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REPLACEMENT EXHAUSTER UNIT

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**This document was reviewed following the
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December 16, 1994

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7. Abstract

THIS ACCEPTANCE TEST PROCEDURE WILL VERIFY THAT THE CONTROLS, ALARMS, INTERLOCKS, AND INTERFACES WITH OTHER SY TANK FARM EQUIPMENT AND REMOTE MONITORING STATIONS ARE ALL FUNCTIONING CORRECTLY FOR THE SY FARM REPLACEMENT EXHAUSTER UNIT. TESTING WILL BE CONDUCTED IN TWO PHASES, THE FIRST AT THE KEH 200W AREA FAB SHOP AND THE SECOND IN THE SY TANK FARM AFTER INSTALLATION OF THE EXHAUSTER UNIT IN THE FARM.

8.

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ACCEPTANCE TEST PROCEDURE FOR SY TANK FARM REPLACEMENT EXHAUSTER UNIT

**WHC-SD-WM-ATP-080
REVISION 0**

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DECEMBER 1994

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ATP FOR SY TANK FARM REPLACEMENT EXHAUSTER UNIT

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ATP FOR SY TANK FARM REPLACEMENT EXHAUSTER UNIT

1.0 PURPOSE/SCOPE

The proper functioning of a new 241-SY Tank Farm replacement exhauster will be acceptance tested, to establish operability and to provide an operational baseline for the equipment.

During this test, a verification of all of the alarm and control circuits associated with the exhauster, which provide operating controls and/or signals to local and remote alarm/annunciator panels, shall be performed. Test signals for sensors that provide alarms, warnings, and/or interlocks will be applied to verify that alarm, warning, and interlock setpoints are correct.

Alarm and warning lights, controls, and local and remote readouts for the exhauster will be verified to be adequate for proper operation of the exhauster.

Testing per this procedure shall be conducted in two phases. The first phase of testing, to verify alarm, warning, and interlock setpoints primarily, will be performed in the MO-566 Fab Shop. The second phase of testing, to verify proper operation and acceptable interface with other tank farm systems, will be conducted after the exhauster and all associated support and monitoring equipment have been installed in the SY Tank Farm.

2.0 REFERENCES

- 2.1 H-2-85591, "SY Farm K1-1 Exhauster Alarm Annunciator Panel", Sheets 1, 3
- 2.2 WHC-CM-6-1, Standard Engineering Practices Manual, EP-1.12, "Supporting Documents Requirements"
- 2.3 WHC-IP-1026, Engineering Practice Guidelines, EPG-1.12, "Supporting Documents"
- 2.4 WHC-IP-1026, Engineering Practice Guidelines, Appendix K, "Test Plans, Specifications, Procedures, and Reports"
- 2.5 Vendor Test 93052ATP, Rev. 1, "Acceptance Test Procedure (ATP) for 241-SY Tank Farm Replacement Exhauster Unit Specification WHC-S-0193, Rev. 0"
- 2.6 Vendor Test AMC W. O. #22445, "Factory Acceptance Test Procedure of Sampling/Monitoring System for 241-SY Tank Farm Replacement Exhauster Stack Westinghouse Hanford Company P. O. No. MDW-XVV-281221"
- 2.7 Vendor Information, "Sequence of Operation Air Sampling and Monitoring System for the 241-SY Tank Farm Exhauster Stack AMC W. O. No. 22445"
- 2.8 Vendor Drawing (Air Monitor Corporation), W22445BA, "Sample Monitoring Controls Power Distribution Schematics"

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- 2.9 Vendor Drawing (Air Monitor Corporation), W22445DA, "Sample Monitoring Controls Pump Control Wiring Diagram"
- 2.10 Vendor Drawing (Air Monitor Corporation), W22445FA, "Sample Monitoring Controls System Schematic"
- 2.11 Vendor Drawing (Barnebey & Sutcliffe Corp), 24592, "(General Arrangement) Tank Farm Exhauster/24372", Sheet 2 of 4, Rev. C
- 2.12 Vendor Drawing (Barnebey & Sutcliffe Corp), 24592, "Process & Instrumentation Diagram Exhauster (241-SY Tank Farm)", Sheet 3 of 4, Rev. C
- 2.13 Vendor Drawing (Nutherm), 1023-59341-43, "Dimensional Outline/Detail Electric Heater Control Panel", Rev. A
- 2.14 Vendor Drawing (Nutherm), 1023-59342-43, "Electrical Schematic Heater/Control Panel", Rev. C

3.0 RESPONSIBILITIES

The following personnel will be required for the performance of this procedure:

- Test Director: The engineer assigned shift responsibility for performance of the test.
- Test Engineer: The engineer assigned to assist and relieve the Test Director during the performance of the test.
- Support Personnel: Fab Shop or other Craft personnel assigned to support testing activities.
- Tank Farm Operations: Operators assigned by the West Area Shift Manager (WASM) to support testing activities.

At least one engineer acting as a Test Director is required to be present at the exhauster skid during testing. One or more support persons and tank farm operators could also be required to conduct testing activities during both phases of testing.

If, during testing, any indicated parameter or control function is not correct or appears to be malfunctioning, then the engineer conducting this test shall make a determination as to the feasibility of continuing testing. In most cases, if actual exhauster operation is not occurring, there will be no safety impact to continuing the test and completing corrective actions later. A record of all noted deficiencies will be kept on Attachment 1, "Exception List".

At the completion of all testing, approval of all data collected and exhauster system performance shall be documented on Attachment 3, "Final Procedure Acceptance Sheet".

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All changes to this procedure shall be implemented by direct ECN and shall receive the approval signatures appropriate to the approval designation of the change.

4.0 DESCRIPTION OF THE SYSTEM

The exhauster, which is mounted on a skid and which will eventually be located in the SY tank farm, receives input signals from a variety of sensors mounted on the skid and associated equipment. These sensors provide information such as:

- Exhauster system inlet vacuum pressure
- Prefilter and HEPA filter differential pressures
- Exhaust stack sampler status
- Exhaust fan status
- System status (running/shut down)
- Radiation monitoring systems status

The output of these sensors is transmitted to the exhauster annunciator panel where the signals are displayed and monitored for out-of-specification conditions.

This procedure will test the signals to be transmitted from the exhauster skid to the annunciator panel, the operation of the exhauster equipment, and the operational interface of the exhauster equipment with other tank farm systems such as radiation monitoring systems, exhaust stack monitoring systems, remote monitoring stations, and tank ventilation monitoring systems.

5.0 TEST CONDITIONS AND EQUIPMENT REQUIRED

5.1 The provisions of the following manuals apply to all work performed under this procedure:

- WHC-CM-4-3, Industrial Safety Manual, Vols 1-3
- WHC-CM-4-10, Radiation Protection Manual
- WHC-CM-4-15, Radiation Work Requirements and Permits Manual, Vol 2
- WHC-CM-4-40, Industrial Hygiene Manual

5.2 Jumpers and Lifted Leads

In this procedure, there are several occasions when leads are lifted and landed at various terminals. Some of these leads must be energized to perform an adequate test. Required hand and eye protection shall be worn, and insulated tools shall be used, when working on energized circuits (< 150 Vac).

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5.3 Unexpected Alarms

If unexpected, non-exhauster, tank farm equipment alarms or abnormal indications are received during testing, then exhauster testing evolutions shall be immediately suspended and actions, as prescribed in approved Tank Farms Alarm Response and Emergency Procedures, shall be taken by Tank Farms Operations personnel to place the equipment/farm in a safe, stable condition. When the reason for the unexpected condition is understood and resolved, then exhauster testing activities may be resumed after permission to do so is received from the responsible West Area Shift Manager (WASM).

5.4 Prior to initiation of phase one testing, the following items shall be verified:

- 5.4.1 The exhauster skid has been received in the MO-566 Fab Shop and assembled to the extent necessary to conduct testing of alarms and interlocks.

Verified by: _____ / _____
(Test Director) Date

- 5.4.2 The exhauster skid has been supplied with temporary electrical power, potable water, and a temporary prefilter and HEPA filters.

Verified by: _____ / _____
(Test Director) Date

- 5.4.3 Necessary scaffolding has been erected at the exhauster skid to allow access to the stack sampling enclosure during testing.

Verified by: _____ / _____
(Test Director) Date

5.5 Prior to initiation of phase two testing, the following items shall be verified:

- 5.5.1 The exhauster skid has been installed in the 241-SY Tank Farm and all connections to remote alarm/annunciator panels and other tank farm equipment have been completed.

Verified by: _____ / _____
(Test Director) Date

5.6 Prior to initiation of testing, the following equipment shall be available for use:

NOTE: The following items are needed for both phases of testing.

- 5.6.1 Insulated hand tools normally required for accessing equipment cabinets and terminal boards.

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- 5.6.2 Container, approximately 1 gallon capacity, for transporting potable water

NOTE: The following items are needed for phase 1 testing only.

- 5.6.3 Calibrated velometer, capable of measuring 1100 scfm
- 5.6.4 Calibrated signal generator, capable of supplying 4 - 20 mA
- 5.6.5 Voltmeter (calibration not required); Range: 0.00 - 30.00 (nominal) Vdc, 0.00 - 500.00 (nominal) Vac
- 5.6.6 Calibrated Type J T/C simulator with temperature reading
- 5.6.7 Type J T/C with approximately 3 feet of T/C wire leads
- 5.6.8 Vise Grip type pliers (4 pr)
- 5.6.9 Calibrated probe-type thermometer, 0 - 212 °F, with accuracy to ± 1 °F
- 5.6.10 Stopwatch, with commercial accuracy (no calibration required)

NOTE: The following items are needed for phase 2 testing only.

- 5.6.11 Anti-contamination clothing and other personnel safety equipment required for access to the SY tank farm, and to perform work on energized equipment
- 5.6.12 Radios (2 minimum) or other means of communications, for communicating between the exhaustor skid and remote monitoring stations
- 5.7 Calibration and use information for all Measuring and Test Equipment (M & TE) used during the performance of this procedure shall be recorded on Attachment 2, Measurement and Test Equipment Record Sheet.

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6.0 ACCEPTANCE TEST

- 6.0.1 If any discrepancy is noted during testing, then record a description of the condition in Attachment 1.
- 6.0.1.1 For each discrepancy recorded, enter an identifying number in the "EXCEPTION NUMBER" Column of Attachment 1.
- 6.0.1.2 Reproduce Attachment 1 as needed, and attach the additional pages to this procedure, to record all discrepancies noted during testing.

NOTE: Sections 6.1 through 6.12 describe testing activities to be performed during the first phase of testing. Sections 6.13 and 6.14 describe testing activities to be performed during the second phase of testing.

6.1 Exhauster Fan Controls Operability Check

- 6.1.1 Open the fill port cap on the seal pot reservoir.
- 6.1.2 Using any available source of potable water and a convenient container or hose, fill the seal pot reservoir through the fill port, to the main drain level.
- 6.1.3 Replace the fill port cap.
- 6.1.4 Ensure that the "ALARM SELECTOR" Switch is in "AUTO".

NOTE: There are 7 individual circuit breakers in the Power Distribution panel located on the exhauster skid. These circuit breakers should be OPEN/OFF prior to closing the main power supply circuit breaker for the exhauster skid and closed one at a time for initial power-up of the exhauster system for testing.

- 6.1.5 Open the Power Distribution Panel doors and ensure that the 7 circuit breakers inside the panel are OPEN or OFF.
- 6.1.6 Close the exhauster main power supply circuit breaker.
- 6.1.7 Close the 5 circuit breakers NOT labeled "SPARE" in the Power Distribution Panel one at a time, pausing after each breaker is closed, to observe the exhauster skid for unusual conditions.
- 6.1.8 When all 5 circuit breakers are closed, then close the Power Distribution Panel doors.

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NOTE: When the exhauster motor is "bumped" in Step 6.1.10, the test engineer must be in a position to verify proper direction-of-rotation of the exhauster fan.

- 6.1.9 Ensure that "FAN NOT RUNNING", "POWER ON", and "SYSTEM SHUTDOWN" lights are lit.
- 6.1.10 Press the "FAN START" button and then quickly press the "FAN STOP" button to "bump" the exhauster fan motor.
- 6.1.11 Verify that the direction-of-rotation of the exhauster fan was in the direction of the arrow on the fan housing.
- 6.1.12 If the exhauster fan motor direction-of-rotation was NOT correct, then stop testing and repeat Steps 6.1.4 through 6.1.11 after corrections have been made, and go to Step 6.1.13.
- 6.1.13 With fan ON and all alarms cleared, position the "ALARM SELECTOR" switch to "TEST".
- 6.1.14 After ALARM TEST light is lit, then release the switch.
- 6.1.15 Verify that the audible alarm horn is sounding.
- 6.1.16 Silence the alarm by positioning the "ALARM SELECTOR" switch to "SILENCE" and verify that the audible horn is silenced.
- 6.1.17 Verify that the ALARM ACTIVE and SHUTDOWN ACTIVE lights are NOT lit.
- 6.1.18 Initial the "INITIALS - ON" column of Table 1 to verify each light is lit.

Table 1

Light DESCRIPTION	INITIALS - ON	INITIALS - OFF
PREFILTER HI Δ P ALARM		
HEPA 1 LO Δ P ALARM		
HEPA 1 HI Δ P ALARM		
HEPA 1 HI HI Δ P SHUTDOWN		
HEPA 2 LO Δ P ALARM		
HEPA 2 HI Δ P ALARM		
HEPA 2 HI HI Δ P SHUTDOWN		
SYSTEM HI Δ P ALARM		

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Light DESCRIPTION	INITIALS - ON	INITIALS - OFF
SYSTEM HI HI Δ P SHUTDOWN		
STACK SAMPLER SHUTDOWN		
HIGH RADIATION SHUTDOWN		
SYSTEM INLET LO VACUUM ALARM		
SYSTEM INLET HI VACUUM ALARM		
SYSTEM INLET HI HI VACUUM SHUTDOWN		
ALARM ON		
DUCT HEATER LO Δ T ALARM		
DUCT HEATER HI Δ T ALARM		
SEAL POT HI LIQUID LEVEL ALARM		
SEAL POT LO LIQUID LEVEL ALARM		

6.1.19 Silence the alarm.

6.1.20 Press the "ALARM RESET" push button.

6.1.21 Position the "ALARM SELECTOR" switch to "AUTO".

6.1.22 Initial the "INITIALS - OFF" column of Table 1 to verify each light is NOT lit.

6.1.23 Initial the "INITIALS" column of Table 2 to verify each light is lit.

Table 2

Light DESCRIPTION	INITIALS
PREFILTER HI Δ P OK	
HEPA 1 LO Δ P OK	
HEPA 1 HI Δ P OK	
HEPA 1 HI HI Δ P OK	
HEPA 2 LO Δ P OK	
HEPA 2 HI Δ P OK	
HEPA 2 HI HI Δ P OK	

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Light DESCRIPTION	INITIALS
SYSTEM HI ΔP OK	
SYSTEM HI HI ΔP OK	
STACK SAMPLER OK	
HIGH RADIATION OK	
SYSTEM INLET LO VACUUM OK	
SYSTEM INLET HI VACUUM OK	
SYSTEM INLET HI HI VACUUM OK	
POWER ON	
SHUTDOWN ACTIVE	
FAN RUNNING	
ALARM ACTIVE	
STACK SAMPLER OK (REDUNDANT)	
DUCT HEATER LO TEMP OK	
DUCT HEATER HI TEMP OK	
SEAL POT HI LIQUID LEVEL OK	
SEAL POT LO LIQUID LEVEL OK	

- 6.1.24 Stop fan.
- 6.1.25 Simultaneously press the "FAN START" button and start a stopwatch.
- 6.1.26 Record the time for both the BLUE "ALARM ACTIVE" and "SHUTDOWN ACTIVE" lights illuminate: _____ seconds.
- 6.1.27 Verify that the time recorded in Step 6.1.26 is 5 seconds (4 to 6 seconds).
- 6.1.28 Press the "EMERGENCY STOP" button and verify that the fan stops.
- 6.1.29 Pull out the "EMERGENCY STOP" button to restore power to the panel. Fan should restart.
- 6.1.30 Refer to Table 3 for testing the "FAIL SAFE" feature of the annunciator panel relays.

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WARNING

Testing per steps 6.1.31 through 6.1.40 requires access to energized electrical components in an energized control panel. Voltages as high as 120 Vac are present inside the panel. All required safety precautions for work inside energized panels shall be followed and all required personal protective equipment shall be worn during panel access.

NOTE: During "FAIL SAFE" testing of the relays listed in Table 3, relays may be tested in any convenient order, at the direction of the Test Director.

- 6.1.31 Select a relay listed in the "RELAY DESCRIPTION" column of Table 3.
- 6.1.32 Carefully remove the relay from the annunciator panel socket and verify:
 - The associated indicator light, as listed in the "EXPECTED ALARM" column of Table 3, is lit.
 - The associated GREEN "OK" light is NOT lit.
 - If the expected alarm light is red, then the SYSTEM ALARM light will light.
 - If the expected alarm light is yellow, then the SYSTEM ALARM light will light and SYSTEM SHUTDOWN will occur.
 - The audible alarm horn is sounding.
- 6.1.33 Silence the alarm.
- 6.1.34 Reinstall the relay in the annunciator panel socket.
- 6.1.35 To clear RED alarm lights, press the "ALARM RESET" push button.
- 6.1.36 To clear YELLOW alarm lights, restart fan.
- 6.1.37 Position the "ALARM SELECTOR" switch to "AUTO".
- 6.1.38 Verify that the lights lit in Step 6.1.32 are NOT lit, and that the associated GREEN "OK" light is lit.
- 6.1.39 Initial the "INITIALS" column of Table 3 for each relay that was tested satisfactorily.
- 6.1.40 Repeat Steps 6.1.31 through 6.1.39 until all relays listed in Table 3 have been tested.

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Table 3:

RELAY DESCRIPTION	EXPECTED ALARM	INITIALS
LO INLET VACUUM	SYSTEM INLET LO VACUUM ALARM	
HI INLET VACUUM	SYSTEM INLET HI VACUUM ALARM	
HI HI INLET VACUUM	SYSTEM INLET HI HI VACUUM SHUTDOWN	
HI PREFILTER ΔP	PREFILTER HI ΔP ALARM	
LO HEPA #1 ΔP	HEPA #1 LO ΔP ALARM	
HI HEPA #1 ΔP	HEPA #1 HI ΔP ALARM	
HI HI HEPA #1 ΔP	HEPA #1 HI HI ΔP SHUTDOWN	
LO HEPA #2 ΔP	HEPA #2 LO ΔP ALARM	
HI HEPA #2 ΔP	HEPA #2 HI ΔP ALARM	
HI HI HEPA #2 ΔP	HEPA #2 HI HI ΔP SHUTDOWN	
HI SYSTEM ΔP	SYSTEM HI ΔP ALARM	
HI HI SYSTEM ΔP	SYSTEM HI HI ΔP SHUTDOWN	
STACK SAMPLER SYSTEM SHUTDOWN	STACK SAMPLER SHUTDOWN	
HI RADIATION	HIGH RADIATION SHUTDOWN	
HI SEAL POT LEVEL	SEAL POT HI LIQUID LVL ALARM	
LO SEAL POT LEVEL	SEAL POT LO LIQUID LVL ALARM	
HI DUCT HEATER ΔT	DUCT HEATER HI ΔT ALARM	
LO DUCT HEATER ΔT	DUCT HEATER LO ΔT ALARM	

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

ATP FOR SY TANK FARM REPLACEMENT EXHAUSTER UNIT

6.2 Exhauster Unit System Flowrate Check

- 6.2.1 With fan running, adjust valve on system inlet piping until the SYSTEM INLET VACUUM indicator reads approximately 2.5" w.g. (2.4 to 2.6" w.g.).
- 6.2.2 Using a velometer, take a 10-point traverse reading across the stack outlet.
- 6.2.3 Record the velometer readings in Table 4.

Table 4

READING NO.	POSITION	VALUE OBTAINED	READING NO.	POSITION	VALUE OBTAINED
1	1/4"		6	5 1/4"	
2	5/8"		7	6 1/4"	
3	1 1/8"		8	6 7/8"	
4	1 3/4"		9	7 3/8"	
5	2 3/4"		10	7 3/4"	
	subtotal			subtotal	

- 6.2.4 Calculate and record the average velometer reading.
Average reading: _____.
- 6.2.5 Correct the velometer reading for standard air, and record the corrected value.
Corrected reading: _____.
- 6.2.6 Verify that the corrected reading is 1000 scfm (900 to 1100 scfm).

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

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6.3 Exhauster Unit System Inlet HI VACUUM ALARM, HI HI VAC SHUTDOWN, and LO VAC ALARM Checks

NOTE: The System Inlet HI VACUUM ALARM setpoint is 4.5" w.g. (4.4 to 4.6" w.g.).

- 6.3.1 With fan running, slowly adjust the valve on the system inlet piping until the System Inlet HI VACUUM ALARM is actuated.
- 6.3.2 Record the SYSTEM INLET VACUUM reading when the alarm actuates.
Reading: _____ " w.g.
- 6.3.3 Verify that the reading is 4.5" w.g. (4.4 to 4.6" w.g.).
- 6.3.4 Secure the valve in place.
- 6.3.5 Verify the following:
 - (RED) System Inlet HI VACUUM ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) System Inlet HI VACUUM OK light is NOT lit.
 - (GREEN) System Inlet HI HI VAC OK light is lit.
- 6.3.6 Verify that the audible horn is sounding at the annunciator panel.
- 6.3.7 Silence alarm.
- 6.3.8 Slowly adjust valve on system inlet piping until the SYSTEM INLET VACUUM indicator reads approximately 2.5" w.g. (2.4 to 2.6" w.g.).
- 6.3.9 Verify the following:
 - (RED) System Inlet HI VACUUM ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) System Inlet HI VACUUM OK light is NOT lit.

NOTE: The System Inlet HI HI VAC SHUTDOWN setpoint is 5.9" w.g. (5.8 to 6.0" w.g.).

- 6.3.10 Slowly adjust valve on system inlet piping until the System Inlet HI HI VAC SHUTDOWN is initiated.
- 6.3.11 Record the SYSTEM INLET VACUUM reading when the shutdown is initiated. Reading: _____ " w.g.
- 6.3.12 Verify that the reading is 5.9" w.g. (5.8 to 6.0" w.g.).

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- 6.3.13 Verify the following:
- The fan has stopped.
 - The (GREEN) System Inlet HI HI VAC OK light is NOT lit.
 - The (YELLOW) SYSTEM SHUTDOWN light is lit.
 - The (YELLOW) System Inlet HI HI VAC SHUTDOWN light is lit.
 - The (RED) ALARM ON light is lit.
- 6.3.14 Slowly adjust valve on system inlet piping until the SYSTEM INLET VACUUM gauge reads approximately 2.5" w.g. (2.4 to 2.6" w.g.).
- 6.3.15 Press the "ALARM RESET" push button.
- 6.3.16 Start the exhaust fan and verify the following:
- The (YELLOW) SYSTEM SHUTDOWN light is NOT lit.
 - The (GREEN) System Inlet HI HI VAC OK light is lit.
 - The (RED) System Inlet HI VACUUM ALARM light is NOT lit.
 - The (YELLOW) System Inlet HI HI VAC SHUTDOWN light is NOT lit.
 - The (RED) ALARM ON light is NOT lit.
- 6.3.17 Fully open the valve on system inlet piping.
- 6.3.18 Stop fan.
- 6.3.19 Disconnect the signal wires connected to SYSTEM INLET VACUUM Isolation Barrier, terminals 3 and 5 in the annunciator panel.
- 6.3.20 Connect a calibrated 4 - 20 mA signal generator to terminals 3 and 5 of the Isolation Barrier.
- 6.3.21 Adjust the signal generator output until the SYSTEM INLET VACUUM indicator reads 2.0" w.g. (1.0 to 3.0" w.g.).
- 6.3.22 Start fan.
- 6.3.23 Position the "ALARM SELECTOR" switch to "AUTO":

NOTE: The System Inlet LO VACUUM ALARM setpoint is 0.25" w.g. (0.15 to 0.35" w.g.).

- 6.3.24 Slowly decrease the signal generator output until the System Inlet LO VACUUM ALARM actuates.
- 6.3.25 Record the SYSTEM INLET VACUUM reading when the alarm is actuated.
Reading: _____ " w.g.
- 6.3.26 Verify that the reading is 0.25" w.g. (0.15 to 0.35" w.g.).

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- 6.3.27 Verify that the audible horn is sounding at the annunciator panel.
- 6.3.28 Silence the alarm.
- 6.3.29 Verify the following:
- (RED) System Inlet LO VACUUM ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) System Inlet LO VACUUM OK light is NOT lit.
 - The fan is still running.
- 6.3.30 Slowly adjust the signal generator output until the SYSTEM INLET VACUUM indicator reads 2.0" w.g. (1.0 to 3.0" w.g.).
- 6.3.31 Verify the following:
- (RED) System Inlet LO VACUUM ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) System Inlet LO VACUUM OK light is NOT lit.
- 6.3.32 Press the "ALARM RESET" push button and verify the following:
- (RED) System Inlet LO VACUUM ALARM light is NOT lit.
 - (RED) ALARM ON light is NOT lit.
 - (GREEN) System Inlet LO VACUUM OK light is lit.
- 6.3.33 Stop fan.
- 6.3.34 Disconnect the signal generator and reconnect signal wires to the Isolation Barrier, terminals 3 and 5.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

6.4 Prefilter HIGH Δ P ALARM Check

- 6.4.1 Disconnect the signal wires connected to PREFILTER Δ P Isolation Barrier, terminals 3 and 5 in the annunciator panel.
- 6.4.2 Connect a calibrated 4 - 20 mA signal generator to terminals 3 and 5 of the Isolation Barrier.
- 6.4.3 Adjust the signal generator output until the PREFILTER Δ P indicator reads 0.5" w.g. (0.0 to 1.0" w.g.).

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- 6.4.4 Position the "ALARM SELECTOR" switch to "AUTO".
- 6.4.5 Start fan.

NOTE: The PREFILTER HI Δ P ALARM setpoint is 1.5" w.g. (1.4 to 1.6" w.g.).

- 6.4.6 Slowly increase the signal generator output until the PREFILTER HI Δ P ALARM actuates.
- 6.4.7 Record the PREFILTER Δ P reading when the alarm is actuated.
Reading: _____ " w.g.
- 6.4.8 Verify that the reading is 1.5" w.g. (1.4 to 1.6" w.g.).
- 6.4.9 Verify that the audible horn is sounding at the annunciator panel.
- 6.4.10 Silence the alarm.
- 6.4.11 Verify the following:
- (RED) PREFILTER HI Δ P ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) PREFILTER HI Δ P OK light is NOT lit.
 - The fan is still running.
- 6.4.12 Slowly adjust the signal generator output until the PREFILTER Δ P indicator reads 1.0" w.g. (0.9 to 1.1" w.g.).
- 6.4.13 Verify the following:
- (RED) PREFILTER HI Δ P ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) PREFILTER HI Δ P OK light is NOT lit.
- 6.4.14 Press the "ALARM RESET" push button and verify the following:
- (RED) PREFILTER HI Δ P ALARM light is NOT lit.
 - (RED) ALARM ON light is NOT lit.
 - (GREEN) PREFILTER HI Δ P OK light is lit.
- 6.4.15 Stop fan.

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- 6.4.16 Disconnect the signal generator and reconnect signal wires to the Isolation Barrier, terminals 3 and 5.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

6.5 HEPA 1 LO Δ P ALARM, HI Δ P ALARM, and HI HI Δ P SHUTDOWN Checks

- 6.5.1 Disconnect the signal wires connected to HEPA 1 Δ P Isolation Barrier, terminals 3 and 5 in the annunciator panel.
- 6.5.2 Connect a calibrated 4 - 20 mA signal generator to terminals 3 and 5 of the Isolation Barrier.
- 6.5.3 Adjust the signal generator output until the HEPA 1 Δ P indicator reads 2.0" w.g. (1.0 to 3.0" w.g.).
- 6.5.4 Position the "ALARM SELECTOR" switch to "AUTO".
- 6.5.5 Start fan.

NOTE: The HEPA 1 LO Δ P ALARM setpoint is 0.3" w.g. (0.2 to 0.4" w.g.).

- 6.5.6 Slowly decrease the signal generator output until the HEPA 1 LO Δ P ALARM actuates.
- 6.5.7 Record the HEPA 1 Δ P reading when the alarm is actuated. Reading: _____ " w.g.
- 6.5.8 Verify that the reading is 0.3" w.g. (0.2 to 0.4" w.g.).
- 6.5.9 Verify that the audible horn is sounding at the annunciator panel.
- 6.5.10 Silence the alarm.
- 6.5.11 Verify the following:
- (RED) HEPA 1 LO Δ P ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) HEPA 1 LO Δ P OK light is NOT lit.
 - The fan is still running.

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- 6.5.12 Slowly adjust the signal generator output until the HEPA 1 ΔP indicator reads 2.0" w.g. (1.0 to 3.0" w.g.).
- 6.5.13 Verify the following:
- (RED) HEPA 1 LO ΔP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) HEPA 1 LO ΔP OK light is NOT lit.
- 6.5.14 Press the "ALARM RESET" push button and verify the following:
- (RED) HEPA 1 LO ΔP ALARM light is NOT lit.
 - (RED) ALARM ON light is NOT lit.
 - (GREEN) HEPA 1 LO ΔP OK light is lit.
- 6.5.15 Position the "ALARM SELECTOR" switch to "AUTO".

NOTE: The HEPA 1 HI ΔP ALARM setpoint is 4.0" w.g. (3.9 to 4.1" w.g.).

- 6.5.16 Slowly increase the signal generator output until the HEPA 1 HI ΔP ALARM actuates.
- 6.5.17 Record the HEPA 1 ΔP reading when the alarm is actuated. Reading: _____ " w.g.
- 6.5.18 Verify that the reading is 4.0" w.g. (3.9 to 4.1" w.g.).
- 6.5.19 Verify that the audible horn is sounding at the annunciator panel.
- 6.5.20 Silence the alarm.
- 6.5.21 Verify the following:
- (RED) HEPA 1 HI ΔP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) HEPA 1 HI ΔP OK light is NOT lit.
 - The fan is still running.
- 6.5.22 Slowly adjust the signal generator output until the HEPA 1 ΔP indicator reads 2.0" w.g. (1.0 to 3.0" w.g.).
- 6.5.23 Verify the following:
- (RED) HEPA 1 HI ΔP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) HEPA 1 HI ΔP OK light is NOT lit.

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6.5.24 Press the "ALARM RESET" push button and verify the following:

- (RED) HEPA 1 HI Δ P ALARM light is NOT lit.
- (RED) ALARM ON light is NOT lit.
- (GREEN) HEPA 1 HI Δ P OK light is lit.

6.5.25 Position the "ALARM SELECTOR" switch to "AUTO".

NOTE: The HEPA 1 HI HI Δ P SHUTDOWN setpoint is 4.5" w.g. (4.4 to 4.6" w.g.).

6.5.26 Slowly increase the signal generator output until the HEPA 1 HI HI Δ P shutdown is initiated.

6.5.27 Record the HEPA 1 Δ P reading when the shutdown is initiated.
Reading: _____ " w.g.

6.5.28 Verify that the reading is 4.5" w.g. (4.4 to 4.6" w.g.).

6.5.29 Verify the following:

- (RED) ALARM ON light is lit.
- (YELLOW) HEPA 1 HI HI Δ P SHUTDOWN light is lit.
- (GREEN) HEPA 1 HI HI Δ P OK light is NOT lit.
- (YELLOW) SYSTEM SHUTDOWN light is lit.
- The fan is NOT running.

6.5.30 Slowly adjust the signal generator output until the HEPA 1 Δ P indicator reads 2.0" w.g. (1.0 to 3.0" w.g.).

6.5.31 Verify the following:

- (RED) ALARM ON light is lit.
- (YELLOW) HEPA 1 HI HI Δ P SHUTDOWN light is lit.
- (GREEN) HEPA 1 HI HI Δ P OK light is NOT lit.
- (YELLOW) SYSTEM SHUTDOWN light is lit..

6.5.32 Press the "ALARM RESET" push button.

6.5.33 Position the "ALARM SELECTOR" switch to "AUTO".

6.5.34 Start fan and verify the following:

- (RED) ALARM ON light is NOT lit.
- (YELLOW) HEPA 1 HI HI Δ P SHUTDOWN light is NOT lit.
- (GREEN) HEPA 1 HI HI Δ P OK light is lit.
- (YELLOW) SYSTEM SHUTDOWN light is NOT lit.

6.5.35 Stop fan.

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- 6.5.36 Disconnect the signal generator and reconnect signal wires to the Isolation Barrier, terminals 3 and 5.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

6.6 HEPA 2 LO Δ P ALARM, HI Δ P ALARM, and HI HI Δ P SHUTDOWN Checks

- 6.6.1 Disconnect the signal wires connected to HEPA 2 Δ P Isolation Barrier, terminals 3 and 5 in the annunciator panel.
- 6.6.2 Connect a calibrated 4 - 20 mA signal generator to terminals 3 and 5 of the Isolation Barrier.
- 6.6.3 Adjust the signal generator output until the HEPA 2 Δ P indicator reads 2.0" w.g. (1.0 to 3.0" w.g.).
- 6.6.4 Position the "ALARM SELECTOR" switch to "AUTO".
- 6.6.5 Start fan.

NOTE: The HEPA 2 LO Δ P ALARM setpoint is 0.3" w.g. (0.2 to 0.4" w.g.).

- 6.6.6 Slowly decrease the signal generator output until the HEPA 2 LO Δ P ALARM actuates.
- 6.6.7 Record the HEPA 2 Δ P reading when the alarm is actuated. Reading: _____ " w.g.
- 6.6.8 Verify that the reading is 0.3" w.g. (0.2 to 0.4" w.g.).
- 6.6.9 Verify that the audible horn is sounding at the annunciator panel.
- 6.6.10 Silence the alarm.
- 6.6.11 Verify the following:
- (RED) HEPA 2 LO Δ P ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) HEPA 2 LO Δ P OK light is NOT lit.
 - The fan is still running.

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- 6.6.12 Slowly adjust the signal generator output until the HEPA 2 ΔP indicator reads 2.0" w.g. (1.0 to 3.0" w.g.).
- 6.6.13 Verify the following:
- (RED) HEPA 2 LO ΔP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) HEPA 2 LO ΔP OK light is NOT lit.
- 6.6.14 Press the "ALARM RESET" push button and verify the following:
- (RED) HEPA 2 LO ΔP ALARM light is NOT lit.
 - (RED) ALARM ON light is NOT lit.
 - (GREEN) HEPA 2 LO ΔP OK light is lit.
- 6.6.15 Position the "ALARM SELECTOR" switch to "AUTO".

NOTE: The HEPA 2 HI ΔP ALARM setpoint is 4.0" w.g. (3.9 to 4.1" w.g.).

- 6.6.16 Slowly increase the signal generator output until the HEPA 2 HI ΔP ALARM actuates.
- 6.6.17 Record the HEPA 2 ΔP reading when the alarm is actuated. Reading: _____ " w.g.
- 6.6.18 Verify that the reading is 4.0" w.g. (3.9 to 4.1" w.g.).
- 6.6.19 Verify that the audible horn is sounding at the annunciator panel.
- 6.6.20 Silence the alarm.
- 6.6.21 Verify the following:
- (RED) HEPA 2 HI ΔP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) HEPA 2 HI ΔP OK light is NOT lit.
 - The fan is still running.
- 6.6.22 Slowly adjust the signal generator output until the HEPA 2 ΔP indicator reads 2.0" w.g. (1.0 to 3.0" w.g.).
- 6.6.23 Verify the following:
- (RED) HEPA 2 HI ΔP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) HEPA 2 HI ΔP OK light is NOT lit.

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6.6.24 Press the "ALARM RESET" push button and verify the following:

- (RED) HEPA 2 HI Δ P ALARM light is NOT lit.
- (RED) ALARM ON light is NOT lit.
- (GREEN) HEPA 2 HI Δ P OK light is lit.

6.6.25 Position the "ALARM SELECTOR" switch to "AUTO".

NOTE: The HEPA 2 HI HI Δ P SHUTDOWN setpoint is 4.5" w.g. (4.4 to 4.6" w.g.).

6.6.26 Slowly increase the signal generator output until the HEPA 2 HI HI Δ P shutdown is initiated.

6.6.27 Record the HEPA 2 Δ P reading when the shutdown is initiated.
Reading: _____ " w.g.

6.6.28 Verify that the reading is 4.5" w.g. (4.4 to 4.6" w.g.).

6.6.29 Verify the following:

- (RED) ALARM ON light is lit.
- (YELLOW) HEPA 2 HI HI Δ P SHUTDOWN light is lit.
- (GREEN) HEPA 2 HI HI Δ P OK light is NOT lit.
- (YELLOW) SYSTEM SHUTDOWN light is lit.
- The fan is NOT running.

6.6.30 Slowly adjust the signal generator output until the HEPA 2 Δ P indicator reads 2.0" w.g. (1.0 to 3.0" w.g.).

6.6.31 Verify the following:

- (RED) ALARM ON light is lit.
- (YELLOW) HEPA 2 HI HI Δ P SHUTDOWN light is lit.
- (GREEN) HEPA 2 HI HI Δ P OK light is NOT lit.
- (YELLOW) SYSTEM SHUTDOWN light is lit.

6.6.32 Press the "ALARM RESET" push button.

6.6.33 Position the "ALARM SELECTOR" switch to "AUTO".

6.6.34 Start fan and verify the following:

- (RED) ALARM ON light is NOT lit.
- (YELLOW) HEPA 2 HI HI Δ P SHUTDOWN light is NOT lit.
- (GREEN) HEPA 2 HI HI Δ P OK light is lit.
- (YELLOW) SYSTEM SHUTDOWN light is NOT lit.

6.6.35 Stop fan.

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- 6.6.36 Disconnect the signal generator and reconnect signal wires to the Isolation Barrier, terminals 3 and 5.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

6.7 SYSTEM HI Δ P ALARM and HI HI Δ P SHUTDOWN Checks

- 6.7.1 Disconnect the signal wires connected to SYSTEM Δ P Isolation Barrier, terminals 3 and 5 in the annunciator panel.
- 6.7.2 Connect a calibrated 4 - 20 mA signal generator to terminals 3 and 5 of the Isolation Barrier.
- 6.7.3 Adjust the signal generator output until the SYSTEM Δ P indicator reads less than 4.0" w.g.
- 6.7.4 Position the "ALARM SELECTOR" switch to "AUTO".
- 6.7.5 Start fan.

NOTE: The SYSTEM HI Δ P ALARM setpoint is 4.5" w.g. (4.4 to 4.6" w.g.).

- 6.7.6 Slowly increase the signal generator output until the SYSTEM HI Δ P ALARM actuates.
- 6.7.7 Record the SYSTEM Δ P reading when the alarm is actuated. Reading: _____ " w.g.
- 6.7.8 Verify that the reading is 4.5" w.g. (4.4 to 4.6" w.g.).
- 6.7.9 Verify that the audible horn is sounding at the annunciator panel.
- 6.7.10 Silence the alarm.
- 6.7.11 Verify the following:
- (RED) SYSTEM HI Δ P ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) SYSTEM HI Δ P OK light is NOT lit.
 - The fan is still running.

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- 6.7.12 Adjust the signal generator output until the SYSTEM ΔP indicator reads less than 4.0" w.g.
- 6.7.13 Verify the following:
- (RED) SYSTEM HI ΔP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) SYSTEM HI ΔP OK light is NOT lit.
- 6.7.14 Press the "ALARM RESET" push button and verify the following:
- (RED) SYSTEM HI ΔP ALARM light is NOT lit.
 - (RED) ALARM ON light is NOT lit.
 - (GREEN) SYSTEM HI ΔP OK light is lit.
- 6.7.15 Position the "ALARM SELECTOR" switch to "AUTO".

NOTE: The SYSTEM HI HI ΔP SHUTDOWN setpoint is 5.9" w.g. (5.8 to 6.0" w.g.).

- 6.7.16 Slowly increase the signal generator output until the SYSTEM HI HI ΔP shutdown is initiated.
- 6.7.17 Record the SYSTEM ΔP reading when the shutdown is initiated.
Reading: _____ " w.g.
- 6.7.18 Verify that the reading is 5.9" w.g. (5.8 to 6.0" w.g.).
- 6.7.19 Verify the following:
- (RED) ALARM ON light is lit.
 - (YELLOW) SYSTEM HI HI ΔP SHUTDOWN light is lit.
 - (GREEN) SYSTEM HI HI ΔP OK light is NOT lit.
 - (YELLOW) SYSTEM SHUTDOWN light is lit.
 - The fan is NOT running.
- 6.7.20 Adjust the signal generator output until the SYSTEM ΔP indicator reads under 4.0" w.g.
- 6.7.21 Verify the following:
- (RED) ALARM ON light is lit.
 - (YELLOW) SYSTEM HI HI ΔP SHUTDOWN light is lit.
 - (GREEN) SYSTEM HI HI ΔP OK light is NOT lit.
 - (YELLOW) SYSTEM SHUTDOWN light is lit.
- 6.7.22 Press the "ALARM RESET" push button.
- 6.7.23 Position the "ALARM SELECTOR" switch to "AUTO".

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- 6.7.24 Start fan and verify the following:
- (RED) ALARM ON light is NOT lit.
 - (YELLOW) SYSTEM HI HI ΔP SHUTDOWN light is NOT lit.
 - (GREEN) SYSTEM HI HI ΔP OK light is lit.
 - (YELLOW) SYSTEM SHUTDOWN light is NOT lit.
- 6.7.25 Stop fan.
- 6.7.26 Disconnect the signal generator and reconnect signal wires to the Isolation Barrier, terminals 3 and 5.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

6.8 Stack Sampler Shutdown Check

- 6.8.1 With fan running, install a jumper across terminals 131 and 132 in the Sampler Cabinet panel.
- 6.8.2 Verify that the audible horn is sounding at the annunciator panel.
- 6.8.3 Silence the alarm.
- 6.8.4 Verify the following:
- The fan has stopped.
 - (GREEN) Stack Sampler OK (both) lights are NOT lit.
 - (YELLOW) Stack Sampler SHUTDOWN light is lit.
 - (YELLOW) System SHUTDOWN light is lit.
 - (RED) ALARM ON light is lit.
- 6.8.5 Carefully remove the jumper from terminals 131 and 132 and verify the following:
- (GREEN) Stack Sampler OK (both) lights are NOT lit.
 - (YELLOW) Stack Sampler SHUTDOWN light is lit.
 - (YELLOW) System SHUTDOWN light is lit.
 - (RED) ALARM ON light is lit.
- 6.8.6 Press the "ALARM RESET" push button.
- 6.8.7 Position the "ALARM SELECTOR" switch to "AUTO".

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6.8.8 Start fan and verify the following:

- (GREEN) Stack Sampler OK (both) lights are lit.
- (YELLOW) Stack Sampler SHUTDOWN light is NOT lit.
- (YELLOW) System SHUTDOWN light is NOT lit.
- (RED) ALARM ON light is NOT lit.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

6.9 High Radiation Shutdown Check

6.9.1 With the fan running, install a jumper across terminals 131 and 132 in the sampler panel.

6.9.2 Verify that the audible horn is sounding at the annunciator panel.

6.9.3 Silence the alarm.

6.9.4 Verify the following:

- The fan has stopped.
- (GREEN) High Radiation OK light is NOT lit.
- (YELLOW) High Radiation SHUTDOWN light is lit.
- (YELLOW) System SHUTDOWN light is lit.
- (RED) ALARM ON light is lit.

6.9.5 Carefully remove the jumper from terminals 131 and 132 and verify the following:

- (GREEN) High Radiation OK light is NOT lit.
- (YELLOW) High Radiation SHUTDOWN light is lit.
- (YELLOW) System SHUTDOWN light is lit.
- (RED) ALARM ON light is lit.

6.9.6 Press the "ALARM RESET" push button.

6.9.7 Position the "ALARM SELECTOR" switch to "AUTO".

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6.9.8 Press the "FAN START" push button and verify the following:

- (GREEN) High Radiation OK light is lit.
- (YELLOW) High Radiation SHUTDOWN light is NOT lit.
- (YELLOW) System SHUTDOWN light is NOT lit.
- (RED) ALARM ON light is NOT lit.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

6.10 Exhauster Unit Mist Eliminator Spray-Down System and Seal Pot Hi and Lo Liquid Level Alarm Checks

- 6.10.1 Close the main water supply valve.
- 6.10.2 Connect water to water supply connection on exhauster.
- 6.10.3 Open drain valve and provide for water removal.
- 6.10.4 Close both the upstream and downstream water supply valves.
- 6.10.5 Open the main water supply valve.
- 6.10.6 Open the upstream water supply valve.
- 6.10.7 Verify that water is flowing from the drain line and that the pressure gauge indicates water pressure.
- 6.10.8 Close the upstream water supply valve and open the downstream water supply valve.
- 6.10.9 Verify that water is flowing from the drain line and that the pressure gauge indicates water pressure.
- 6.10.10 Open the upstream water supply valve.
- 6.10.11 Verify that an increased amount of water is flowing from the drain line.
- 6.10.12 Close the drain line valve.
- 6.10.13 When alarm sounds or when water is observed through the seal pot overflow drain line, then close the main supply valve.

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- 6.10.14 Verify that the SEAL POT HI LIQUID LVL ALARM actuates before a flow of water is observed through the seal pot overflow drain line, and that the audible horn is sounding.
- 6.10.15 Silence the alarm.
- 6.10.16 Verify the following:
- (GREEN) SEAL POT HI LIQUID LVL OK light is NOT lit.
 - The (RED) SEAL POT HI LIQUID LVL ALARM light is lit.
 - The (RED) ALARM ON light is lit.
 - The fan is still running.
- 6.10.17 Open the seal pot drain line valve and verify that water begins to flow from the drain line.
- 6.10.18 Verify the following:
- (RED) SEAL POT HI LIQUID LVL ALARM light is lit.
 - The (RED) ALARM ON light is lit.
 - The (GREEN) SEAL POT HI LIQUID LVL OK light is NOT lit.
- 6.10.19 Press the "ALARM RESET" push button and verify the following:
- (RED) SEAL POT HI LIQUID LVL ALARM light is NOT lit.
 - The (RED) ALARM ON light is NOT lit.
 - The (GREEN) SEAL POT HI LIQUID LVL OK light is lit.
- 6.10.20 Position the "ALARM SELECTOR" switch to "AUTO".
- 6.10.21 Drain water from the seal pot reservoir until the SEAL POT LO LIQUID LVL ALARM is actuated.
- 6.10.22 When the SEAL POT LO LIQUID LVL ALARM actuates, then verify that the audible horn is sounding.
- 6.10.23 Silence the alarm.
- 6.10.24 Verify the following:
- (GREEN) SEAL POT LO LIQUID LVL OK light is NOT lit.
 - (RED) SEAL POT LO LIQUID LVL ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - The fan is running.
- 6.10.25 Open main supply valve until water starts to flow out of the drain valve and then close main supply valve.

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6.10.26 Verify the following:

- (GREEN) SEAL POT LO LIQUID LVL OK light is NOT lit.
- (RED) SEAL POT LO LIQUID LVL ALARM light is lit.
- (RED) ALARM ON light is lit.

6.10.27 Press the "ALARM RESET" push button and verify the following:

- The (RED) SEAL POT LO LIQUID LVL ALARM light is NOT lit.
- The (RED) ALARM ON light is NOT lit.
- The (GREEN) SEAL POT LO LIQUID LVL OK light is lit.

6.10.28 Position the "ALARM SELECTOR" switch to "AUTO".

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

6.11 Exhauster Unit Heat Tracing System Checks

6.11.1 Record the initial setpoint value for the heat tracing system thermostat: _____°F.

6.11.2 Adjust the thermostat to at least 5°F over ambient temperature.

6.11.3 Place a probe-type thermometer near the heat tracing cable and verify that the temperature increases.

6.11.4 Adjust the thermostat to at least 5°F below ambient temperature.

6.11.5 Place a probe-type thermometer near the heat tracing cable and verify that the temperature decreases.

6.11.6 Remove the thermometer from the exhauster unit and reset the thermostat to the setpoint value recorded in Step 6.11.1.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

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6.12 Exhauster Unit Duct Heat System Checks

- 6.12.1 Start fan.
- 6.12.2 Connect a voltmeter in parrallel with the wire between Fuse 1 and SCR terminal L1.
- 6.12.3 Ensure that voltmeter reads approximately zero volts.
- 6.12.4 Stop fan.

NOTE: Steps 6.12.5 through 6.12.7 test the air flow switch located on the stack.

- 6.12.5 Verify that the heater is not working by observing approximately 480 volts on the voltmeter.
- 6.12.6 Restart fan.
- 6.12.7 Verify heater is working by observing approximately zero volts on voltmeter.
- 6.12.8 Disconnect T/C wires to terminals C1 and C2.
- 6.12.9 Connect a Type J T/C simulator to terminals C1 and C2.

NOTE: TC1 setpoint is 250 °F (230 to 270 °F), raising.

- 6.12.10 Slowly raise simulator output from approximately 200 °F, observing voltmeter.
- 6.12.11 Record simulated temperature when the heater stops working, as observed on the voltmeter. Temperature: _____ °F
- 6.12.12 Slowly lower simulator output.
- 6.12.13 Record simulated temperature when the heater starts working, as observed on the voltmeter. Temperature: _____ °F
- 6.12.14 Remove simulator and reconnect T/C wires.
- 6.12.15 Disconnect T/C wires to terminals C3 and C4.
- 6.12.16 Connect a Type J T/C simulator to terminals C3 and C4.

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NOTE: TC2 setpoint is 210 °F (190 to 230 °F), raising.

- 6.12.17 Slowly raise simulator output from approximately 150 °F, observing voltmeter.
- 6.12.18 Record simulated temperature when the heater stops working, as observed on the voltmeter. Temperature: _____ °F
- 6.12.19 Slowly lower simulator output.
- 6.12.20 Record simulated temperature when the heater starts working, as observed on the voltmeter. Temperature: _____ °F
- 6.12.21 Remove simulator and reconnect T/C wires.
- 6.12.22 Remove voltmeter.
- 6.12.23 Disconnect the T/C wires T/C terminal board, terminals C5, C6, C7, and C8.
- 6.12.24 Connect a Type J T/C simulator to terminals C5 and C6.

NOTE: The HI DUCT Δ T ALARM setpoint is 100 °F (98 to 102 °F).

- 6.12.25 Adjust T/C simulator until the HI DUCT Δ T ALARM actuates.
- 6.12.26 Record the DUCT Δ T reading when the alarm is actuated. DUCT Δ T Reading: _____ °F.
- 6.12.27 Verify that the reading is 100 °F (98 to 102 °F).
- 6.12.28 Verify that the audible horn is sounding at the annunciator panel.
- 6.12.29 Silence the alarm.
- 6.12.30 Verify the following:
 - (RED) DUCT HEATER HI TEMP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) DUCT HEATER HI TEMP OK light is NOT lit.
 - The fan is still running.
- 6.12.31 Reduce T/C simulator output until the DUCT Δ T indicator reads 90 °F (85 to 90 °F).

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- 6.12.32 Verify the following:
- (RED) DUCT HEATER HI TEMP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) DUCT HEATER HI TEMP OK light is NOT lit.
- 6.12.33 Press the "ALARM RESET" push button and verify the following:
- (RED) DUCT HEATER HI TEMP ALARM light is NOT lit.
 - (RED) ALARM ON light is NOT lit.
 - (GREEN) DUCT HEATER HI TEMP OK light is lit.
- 6.12.34 Position the "ALARM SELECTOR" switch to "AUTO".

NOTE: The LO DUCT ΔT ALARM setpoint is 80 °F (78 to 82 °F).

- 6.12.35 Reduce T/C simulator output until the LO DUCT ΔT ALARM actuates.
- 6.12.36 Record the DUCT HEATER TEMPERATURE reading when the alarm is actuated. Reading: _____ °F.
- 6.12.37 Verify that the reading is 80 °F (78 to 82 °F).
- 6.12.38 Verify that the audible horn is sounding at the annunciator panel.
- 6.12.39 Silence the alarm.
- 6.12.40 Verify the following:
- (RED) DUCT HEATER LO TEMP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) DUCT HEATER LO TEMP OK light is NOT lit.
 - The fan is still running.
- 6.12.41 Increase T/C simulator output until the DUCT HEATER TEMPERATURE indicator reads 90 °F (85 to 90 °F).
- 6.12.42 Verify the following:
- (RED) DUCT HEATER LO TEMP ALARM light is lit.
 - (RED) ALARM ON light is lit.
 - (GREEN) DUCT HEATER LO TEMP OK light is NOT lit.
- 6.12.43 Press the "ALARM RESET" push button and verify the following:
- (RED) DUCT HEATER LO TEMP ALARM light is NOT lit.
 - (RED) ALARM ON light is NOT lit.
 - (GREEN) DUCT HEATER LO TEMP OK light is lit.

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- 6.12.44 Position the "ALARM SELECTOR" switch to "AUTO".
- 6.12.45 Stop fan.
- 6.12.46 Disconnect the Type J T/C simulator and reconnect T/C.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

NOTES: This concludes the testing to be conducted in the fab shop.

The rest of section 6.0 shall be completed in Rev 1 of this ATP to allow for fab shop testing to begin as soon as possible.

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6.13 Exhauster Fan Controls Operability Check

NOTE: Testing per this section and all following sections will be conducted after installation of the exhauster unit in the SY tank farm.

- 6.13.1 If any discrepancy is noted during testing, then record a description of the condition in Attachment 1.
 - 6.13.1.1 For each discrepancy recorded, enter an identifying number in the "EXCEPTION NUMBER" Column of Attachment 1.
 - 6.13.1.2 Reproduce Attachment 1 as needed, and attach the additional pages to this procedure, to record all discrepancies noted during testing.
- 6.13.2 Open the fill port cap on the seal pot reservoir.
- 6.13.3 Using any available source of potable water and a convenient container or hose, fill the seal pot reservoir through the fill port, to the main drain level.
- 6.13.4 Replace the fill port cap.
- 6.13.5 Ensure that the "ALARM SELECTOR" Switch is in "AUTO".

NOTE: There are 7 individual circuit breakers in the Power Distribution panel located on the exhauster skid. These circuit breakers should be OPEN/OFF prior to closing the main power supply circuit breaker for the exhauster skid and closed one at a time for initial power-up of the exhauster system for testing.

- 6.13.6 Open the Power Distribution Panel doors and ensure that the 7 circuit breakers inside the panel are OPEN or OFF.
- 6.13.7 Close the exhauster main power supply circuit breaker.
- 6.13.8 Close the 7 circuit breakers in the Power Distribution Panel one at a time, pausing after each breaker is closed, to observe the exhauster skid for unusual conditions.
- 6.13.9 When all 7 circuit breakers are closed, then close the Power Distribution Panel doors.
- 6.13.10 Position the "ALARM SELECTOR" switch to "TEST".
- 6.13.11 Verify that the audible alarm horn is sounding and all RED or YELLOW lights are lit.

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- 6.13.12 Silence alarm.
- 6.13.13 Press the "ALARM RESET" push button.
- 6.13.14 Position the "ALARM SELECTOR" switch to "AUTO".
- 6.13.15 Start fan.
- 6.13.16 Verify that no RED or YELLOW lights are lit.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

6.14 Exhauster Fan Remote Monitoring Stations Checks

NOTE: The SY tank farm exhauster unit is connected to the 242-S Evaporator, the Computer Automated Surveillance System (CASS), and Building 241-SY-271 for remote system status monitoring.

- 6.14.1 Request that the CASS verify that alarms associated with the SY tank farm K1 exhaust ventilation system are clear (Points 1450 and 1467).

NOTE: The Alarm Annunciator Panel in the 242-S evaporator building is being re-designed. Alarms associated with the SY tank farm K1 exhaust ventilation system may appear in alarm windows D3-3 and D3-4 (old configuration) or windows G4-4 and G4-6 (new configuration).

- 6.14.2 Request that the operator in the 242-S evaporator verify that all alarms associated with the SY tank farm K1 exhaust ventilation system are clear.
- 6.14.3 Request that the operator in the 241-SY-271 building verify that all alarms associated with the SY tank farm K1 exhaust ventilation system are clear.
- 6.14.4 Press the "EMERGENCY STOP" button and verify that the fan stops.
- 6.14.5 Contact the CASS operator at 373-1005 and verify that Point 1450 is displaying "SY FARM EXHAUSTER TROUBLE".

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- 6.14.6 Contact the 242-S evaporator operator and verify that alarm window D3-3 (G4-4) is displaying "SY FARM EXHAUSTER TROUBLE".
- 6.14.7 Contact the operator in the 241-SY-271 building and verify that alarm window "SY TANK FARM EXHAUSTER TROUBLE" is lit.
- 6.14.8 Pull out the "EMERGENCY STOP" button.
- 6.14.9 Restart fan.
- 6.14.10 Contact the CASS operator at 373-1005 and verify that the Point 1450 alarm is clear.
- 6.14.11 Contact the 242-S evaporator operator and verify that alarm window D3-3 (G4-4) is displaying an "alarm clear" condition.
- 6.14.12 Contact the operator in the 241-SY-271 building and verify that alarm window "SY TANK FARM EXHAUSTER TROUBLE" is displaying an "alarm clear" condition.
- 6.14.13 Stop fan.
- 6.14.14 Install a jumper across terminals xx and yy in the annunciator panel.
- 6.14.15 Position the "ALARM SELECTOR" switch to "AUTO".

NOTE: The ALPHA RADIATION SHUTDOWN will be initiated immediately after the (BLUE) ALARM ACTIVE and SHUTDOWN ACTIVE lights illuminate.

- 6.14.16 Restart fan.
- 6.14.17 Verify that the HI RADIATION SHUTDOWN alarm is actuated at the annunciator panel.
- 6.14.18 Contact the CASS operator at 373-1005 and verify that Point 1467 is displaying "SY FARM VESSEL EXHAUST RADIATION HIGH".
- 6.14.19 Contact the 242-S evaporator operator and verify that alarm window D3-4 (G4-6) is displaying "RADIATION 241-SY TANK VESSEL EXHAUST".
- 6.14.20 Contact the operator in the 241-SY-271 building and verify that alarm window "RADIATION 241-SY TANK VESSEL EXHAUST" is lit.
- 6.14.21 Carefully remove the jumper from terminals xx and yy.
- 6.14.22 Press the "ALARM RESET" push button.

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- 6.14.23 Position the "ALARM SELECTOR" switch to "AUTO".
- 6.14.24 Press the "FAN START" push button.
- 6.14.25 Verify that the GREEN "FAN RUNNING" light is lit.
- 6.14.26 After a time delay, verify that the BLUE "ALARM ACTIVE" and "SHUTDOWN ACTIVE" lights are lit.
- 6.14.27 Contact the CASS operator at 373-1005 and verify that the Point 1467 alarm is clear.
- 6.14.28 Contact the 242-S evaporator operator and verify that alarm window D3-4 (G4-6) is displaying an "alarm clear" condition.
- 6.14.29 Contact the operator in the 241-SY-271 building and verify that alarm window "RADIATION 241-SY TANK VESSEL EXHAUST" is displaying an "alarm clear" condition.

Testing as directed by this procedure section has been completed, and discrepancies, if any, have been listed on Attachment 1, Exception List.

Test Engineer: _____ Date: _____

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7.0 ATTACHMENTS

Attachment 1: Exception List

Attachment 2: Measurement and Test Equipment Record Sheet

Attachment 3: Final Procedure Acceptance Sheet

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EXCEPTION NUMBER	STEP NUMBER	EXCEPTION DESCRIPTION	EXCEPTION RESOLUTION	RESOLUTION APPROVED BY:	DATE RESOLVED																																																												

Attachment 1: Exception List

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Attachment 2: Measurement and Test Equipment Record Sheet

ATP FOR SY TANK FARM REPLACEMENT EXHAUSTER UNIT

Completion of this procedure has demonstrated that:

- Each sensor that provides an audible and/or visual alarm has been verified to actuate the alarm at the proper setpoint, and the alarm function has been verified to be correct at the annunciator panel.
- The exhauster unit has been tested for proper operation of all controls and instrumentation.
- The exhauster unit components have been tested for proper operation (airflow differential pressure, operating temperature, sump level, etc.).
- A record of all noted deficiencies was kept on Attachment 1, Exception List, and all recorded exceptions have been resolved and the resolutions approved.

Approved by:

J. McClees, Cognizant Engineer

Date

R. W. Reed, Test Engineering

Date

Attachment 3: Final Procedure Acceptance Sheet

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