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ACCEPTANCE TEST PROCEDURE FOR NEW PUMPING AND INSTRUMENTATION CONTROL SKID "N"

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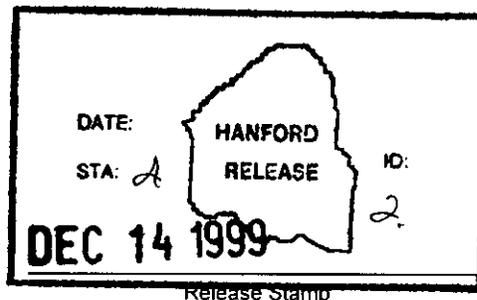
Abstract:

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

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ACCEPTANCE TEST PROCEDURE FOR NEW PUMPING INSTRUMENTATION AND CONTROL SKID “N”

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 “N”. 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 LMHC 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

LMHC 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, and 5.4 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 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-5490 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-14-103784, sheets 7 through 12 and H-14-103787, sheet 5.
- 4.1.2 Panel board arrangement on drawing H-14-103790.
- 4.1.3 Flow diagrams on drawings H-14-103784, sheet 5 and H-14-103789.

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

Engineer Signature _____ Date _____

Quality Assurance Inspector 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 "N" 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 _____

Quality Assurance Inspector 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 section 5.6.)

Report #'s: _____

Quality Assurance Inspector 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

- 4.3.1 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 and the NEC report received. (This needs to be completed prior to the section 5.0 functional checks.) Report # _____

Quality Assurance Inspector 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.

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

Calibration No. _____ Exp. Date _____ QA _____

Calibration No. _____ Exp. Date _____ QA _____

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 _____

Calibration No. _____ Exp. Date _____ QA _____

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 (3 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.

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- 4.4.10 _____ A thermocouple simulator 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.

4.6 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-6035N (EQUALIZING)
_____ SALW-V-6036N (EQUALIZING)

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

Air Compressor Cabinet

_____ SALW-V-6025N
_____ SALW-V-6026N
_____ SALW-V-6034N
_____ SALW-V-6043N
_____ SALW-V-6044N
_____ SALW-V-6046N
_____ SALW-V-6047N
_____ SALW-V-6048N
_____ SALW-V-6049N
_____ SALW-V-6050N
_____ SALW-V-6051N
_____ SALW-V-6053N

Water Cabinet

_____ SALW-V-6027N
_____ SALW-V-6028N
_____ SALW-V-6029N
_____ SALW-V-6030N
_____ SALW-V-6031N
_____ SALW-V-6032N
_____ SALW-V-6037N
_____ SALW-V-6052N

WFIE Cabinet

_____ SALW-V-6001N
_____ SALW-V-6002N
_____ SALW-V-6003N
_____ SALW-V-6004N
_____ SALW-V-6005N
_____ SALW-V-6006N
_____ SALW-V-6007N
_____ SALW-V-6008N
_____ SALW-V-6011N
_____ SALW-V-6012N
_____ SALW-V-6013N
_____ SALW-V-6014N

_____ SALW-V-6015N
_____ SALW-V-6016N
_____ SALW-V-6017N
_____ SALW-V-6018N
_____ SALW-V-6019N
_____ SALW-V-6020N
_____ SALW-V-6021N
_____ SALW-V-6035N(LOW)
_____ SALW-V-6035N(HIGH)
_____ SALW-V-6036N(LOW)
_____ SALW-V-6036N(HIGH)

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

_____ SALW-DS-6002N _____ SALW-DS-6003N
_____ SALW-DS-6004N _____ SALW-DS-6005N

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

_____ 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-6002N). Check all three phases and ground.

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

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

_____ (RED) _____ (YELLOW OR BLUE) _____ (GND)

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

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

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

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

- 5.1.5 Load side of the transformer disconnect switch (SALW-DS-6003N) through the primary of the transformer (SALW-XFMR-6001N). 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 (SALW-DP-6001N) through the secondary of transformer (SALW-XFMR-6001N). 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-6001N) 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-6002N 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-6002N) to ground and phase to phase. (Ensure switches SALW-DS-6003N, SALW-DS-6004N and SALW-DS-6005N 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-6003N) 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 ____ Ensure all the heaters, lights and air conditioner are disconnected or unplugged from the 120vac circuits.

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5.2.10 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 _____ |

5.2.11 _____ Ensure the load-side wire at each breaker where disconnected is reconnected.

5.2.12 _____ Reconnect the circuit 6 wire to the safe side terminal block in the Intrinsic safe panel.

5.2.13 _____ Reconnect any wires disconnected in step 5.2.9 above. (Unplugged items do not have to be plugged back in.)

5.2.14 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-6002N and SALW-DS-6003N) and motor starters (SALW-DS-6004N and SALW-DS-6005N) 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-6002N). Record the voltage readings.

_____ vac, A-B _____ A-C _____ B-C

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

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

_____ vac

5.3.9 _____ Ensure 480vac +/-20vac on the line side of the air compressor motor starter (SALW-DS-6004N). 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 (SALW-DS-6005N). Record the voltage readings.

_____ vac, A-B _____ vac, A-C _____ B-C

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- 5.3.11 _____ Remove the dead front on the panel board (SALW-DP-6001N) for access to the main breaker for a voltage measurement.
- 5.3.12 _____ Close the transformer disconnect switch (SALW-DS-6003N).
- 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-6003N).
- 5.3.15 _____ Replace the dead front on the panel board (SALW-DP-6001N).
- 5.3.16 _____ Close the transformer disconnect switch (SALW-DS-6003N).
- 5.3.17 _____ Close the 100 ampere main breaker in the panel board (SALW-DP-6001N).
- 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 | FGM HT BOX | | | |
| 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 in the Instrument Enclosure.
- 5.3.20 _____ Close breakers 3 and 5 in the distribution panel (SALW-DP-6001N).
- 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 each 24volt power supply.
- First power supply _____; Second power supply _____.
- 5.3.23 _____ Close breaker 6 in the distribution panel (SALW-DP-6001N).
- 5.3.24 _____ Ensure 32vdc +0/-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.)
- 5.3.25 _____ Open breakers 3, 5 and 6 in the panel board (SALW-DP-6001N).
- 5.3.26 _____ Open the 100 amperc main breaker in the panel board (SALW-DP-6001N).
- 5.3.27 _____ Open the transformer disconnect switch (SALW-DS-6003N).
- 5.3.28 _____ Open the main disconnect switch (SALW-DS-6002N).
- 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.

| INSTRUMENT | LOCATION | CAL. STICKER ON |
|-----------------|--------------------|-----------------|
| SALW-PS-6004N | AIR COMPR. CABINET | |
| SALW-WFT-6002N | WFIE CABINET | |
| SALW-LT-6003N | WATER CABINET | |
| SALW-SGT-6001N | WFIE CABINET | |
| SALW-CONV-6001N | WFIE CABINET | |
| SALW-FQIT-6001N | INSTRUMENT ENCL. | |
| SALW-PI-6006N | AIR COMPR. CABINET | |
| SALW-PI-6007N | AIR COMPR. CABINET | |
| SALW-PI-6008N | WATER CABINET | |
| SALW-PI-6001N | WFIE CABINET | |
| SALW-PI-6002N | WFIE CABINET | |
| SALW-PI-6003N | WFIE CABINET | |
| SALW-PI-6004N | WFIE CABINET | |
| SALW-PI-6005N | WFIE CABINET | |
| SALW-PI-6011N | INSTRUMENT ENCL. | |
| SALW-PI-6012N | 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 document RPP-5492.

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.

_____ SALW-DS-6002N
_____ SALW-DS-6003N
_____ SALW-DS-6004N
_____ SALW-DS-6005N

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

| | |
|----------------------|------------------|
| _____ 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 | |

5.6.4 _____ ACKNOWLEDGE any initial skid alarms.

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

5.6.6 _____ START the air compressor by positioning the positioning the switch on SALW-DS-6004N 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-6006N. 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 SALW-V-6043N until the compressor restarts and note the restart pressure as read on gauge SALW-PI-6006N. CLOSE valve SALW-V-6043N 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-6025N located in the air compressor cabinet.
- 5.6.14 _____ SLOWLY OPEN valve SALW-V-6027N located near the water tank.
- 5.6.15 _____ SLOWLY OPEN valve SALW-V-6052N located near the water tank
- 5.6.16 _____ ADJUST pressure regulator valve SALW-PCV-6006N to 30psi (+/- 3psi) as indicated by pressure gauge SALW-PI-6008N on the outside of the water cabinet.
- 5.6.17 _____ ACTUATE the lever on relief valve SALW-PRV-6004N 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-6004N seats properly when the lever is released.
- 5.6.19 _____ ACTUATE the lever on relief valve SALW-PRV-6005N 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-6005N 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-6051N located inside the air compressor cabinet and SALW-V-6026N located on the outside of the air compressor cabinet.
- 5.6.23 _____ SLOWLY OPEN valve SALW-V-6001N located in the WFIE cabinet. (NOTE: SALW-PRV-6002N may open if pressure through SALW-PCV-6001N is too high.)

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- 5.6.24 _____ ADJUST pressure control valve SALW-PCV-6001N 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-6004N located in the WFIE cabinet.
- 5.6.26 _____ SLOWLY OPEN valve SALW-V-6003N located in the WFIE cabinet.
- 5.6.27 _____ SLOWLY OPEN valve SALW-V-6005N located in the WFIE cabinet.
- 5.6.28 _____ SLOWLY OPEN valve SALW-V-6006N located in the WFIE cabinet.
- 5.6.29 _____ SLOWLY OPEN valve SALW-V-6007N located in the WFIE cabinet.
- 5.6.30 _____ SLOWLY OPEN valve SALW-V-6020N located in the WFIE cabinet.
- 5.6.31 _____ SLOWLY OPEN valve SALW-V-6021N located in the WFIE cabinet.
- 5.6.32 _____ SLOWLY OPEN valve SALW-V-6019N 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-6002N.
- 5.6.35 _____ ADJUST flow to dip tube to 1.5 CFH (+/-0.5 CFH) as indicated by SALW-FIV-6003N.
- 5.6.36 _____ ADJUST flow to dip tube to 1.5 CFH (+/-0.5 CFH) as indicated by SALW-FIV-6004N.
- 5.6.37 _____ ENSURE air flow from pressure regulator SALW-PCV-6007N by slowly opening valve SALW-V-6044N in the air compressor cabinet and then reclose the valve.
- 5.6.38 _____ ENSURE air flow from pressure regulator SALW-PCV-6008N by slowly opening valve SALW-V-6048N in the air compressor cabinet and then reclose the valve.
- 5.6.39 _____ ENSURE air flow from the SALW-V-6042N port at the air compressor cabinet by slowly opening valve SALW-V-6046N 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 SALW-V-6047N and SALW-V-6046N 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-6001N 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-6016N
 - _____ SALW-V-6013N
 - _____ SALW-V-6008N

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

- 5.7.3 _____ SLOWLY OPEN SALW-V-6018N WHILE CAREFULLY ADJUSTING Pressure Regulator SALW-PCV-6005N located in the WFIE cabinet to 20psig (+/-2psig) as indicated on gauge SALW-PI-6001N in the WFIE cabinet.
- 5.7.4 _____ ADJUST valve SALW-V-6014N to allow approximately 2 drops/second as indicated by sight glass SALW-FG-6001N.
- 5.7.5 _____ ADJUST valve SALW-V-6015N to allow approximately 2 drops/second as indicated by sight glass SALW-FG-6002N.
- 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-6015N
 - _____ SALW-V-6014N
 - _____ SALW-V-6008N
 - _____ SALW-V-6013N
 - _____ SALW-V-6019N
 - _____ SALW-V-6021N
 - _____ SALW-V-6020N
 - _____ SALW-V-6007N
 - _____ SALW-V-6006N
 - _____ SALW-V-6005N

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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 “FGM” and “CKT5H-A” on terminal board TB4 in the Instrument Enclosure.
- 5.8.3 _____ ENSURE a normally closed switch is connected to “DIL-F” and “CKT5H-A” on terminal board TB4 in the Instrument Enclosure.
- 5.8.4 _____ 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.
- 5.8.5 _____ 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 per H-14-103784, sheet 7.

WATER TANK LEVEL TRANSMITTER

- 5.8.7 _____ ENSURE valve SALW-V-6029N located in the water tank cabinet is CLOSED.
- 5.8.8 _____ ENSURE valve SALW-V-6031N 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 SALW-LT-6003N.
- 5.8.10 _____ ENSURE the LOW PRESSURE vent/test port of level transmitter SALW-LT-6003N is OPEN to atmosphere.
- 5.8.11 _____ ADJUST the test manometer connected to SALW-LT-6003N 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 between 11.75” to 12.75” 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 approximately 15.5” 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 SALW-LT-6003N high
pressure vent/test port and reinstall the vent plugs on both the high and low
sides.
- 5.8.21 _____ OPEN valve SALW-V-6029N located in the Water Cabinet.
- 5.8.22 _____ OPEN valve SALW-V-6031N 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 SALW-V-6001N is CLOSED.
- 5.8.26 _____ ENSURE SALW-V-6005N is OPEN.

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- 5.8.27 _____ ENSURE SALW-V-6006N is OPEN.
- 5.8.28 _____ ENSURE adjustment valves on SALW-FIV-6002N, SALW-FIV-6003N and SALW-FIV-6004N are CLOSED.
- 5.8.29 _____ ENSURE SALW-WFT-6002N EQUALIZING valve located on the SALW-V-6036N 3-Valve manifold in the WFIE cabinet is CLOSED.
- 5.8.30 _____ ENSURE the LOW and HIGH side isolation valves located on the SALW-V-6036N 3-Valve manifold in the WFIE cabinet are OPEN.
- 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 SALW-V-6006N.
- 5.8.35 _____ OPEN SALW-WFT-6002N equalizing valve located on SALW-V-6036N 3-Valve manifold in the WFIE cabinet.
- 5.8.36 _____ CLOSE the LOW and HIGH side isolation valves located on the SALW-V-6036N 3-Valve manifold in the WFIE cabinet.

SPECIFIC GRAVITY TRANSMITTER

- 5.8.37 _____ ENSURE SALW-V-6007N is OPEN.
- 5.8.38 _____ ENSURE SALW-V-6005N is OPEN.
- 5.8.39 _____ ENSURE the LOW and HIGH side isolation valves located on SALW-V-6035N 3-Valve manifold in the WFIE cabinet are OPEN.
- 5.8.40 _____ ENSURE the specific gravity transmitter equalizing valve located on the SALW-V-6035N 3-Valve manifold located in the WFIE cabinet is CLOSED.
- 5.8.41 _____ SET the test manometer to 5" water gauge (+/- 0.3").

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- 5.8.42 _____ RECORD the “SGT” reading on the DTAM. Reading to be 5” +/- 0.35”. _____
- 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 SALW-V-6007N.
- 5.8.48 _____ CLOSE SALW-V-6005N.
- 5.8.49 _____ OPEN SALW-SGT-6001N equalizing valve located on SALW-V-6035N 3-Valve manifold in the WFIE cabinet.
- 5.8.50 _____ CLOSE the LOW side and HIGH side isolation valves located on SALW-V-6035N 3-Valve manifold in the WFIE cabinet.

FLOW METER SIGNAL CHECK

- 5.8.51 _____ IF necessary, ENSURE a brain terminal is connected to flow converter SALW-FQIT-6001N located in the Instrument Enclosure.
- 5.8.52 _____ SIMULATE a flow signal of 4.0gpm (50% span) 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 4.0 +/- 0.4 gpm.
- Flow converter _____ DTAM (PMP FLOW) _____
- 5.8.54 _____ RESTORE the flow converter, SALW-FQIT-6001N 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 SALW-PI-6012N. Reading to be approximately zero.
_____ psi
- 5.8.57 _____ SET the current source to approximately 20mA and record the suction pressure reading on SALW-PI-6012N. 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 SALW-PI-6011N and on the DTAM. Readings should be approximately zero.
SALW-PI-6011N _____ psi DTAM (PMP DISC) _____ psi
- 5.8.61 _____ SET the current source to approximately 20mA and record the discharge pressures on SALW-PI-6011N and on the DTAM. Readings should be approximately 300psi.
SALW-PI-6011N _____ psi DTAM (PMP DISC) _____ psi
- 5.8.62 _____ DISCONNECT the current source.

PIT FLAMMABLE GAS MONITOR ANALOG SIGNAL TO PLC

- 5.8.63 _____ ENSURE a current source is connected to terminal board TB1 in the Instrument Enclosure, points FGM 0(+) and FGM 0(-)
- 5.8.64 _____ SET the current source to approximately 4mA.

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- 5.8.65 _____ RECORD the “FGM” percent reading from the DTAM. Reading is to be approximately zero. _____ %
- 5.8.66 _____ SET the current source to approximately 10mA.
- 5.8.67 _____ RECORD the “FGM” percent reading from the DTAM. Reading is to be approximately 11%. _____ %
- 5.8.68 _____ SET the current source to approximately 20mA.
- 5.8.69 _____ RECORD the “FGM” percent reading from the DTAM. Reading is to be approximately 30%. _____ %
- 5.8.70 _____ DISCONNECT the current source.

DOME 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 10mA.
- 5.8.75 _____ RECORD the “FGM” percent reading from the DTAM. Reading is to be approximately 11%. _____ %
- 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 30%. _____ %
- 5.8.78 _____ DISCONNECT the current source.

THERMOCOUPLE INPUTS TO THE PLC

- 5.8.79 _____ WARM thermocouple SALW-TE-6004N located in the Instrument Enclosure.
- 5.8.80 _____ ENSURE the “PLC CAB temp” on the DTAM displays a temperature change.

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- 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 SALW-TE-6004N 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 SALW-TE-6003N 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 SALW-TE-6003N thermocouple.
- 5.8.90 _____ ENSURE the “CMPRSR temp” alarm returns to “norm” when the temperature decreases below 125 degrees F.
- 5.8.91 _____ 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.
- 5.8.92 _____ ENSURE alarm 30, “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”.
- 5.8.94 _____ 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.
- 5.8.95 _____ ENSURE alarm 25, “WATER CAB Temp Low” occurs at the DTAM.
- 5.8.96 _____ WARM or ALLOW to warm the thermocouple probe in the Water cabinet and ENSURE the “WATER CAB Temp” alarm is “norm”.

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- 5.8.97 _____CONNECT a temperature simulator to the intrinsic side of the top thermocouple module (MTL 3081) in the Intrinsic Safe panel.
- 5.8.98 _____SET the temperature simulator to approximately 140 degrees F.
- 5.8.99 _____ENSURE the “PUMP temp” reads approximately 140 degree at the DTAM.
- 5.8.100_____ENSURE the “Jmp Htr” is ON at the DTAM.
- 5.8.101_____DECREASE the temperature simulator to approximately 39 degrees or lower until alarm 8 “Pump/Jumper Temp Trouble” alarms on the DTAM.
- 5.8.102_____ACKNOWLEDGE the alarm.
- 5.8.103_____DISCONNECT the temperature simulator.
- 5.8.104_____CONNECT a temperature simulator to the intrinsic side of the second thermocouple module (MTL 3081) in the Intrinsic Safe panel.
- 5.8.105_____SET the temperature simulator to approximately 140 degrees F.
- 5.8.106_____ENSURE the “JMPER TEMP” reads approximately 140 degree at the DTAM.
- 5.8.107_____ENSURE the “Jmp Htr” is ON at the DTAM.
- 5.8.108_____ENSURE the switch installed on TB4 between points “FGM” and “CKT5H-A” is 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 to 206 degrees F or higher until the voltage at TB12 goes to approximately zero.
- 5.8.111_____WHILE MONITORING the voltage at TB12, decrease the temperature to 194 degrees F or lower until the voltage at TB12 goes to approximately 120vac.
- 5.8.112_____OPEN the switch on TB4 that is across “FGM” and “CKT5H-A”.
- 5.8.113_____ENSURE the voltage at TB12 goes to approximately zero.
- 5.8.114_____CLOSE the switch on TB4 that is across “FGM” and “CKT5H-A”.

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- 5.8.115 _____ ENSURE the voltage at TB12 returns to approximately 120vac.
- 5.8.116 _____ TURN OFF the heat trace from the DTAM.
- 5.8.117 _____ ENSURE the voltage at TB12 goes to approximately zero.
- 5.8.118 _____ TURN ON the heat trace from the DTAM.
- 5.8.119 _____ ENSURE the voltage at TB12 returns to approximately 120vac.
- 5.8.120 _____ INCREASE the temperature simulator to approximately 226 degrees or higher until alarm 8 "Pump/Jumper Temp Trouble" alarms on the DTAM.
- 5.8.121 _____ ACKNOWLEDGE the alarm.
- 5.8.122 _____ DISCONNECT the temperature simulator.
- 5.8.123 _____ ENSURE the "JMPR HT" alarm returns to "norm" on the DTAM.
- 5.8.124 Engineer to Ensure section 5.8 is completed and sign below.

Engineer Signature

Date

- 5.8.125 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 FGM switch 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 5.8.7.
- 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.)
- 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.

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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.

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- 5.9.22 _____ APPLY software forces to allow the jet pump to start. (Engineering will apply the forces from the laptop computer connected to the PLC.)
- 5.9.23 _____ 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 12 occurs, "JET PUMP SHUTDOWN".
 - _____ Alarm 3 occurs, "Flush Pressure HI".
 - _____ 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" (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.
- 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.

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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 form 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.

FLAMMABLE GAS MONITOR INTERLOCK INPUT

5.9.52 _____ START the pump from the DTAM.

5.9.53 _____ OPEN the FGM switch at TB4.

5.9.54 _____ ENSURE the following occurs immediately: (Acknowledge alarms as necessary to view the alarms.)

_____ “FLAMMABLE GAS HIGH” (alarm 22) 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.

5.9.55 _____ CLOSE the FGM switch at TB4.

5.9.56 _____ ENSURE the “FGM” alarm indicates “norm” at the DTAM.

5.9.57 _____ START the pump from the DTAM.

5.9.58 _____ OPEN the dilution switch at TB4 in the Instrument Enclosure.

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

_____ “DILUTION TANK NO FLOW” (alarm 35) 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.

5.9.59 _____ CLOSE the dilution switch.

5.9.60 _____ ENSURE the “Dilution tk” alarm indicates “norm” on the DTAM.

RECIRCULATION LOW FLOW

5.9.61 _____ START the pump from the DTAM.

5.9.62 _____ OPEN the Recirculation switch at the Intrinsic Safe panel.

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

_____ “Recirculation Failure” (alarm 21) 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.

- 5.9.64 _____ CLOSE the Recirculation switch.
- 5.9.65 _____ ENSURE the “Recirc Loop” alarm indicates “norm” at the DTAM.

LEAK DETECTION INTERLOCK

- 5.9.66 _____ ENSURE there is a water supply and bucket available to actuate the leak detector probes.
- 5.9.67 _____ START the pump from the DTAM.
- 5.9.68 _____ PLACE the primary leak detector probe in a bucket of water.
- 5.9.69 _____ 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” (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.
 - _____ Ensure address N20:32/3 in ladder 5 actuates as observed on the laptop.
- 5.9.70 _____ REMOVE the leak detector probe from the bucket and allow the water to drain off.
- 5.9.71 _____ ENSURE the “Pump Pit” leak alarm returns to “norm”.
- 5.9.72 _____ ENSURE address N20:32/3 clears as observed on the laptop.
- 5.9.73 _____ START the pump from the DTAM.
- 5.9.74 _____ DISCONNECT one of the “SD” wires going to the primary leak detector probe.
- 5.9.75 _____ 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” (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.
 - _____ Ensure address N20:32/3 actuates as observed on the laptop.
- 5.9.76 _____ RECONNECT the “SD” wire.

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- 5.9.77 _____ ENSURE the “Pump Pit” trouble alarm indicates “norm” on the DTAM.
- 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 _____ PLACE the leak detector 1 probe in a bucket of water.
- 5.9.81 _____ ENSURE the following occurs after a 3-second delay: (Acknowledge alarms as necessary to view the alarms.)
- _____ “LEAK DETECTOR NO 1 LEAK DETECTED” (alarm 18) 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.
- _____ Ensure address N20:32/4 actuates in ladder 5 as observed on the laptop.
- 5.9.82 _____ REMOVE the leak detector probe from the bucket and allow the water to drain off.
- 5.9.83 _____ ENSURE the “Leak 1” alarm returns to “norm”.
- 5.9.84 _____ ENSURE address N20:32/4 clears as observed on the laptop.
- 5.9.85 _____ START the pump from the DTAM.
- 5.9.86 _____ DISCONNECT one of the “SD” wires going to the leak detector 1 probe.
- 5.9.87 _____ ENSURE the following occurs after a 3-second delay: (Acknowledge alarms as necessary to view the alarms.)
- _____ “LEAK DETECTOR NO 1 TROUBLE” (alarm 19) 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.
- _____ Ensure address N20:32/4 actuates as observed by the laptop.
- 5.9.88 _____ RECONNECT the “SD” wire.

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- 5.9.89 _____ ENSURE the “Leak 1 ck” alarm indicates “norm” on the DTAM.
- 5.9.90 _____ ENSURE address N20:32/4 clears as observed on the laptop.
- 5.9.91 _____ DISCONNECT the current sources from the PXPT, RFPT and JFPT termination points.
- 5.9.92 _____ DISCONNECT the test switches from the FGM, Dilution and Recirculation termination points.
- 5.9.93 _____ DISCONNECT the proximity switches from the Intrinsic Safe panel.
- 5.9.94 _____ REMOVE the laptop computer from the PLC.
- 5.9.95 _____ DISCONNECT the leak detector probes from the Instrument Enclosure.
- 5.9.96 Engineer to ENSURE section 5.9 is completed and sign below.

Engineer Signature Date

- 5.9.97 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 approximately 40 degrees F to allow the heat to turn OFF.
- 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

ACCEPTANCE TEST PROCEDURE EXCEPTION RECORD

This page may be reproduced as necessary.

| | |
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| ATP step number: | ATP Exception Log Number |
| Description of Exception: | |
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| | |
| Resolution of Exception: | |
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| | |
| | |
| | |
| Date of Resolution: | |
| Cognizant Engineer signature: | |
| Quality Assurance signature: | |
| Design Authority: | |
| 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:

Cognizant Engineer (Signature)

(Print Name)

Date

Quality Assurance (Signature)

(Print Name)

Date

