOVE the metal from the front face of LS-2.

5.9.48 ENSURE the "JR-1" still indicates "NON-PROCESS" at the DTAM.

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

5.9.50 REPLACE the metal in front of LS-1 and LS-2.

5.9.51 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**

5.9.52 START the pump from the DTAM.

5.9.53 OPEN the CGM-AX switch at TB4.
5.9.54 ENSURE the following occurs immediately: (Acknowledge alarms as necessary to view the alarms.)

- "JET PUMP SHUTDOWN" (alarm 12) occurs at the DTAM.
- "HIGH LFL ON CGM" (alarm 25) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.

5.9.55 CLOSE the CGM-AX switch at TB4.

5.9.56 ENSURE the "HI LFL CGM" alarm indicates "norm" at the DTAM.

5.9.57 START the pump from the DTAM.

5.9.58 OPEN the CGM-F switch at TB4.

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

- "JET PUMP SHUTDOWN" (alarm 12) occurs at the DTAM.
- "CGM FAULT" (alarm 31) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.

5.9.60 CLOSE the CGM-F switch at TB4.

5.9.61 ENSURE the "CGM FAULT" alarm indicates "norm" at the DTAM.

5.9.62 START the pump from the DTAM.

5.9.63 OPEN the dilution switch at TB4 in the Instrument Enclosure.

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

- "JET PUMP SHUTDOWN" (alarm 12) occurs at the DTAM.
- "DILUTION TANK NO FLOW" (alarm 35) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.

5.9.65 CLOSE the dilution switch.
5.9.66 ENSURE the "Dilution tk" alarm indicates "norm" on the DTAM.

RE Circulation LOW FLOW

5.9.67 START the pump from the DTAM.

5.9.68 OPEN the Recirculation switch at the Intrinsic Safe panel.

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

- "JET PUMP SHUTDOWN" (alarm 12) occurs at the DTAM.
- "Recirculation Failure" (alarm 21) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.

5.9.70 CLOSE the Recirculation switch.

5.9.71 ENSURE the "Recirc Loop" alarm indicates "norm" at the DTAM.

LEAK DETECTION INTERLOCK

5.9.72 ENSURE there is a water supply and bucket available to actuate the leak detector probes.

5.9.73 START the pump from the DTAM.

5.9.74 PLACE the primary leak detector probe in a bucket of water.

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

- "PUMP PIT LEAK" (alarm 6) occurs at the DTAM.
- "JET PUMP SHUTDOWN" (alarm 12) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.
- Ensure address N20:32/3 in ladder 5 actuates as observed on the laptop.

5.9.76 REMOVE the leak detector probe from the bucket and allow the water to drain off.

5.9.77 ENSURE the "Pump Pit" leak alarm returns to "norm".

5.9.78 ENSURE address N20:32/3 clears as observed on the laptop.
5.9.79 ______START the pump from the DTAM.

5.9.80 ______DISCONNECT one of the “SD” wires going to the primary leak detector probe.

5.9.81 ______ENSURE the following occurs after a 3-second delay: (Acknowledge alarms as necessary to view the alarms.)

- “PUMP PIT LEAK TROUBLE” (alarm 7) occurs at the DTAM.
- “JET PUMP SHUTDOWN” (alarm 12) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.
- Ensure address N20:32/3 actuates as observed on the laptop.

5.9.82 ______RECONNECT the “SD” wire.

5.9.83 ______ENSURE the “Pump Pit” trouble alarm indicates “norm” on the DTAM.

5.9.84 ______ENSURE address N20:32/3 clears as observed on the laptop.

5.9.85 ______START the pump from the DTAM.

5.9.86 ______PLACE the leak detector 1 probe in a bucket of water.

5.9.87 ______ENSURE the following occurs after a 3-second delay: (Acknowledge alarms as necessary to view the alarms.)

- “JET PUMP SHUTDOWN” (alarm 12) occurs at the DTAM.
- “LEAK DETECTOR NO 1 LEAK DETECTED” (alarm 18) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.
- Ensure address N20:32/4 actuates in ladder 5 as observed on the laptop.

5.9.88 ______REMOVE the leak detector probe from the bucket and allow the water to drain off.

5.9.89 ______ENSURE the “Leak 1” alarm returns to “norm”.

5.9.90 ______ENSURE address N20:32/4 clears as observed on the laptop.

5.9.91 ______START the pump from the DTAM.
5.9.92 **DISCONNECT** one of the “SD” wires going to the leak detector 1 probe.

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

- “JET PUMP SHUTDOWN” (alarm 12) occurs at the DTAM.
- “LEAK DETECTOR NO 1 TROUBLE” (alarm 19) occurs at the DTAM.
- Red lights at the motor starter and Instrument Enclosure are OFF.
- Green lights at the motor starter and Instrument Enclosure are ON.
- The horn sounded and the strobe light flashed upon pump shutdown.
- Ensure address N20:32/4 actuates as observed by the laptop.

5.9.94 **RECONNECT** the “SD” wire.

5.9.95 **ENSURE** the “Leak 1 ck” alarm indicates “norm” on the DTAM.

5.9.96 **ENSURE** address N20:32/4 clears as observed on the laptop.

5.9.97 **DISCONNECT** the current sources from the PXPT, RFPT and JFPT termination points.

5.9.98 **DISCONNECT** the test switches from the FGM, Dilution and Recirculation termination points.

5.9.99 **DISCONNECT** the proximity switches from the Intrinsic Safe panel.

5.9.100 **REMOVE** the software forces and disconnect the laptop computer from the PLC.

5.9.101 **DISCONNECT** the leak detector probes from the Instrument Enclosure.

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

---

**Engineer Signature**

**Date**

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

---

**Quality Assurance Inspector Signature**

**Date**

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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.
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. Bleed the air pressure off the air system by turning the selector switch on the air compressor starter to OFF and then OPENING the air drain valves SALW-V-6043P, SALW-V-6046P, SALW-V-6047P, and SALW-V-6037P.

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

- SALW-DS-6002P
- SALW-DS-6003P
- SALW-DS-6004P
- SALW-DS-6005P

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

- Breaker “MAIN”
- Breaker 1
- Breaker 2
- Breaker 3
- Breaker 4
- Breaker 5
- Breaker 6
- Breaker 7
- Breaker 8
- Breaker 9
- Breaker 10
- Breaker 11
- Breaker 12
- Breaker 13
- Breaker 14

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

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

- SALW-V-6035P (EQUALIZING)
- SALW-V-6036P (EQUALIZING)
5.11.5. Ensure the following valves are CLOSED.

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<td>__SALW-V-6025P</td>
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5.11.6. ENSURE the power plug on the power cable is the correct model per H-14-103791, item 41.

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

<table>
<thead>
<tr>
<th>Engineer Signature</th>
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5.11.8. Quality Assurance Inspector to VERIFY that section 5.11 is completed and sign below.

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<thead>
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# ACCEPTANCE TEST PROCEDURE LOG

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# ACCEPTANCE TEST PROCEDURE EXCEPTION LOG

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## ACCEPTANCE TEST PROCEDURE EXCEPTION LOG

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**ACCEPTANCE TEST PROCEDURE EXCEPTION RECORD**

This page may be reproduced as necessary.

<table>
<thead>
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<th>ATP step number:</th>
<th>ATP Exception Log Number</th>
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<td>Date of Resolution:</td>
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<td>Cognizant Engineer signature:</td>
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<td>Quality Assurance signature:</td>
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<td>Design Authority:</td>
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**RESOLUTION COMPLETED:** (date)

| Quality Assurance: |
| Cognizant Engineer: |
**ACCEPTANCE TEST PROCEDURE ACCEPTANCE RECORD**

This Acceptance Test Procedure has been completed and the results, including red-line changes, exceptions, and exception resolutions, have been reviewed for compliance with the intent of the Purpose (Section 1.0). The test results are accepted by the undersigned:

<table>
<thead>
<tr>
<th>Cognizant Engineer (Signature)</th>
<th>(Print Name)</th>
<th>Date</th>
</tr>
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<tbody>
<tr>
<td>Quality Assurance (Signature)</td>
<td>(Print Name)</td>
<td>Date</td>
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</tbody>
</table>
All personnel who will be performing, initialing and signing the procedure shall enter their printed name, signature and initials below.

<table>
<thead>
<tr>
<th>PRINT NAME</th>
<th>SIGNATURE</th>
<th>INITIALS</th>
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53 OF 54
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