**ENGINEERING DATA TRANSMITTAL**

2. To:  (Receiving Organization)  
CHAR. SAMPLING OPERATIONS

3. From: (Originating Organization)  
CHAR. PLANT ENGINEERING

4. Related EDT No.:  
N/A

5. Proj./Prog./Dept./Div.:  
75210 / N4058

6. Cog. Engr.:  
E.J. WALDO

7. Purchase Order No.:  
N/A

8. Originator Remarks:  
FOR APPROVAL / RELEASE

9. Equip./Component No.:  
N/A

10. System/Bldg./Facility:  
200 GEN

11. Receiver Remarks:  

12. Major Assm. Dwg. No.:  
N/A

13. Permit/Permit Application No.:  
N/A

14. Required Response Date:  
5/31/95

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15. **DATA TRANSMITTED**

16. **SIGNATURE/DISTRIBUTION**

(See Approval Designator for required signatures)

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18. Signature of EDT Originator  
E.J. WALDO  
5/30/95

19. Authorized Representative Date for Receiving Organization  
JS LEE  
5/29-95

20. Cognizant Manager Date  
JS SCHOFIELD  
5/30/95

21. DOE APPROVAL (if required)  
□ Approved  
□ Approved w/comments  
□ Disapproved w/comments  
□ Approved  
□ Approved w/comments  
□ Disapproved w/comments

BD-7400-172-2 (04/94) GEF097
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APPROVED FOR PUBLIC RELEASE

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This document provides a procedure for performing operability testing of the Rotary Mode Core Sampling System Exhausters 3 & 4. Upon completion of testing activities an operability testing report will be issued.
OPERABILITY TEST PROCEDURE

FOR THE

ROTARY MODE CORE SAMPLING SYSTEM

EXHAUSTERS 3 & 4

WHC-SD-WM-OTP-176 REV 0

AUTHOR

ERIC J. WALDO

CHARACTERIZATION PLANT ENGINEERING

WESTINGHOUSE HANFORD COMPANY

MAY 1995

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1.0 PURPOSE

The purpose of this Operability Test Procedure is to provide instructions for operability testing of the Rotary Mode Core Sampling (RMCS) exhausters 3 & 4. The procedure follows "Operability Test Procedures and Reports", contained in WHC-CM-6-1, "Standard Engineering Practices", EP-4.2 "Testing Requirements" Rev 5, Change 1.

2.0 SCOPE

Operability testing of the rotary mode core sampling exhausters 3 & 4, will verify that functional and operational requirements have been met. The exhauster is a part of the rotary mode core sampling system which includes the RMCS trucks 3 & 4, and associated equipment. The testing will be performed in a simulated tank farm environment at the "Rock Slinger" test site located just south of U-Plant in the 200 West area.

3.0 RESPONSIBILITIES

Safety, Quality Assurance, Effluent Emissions Monitoring, Characterization Sampling Operations, Characterization Plant Engineering, and RMCS 3&4 Project Management shall approve this procedure prior to its release.

Responsibilities are identified as follows:

Operations Test Director

Responsible for the overall performance of the OTP. Responsible for the proper conduct of operations for the entire test site as well as personnel involved in the testing. Ensures the execution of all testing activities are within the scope of the OTP. Exercises stop work authority for unsafe activities or activities not conforming to this OTP. Directs the overall conduct and sequence of testing activities. Ensures configuration management is properly maintained. Directs actions to be taken to prevent injury to employees or damage to equipment. Acts through the Operations PIC for the proper performance of all operations at the test site. Receives technical advice from the CPE Cognizant Engineer on system and equipment design parameters. Maintains cognizance of test exceptions as documented by the CPE Cognizant Engineer and the resolution of same. Concurs with all changes and with the acceptability and reliability of the equipment by signing the OTR.

CPE Cognizant Engineer - Exhauster

Controls the sequence in which the OTP is conducted through the PIC with concurrence of the Test Director. Provides technical expertise and advice to both the PIC and Test Director as required. Maintains configuration control during testing. Approves any changes to the OTP. Responsible for obtaining additional support from engineering. Acts as the single point of contact for all engineering matters. Notes exceptions to testing on OTP Exception List". Resolves exceptions with
the concurrence of the assigned Quality Engineer for those exceptions which initially required Quality verification. Prepares and releases the OTR at conclusion of operability testing. Concurs with the acceptability and reliability by signing the OTR.

RMCS 3&4 Project Management

Reviews and approves test procedure and report. Monitors testing to ensure tests are completed in a timely manner. Resolves and project related deficiencies.

Characterization Sampling Operations Management

Responsible through the Operations Test Director for the overall testing program. Reviews and approves test procedure. Ensures effective safety meeting is held prior to test start. Monitors testing to extent approval may be given for satisfactory equipment operability and reliability.

Characterization Sampling PIC

Responsible for the assignment of personnel and directing the operation of the exhausters. Controls access to the test area in order to maintain a safe environment. Aids the Cognizant Engineer in maintaining configuration control. Approves changes to the OTP in terms of operational steps or equipment configuration with concurrence of the Test Director. Conducts a pre-job safety meeting at the start of each shift during the performance of the OTP. Briefs the personnel on testing to be performed that day and associated hazards.

Characterization Sampling Operators

Conduct testing according to this procedure as directed by the PIC. Notifies the Test Director and Operation PIC of concerns, exceptions, and off-normal conditions during testing.

Quality Assurance

Reviews and approves test procedure to assure compliance with appropriate regulations. Resolves exceptions requiring quality verification jointly with CPE Exhauster Cognizant Engineer. Quality verification of exceptions is only necessary for those exceptions relating to items which initially required Quality verification.

Safety

Reviews and approves test procedure to assure compliance with applicable regulations. Monitors testing as appropriate.

Effluent Emissions Monitoring

Reviews and approves test procedure to assure compliance with applicable regulations. Monitors testing as appropriate.
4.0 INFORMATION

4.1 SYSTEM DESCRIPTION

The exhausters are made up of a heater assembly leading into a housing containing a second pre-filter and two High Efficiency Particle Air (HEPA) filters in series, a motor driven fan, and an exhaust stack. The exhausted gases are continuously monitored for flow rate, temperature, and humidity. All information monitored is recorded on a data logger in the exhauster instrumentation cabinet.

4.2 TEST GUIDANCE

Testing of the exhausters will be performed in the following manner. The exhausters will be connected to a simulated waste tank riser and placed into standby mode. The exhausters may then be started and stopped at any time as Operations sees fit. Only one set of start-up and shutdown steps will be initialied and included within the OTR. While the exhauster is running, an alarm condition will be made to occur to familiarize operators with operation of the data logger. When operations is satisfied with the performance of the exhauster it will be taken down in the final test section.

Instrument calibrations will be verified by QC personnel during exhauster components acceptance testing and will not be reconfirmed for OTP testing as no advantage will be realized.

Discrepancies, deviations, or irregularities involving the test procedure and equipment performance are to be noted on the "OTP Exception / Resolution Data Sheet". These exceptions shall be jointly resolved between the Exhauster Cognizant Engineer and the assigned Quality Assurance Representative. Quality verification of exceptions is only necessary for those exceptions relating to items which initially required Quality verification. Project related OTP deficiencies shall be addressed by the Exhauster Cognizant Engineer with approval of the RMCS 3&4 Project Management. All resolutions to the exceptions must be agreed upon by the responsible personnel, documented on the exception list, and initialied.

No testing shall be done which involves faulty equipment, as determined by the Exhauster Cognizant Engineer and Characterization Sampling PIC. However, at the discretion of the Exhauster Cognizant Engineer and with approval of the Characterization Sampling PIC, tests may proceed on equipment which is not affected by faulty equipment.

If, due to circumstances, modifications of the test procedure are warranted, written changes may be made with the concurrence of the Exhauster Cognizant Engineer, and Characterization Sampling Operations Management. Quality approval of modifications is also necessary for those modifications relating to items which initially required Quality verification. Safety approval is necessary for any modifications which could affect worker safety. Amendments shall be per instructions in

4.3 TERMS AND DEFINITIONS

ATP  - Acceptance Test Procedure
COG  - exhauster COGnizant engineer
CPE  - Characterization Plant Engineering
OTP  - Operability Test Procedure
OTR  - Operability Test Report
PIC  - Person In Charge
QA   - Quality Assurance
RMCS - Rotary Mode Core Sampling
TWRS - Tank Waste Remediation System
VFD  - Variable Frequency Drive

4.4 REFERENCES

WHC-CM-6-1 REV 5 Change 1 "Standard Engineering Practices", APPENDIX L
WHC-SD-WM-ATP-063 REV 1 "Acceptance Test Procedure for the RMCS Exhausters"
WHC-SD-WM-OTP-174 REV 0-B "Operability Test Procedure for Rotary Mode Core Sampling System 3"
WHC-SD-WM-OTP-175 REV 0-B "Operability Test Procedure for Rotary Mode Core Sampling System 4"

4.5 SAFETY ISSUES

To reduce the possibility of injury, all persons in the vicinity of the test equipment must be made aware of the following concerns:

(A Safety Awareness Session will be conducted at the test site prior to testing.)

Warning - Be aware of tripping hazards (cables and duct work).

Warning - Personal protective equipment should be used during testing, such as safety glasses, gloves, hearing protection, and safety shoes, when appropriate.

4.6 RADIATION AND CONTAMINATION CONTROL

All testing will be non-radioactive and stand-in materials shall be used to simulate waste tank conditions.

4.7 QUALITY ASSURANCE

Quality Assurance shall approve of this Operability Test Procedure prior to its release. A Quality Control representative shall verify all steps requiring QC verification during testing.
4.8 AUTOMATIC EXHAUSTOR SYSTEM SHUTDOWN

The exhaustors are designed to shut down automatically when any one of the four following conditions occur:

- Tank pressure falls below -3 inches water gauge (wg).
- Exhaust stack flow exceeds 250 cfm or falls below 150 cfm.
- Total pressure drop across HEPA filters exceeds 5.5 inches wg.
- Common Fault Alarm is received when Exhauster is in unattended mode.

When the exhaustors shut down an open contact will be established with the core sample truck to inform the truck operator of the development. This contact will be tested during this procedure, concurrently with the performance of WHC-SD-WM-OTP-174 "OTP for RMCS System 3" and WHC-SD-WM-OTP-175 "OTP for RMCS System 4". All automatic shutdowns will have been previously tested during exhauster acceptance testing.

4.9 EXHAUSTOR COMMON FAULT ALARMS

In addition to automatic shutdowns, the exhaustors are equipped with four alarms which will trigger a common fault alarm strobe on the top of the instrumentation monitoring cabinet. Upon operator acknowledgement the alarm lights will extinguish until another new alarm is received. These alarms are generated by a Chessell Data Logger which monitors all exhauster functions. In the event of a data logger system error, the alarm strobe will become lit. A system error cannot be acknowledged and will require the alarming condition to be rectified in order to extinguish alarm lights. The four exhauster conditions which will activate the common fault alarm light are listed below.

- HEPA filter inlet humidity above 75%.
- HEPA filter inlet temperature above 195 °F.
- Alpha Sample Loop Flow Variance above ±10%.
- Record Sample Loop Flow Variance above ±10%.

The flow variance alarms will be caused by shutting off the sample vacuum pump to familiarize operators with alarm acknowledgement procedure. All alarms will have been previously tested during exhauster acceptance testing.

4.10 ACCEPTANCE CRITERIA

The acceptance criteria for this OTP is based on operability and reliability of the equipment as if it were being used in the field. Each step shall be evaluated and signed off by the exhauster cognizant engineer as well as Operations to verify that the equipment is acceptable for field use. Acceptable reliability based on this testing shall be determined by the judgement of the exhauster cognizant engineer.
and the operations manager. The acceptance of the overall reliability of the system shall be documented by signatures on the Test Completion Sign-Off Sheet.

5.0 RECORDS

Pertinent operating conditions will be documented where requested in this OTP. Records for the testing of equipment (section 7 and 8) will be recorded in the tables supplied with the procedure. The operator and other test personnel requested to do so, will initial in the space provided in the left hand margin upon satisfactory completion of the designated tasks.

The Exhauster Cognizant Engineer shall prepare and release an Operability Test Report at the conclusion of OTP testing.

6.0 PREREQUISITES

6.1 SUPPLIES

The following equipment will be required to complete the RMCS exhauster testing:

* RMCS Exhausters 3&4 and associated equipment
* RMCS Trucks 3&4 and associated equipment
* Portable electric generator & power cables
* Electrical distribution trailer
* Support truck
* Volt/Ohm meter
* Hand levels
* Wood blocks

6.2 PROCEDURES

The following procedures are required to complete the Exhauster OTP / System Integration testing.

1. WHC-SD-WM-OTP-174 REV 0-B "Operability Test Procedure for Rotary Mode Core Sampling System 3"

2. WHC-SD-WM-OTP-175 REV 0-B "Operability Test Procedure for Rotary Mode Core Sampling System 4"
7.0 EXHAUSTER #3 TEST PROCEDURE

7.1 EQUIPMENT SETUP

7.1.1 PIC REQUEST Rigger place exhauster within 20 feet of riser to allow flexible duct connection to riser.

7.1.2 PLACE leveling jacks on wooden blocks.

7.1.3 LEVEL exhauster.

7.1.4 PLACE portable monitoring cabinet platform in front of monitoring cabinet doors.

7.1.5 PLACE 12 inch gasket and pressure adapter ring on top of simulated tank riser flange.

7.1.6 PLACE 12 inch flange ring assembly on top of pressure adapter ring.

7.1.7 PIC REQUEST Fitter bolt flange ring assembly through pressure adapter ring to riser.
7.1.8 INSTALL instrument stand on flange ring assembly.

7.1.9 PIC REQUEST Instrument Technician CONNECT pressure shutdown cable from exhauster skid to Instrument Stand Junction Box.

7.1.10 PIC REQUEST Instrument Technician CONNECT tubing from high port of photohelic VTP-PDI-2202B, Tank Press, to flange ring assembly.

7.1.11 CONNECT flexible duct between flange ring assembly and exhauster inlet.

7.1.12 PLACE support stands below flexible duct to minimize sagging and low points.

7.1.13 CONNECT Seal Pot Pump outlet line to Pressure Adapter Ring.

7.1.14 CONNECT Seal Pot vent line to Pressure Adaptor Ring.

7.1.15 PIC REQUEST Electrician CONNECT Skid and platform grounding cables.

7.1.16 PIC REQUEST Electrician ENSURE the following components are OFF:

- Rotary Exhauster 480 VAC 40 AMPS switchgear at RMCS Generator
- VTP-DS-2201B, Var Freq Disconnect 480 V 3 PH (at exhauster)
- VTP-DS-2202B, Htr Disconnect 480 V 3 PH (at exhauster).

7.1.17 PIC REQUEST Electrician CONNECT 480V power cable between portable generator and exhauster.

7.1.18 PIC REQUEST Electrician PLACE Rotary Exhauster 480 VAC 40 AMPS switchgear on portable Generator ON.

7.2 INITIAL PLACEMENT INTO STANDBY MODE

7.2.1 PERFORM system lineup per SYSTEM LINEUP LIST (on next page)
# SYSTEM LINEUP LIST

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<td>VTP-V-2233B</td>
<td>HEPA 1 COND DRN VLV</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2202B</td>
<td>COND DRN VLV TO SEAL POT (on heater)</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2228B</td>
<td>FLT BANK INLET ISO VLY</td>
<td>CLOSED</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2229B</td>
<td>FLT BANK OUTLET ISO VLY</td>
<td>CLOSED</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2234B</td>
<td>SEAL POT FUNNEL ISO VLY</td>
<td>CLOSED</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2210B</td>
<td>VTP-PI-2202B INST ISO VLY</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
</tbody>
</table>

**OP/CE 7.2.2** OPEN VTP-V-2234B, Seal Pot Funnel Iso Valve.

**OP/CE 7.2.3** ADD water to Seal-Pot funnel UNTIL pump activates.

**OP/CE 7.2.4** CLOSE VTP-V-2234B, Seal Pot Funnel Iso Valve.

**OP/CE/OC 7.2.5** PIC REQUEST Instrument Technician ENSURE alarm setpoints are set as follows:
- VTP-PDI-2202B, Tank Press: -3" WG
- VTP-PDI-2203B, Hepa Flt Total D/P: 5.5" WG.

**OP/CE 7.2.6** TURN on Data Logger.
7.3 STARTING EXHAUSTER FROM STANDBY MODE

7.3.1 POSITION valves located on exhauster skid as follows:

- VTP-V-2228B, Flt Bank Inlet Iso Vlv  OPEN
- VTP-V-2229B, Flt Bank Outlet Iso Vlv  OPEN
- VTP-V-2209B, Cond Drn Vlv.        CLOSED

7.3.2 DEPRESS Stop pushbutton TWICE on VTP-PNL-2202B, Var Freq Dr Control Pnl.

7.3.3 DEPRESS AND HOLD Start pushbutton for 2 minutes, 15 seconds, on VTP-PNL-2202B, Var Freq Dr Control Pnl.

7.4 DATA LOGGER OPERATION AND ALARM RESPONSE

NOTE: Data logger's initial display mode is PLANT SUMMARY. All exhauster information is contained within 4 groups, titled OPERATION STATUS, EQUIPMENT STATUS, RUN TIME LOG, and COMMON FAULT ALARMS. In the MULTI-GROUP display mode, all exhauster channel values can be viewed simultaneously. Channel numbers are displayed on chart printout and on alarm summary screen, but not on display screen. Channels on display screen are identified by a descriptive tag and units displayed.

7.4.1 PRESS the MULTI-GROUP key.

7.4.2 RECORD values for the OPERATION STATUS group into the following table AND VERIFY values are acceptable.

<table>
<thead>
<tr>
<th>TAG</th>
<th>UNITS</th>
<th>CH</th>
<th>DESCRIPTION</th>
<th>RANGE</th>
<th>ACCEPTABLE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STACK</td>
<td>SCFM</td>
<td>1</td>
<td>Stack Flow Rate</td>
<td>0 - 391</td>
<td>200 ± 10</td>
<td></td>
</tr>
<tr>
<td>ALPHA</td>
<td>SCFM</td>
<td>3</td>
<td>Alpha Samp Flow Rate</td>
<td>0 - 3.00</td>
<td>1.53 ± .10</td>
<td></td>
</tr>
<tr>
<td>RECORD</td>
<td>SCFM</td>
<td>4</td>
<td>Recrd Samp Flow Rate</td>
<td>0 - 3.00</td>
<td>1.53 ± .10</td>
<td></td>
</tr>
<tr>
<td>BETA</td>
<td>SCFM</td>
<td>5</td>
<td>Beta Samp Flow Rate</td>
<td>0 - 3.00</td>
<td>1.53 ± .10</td>
<td></td>
</tr>
<tr>
<td>STACK</td>
<td>°F</td>
<td>2</td>
<td>Stack Temperature</td>
<td>0 - 150</td>
<td>0 - 150</td>
<td></td>
</tr>
<tr>
<td>SAMPLE</td>
<td>°F</td>
<td>6</td>
<td>Sample Temperature</td>
<td>0 - 150</td>
<td>0 - 150</td>
<td></td>
</tr>
<tr>
<td>PUMP</td>
<td>in wg</td>
<td>7</td>
<td>Pump Static Pressure</td>
<td>0 - (-136)</td>
<td>-100 ± 10</td>
<td></td>
</tr>
</tbody>
</table>
OP/CE/GC__/__/ 7.4.3 RECORD values for the EQUIPMENT STATUS group into the following table AND VERIFY values are acceptable.

<table>
<thead>
<tr>
<th>TAG</th>
<th>CH</th>
<th>DESCRIPTION</th>
<th>RANGE</th>
<th>ACCEPTABLE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STACK</td>
<td>14</td>
<td>Stack Fan (On-Off)</td>
<td>ON, OFF</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>PUMP P1</td>
<td>15</td>
<td>Pump P1 (On-Off)</td>
<td>ON, OFF</td>
<td>One pump ON, and other pump OFF</td>
<td></td>
</tr>
<tr>
<td>PUMP P2</td>
<td>18</td>
<td>Pump P2 (On-Off)</td>
<td>ON, OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMPFAIL</td>
<td>19</td>
<td>Pump Fail</td>
<td>NORMAL, FAILED</td>
<td>NORMAL</td>
<td></td>
</tr>
<tr>
<td>HTRELEM</td>
<td>21</td>
<td>Heater Element Fail</td>
<td>NORMAL, FAILED</td>
<td>NORMAL</td>
<td></td>
</tr>
<tr>
<td>HTRTEMP</td>
<td>22</td>
<td>Heater Overtemp Alm</td>
<td>NORMAL, OVERTMP</td>
<td>NORMAL</td>
<td></td>
</tr>
</tbody>
</table>

OP/CE/GC__/__/ 7.4.4 RECORD values for the COMMON FAULT ALARMS group into the following table AND VERIFY values are acceptable.

<table>
<thead>
<tr>
<th>TAG</th>
<th>UNITS</th>
<th>CH</th>
<th>DESCRIPTION</th>
<th>RANGE</th>
<th>ACCEPTABLE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUMID</td>
<td>%</td>
<td>23</td>
<td>HEPA Inlet Humidity</td>
<td>5 - 95</td>
<td>5 - 75</td>
<td></td>
</tr>
<tr>
<td>TEMP</td>
<td>°F</td>
<td>24</td>
<td>HEPA Inlet Temp</td>
<td>32 - 212</td>
<td>32 - 195</td>
<td></td>
</tr>
<tr>
<td>ALPHVAR</td>
<td>N/A</td>
<td>31</td>
<td>Alpha Samp Flow Var</td>
<td>NORMAL, ALARMED</td>
<td>NORMAL</td>
<td></td>
</tr>
<tr>
<td>REC VAR</td>
<td>N/A</td>
<td>33</td>
<td>Record Samp Flow Var</td>
<td>NORMAL, ALARMED</td>
<td>NORMAL</td>
<td></td>
</tr>
</tbody>
</table>

OP/CE/GC__/__/ 7.4.5 VERIFY that run time and total flow values in the RUN TIME LOG are incrementing.

NOTE: The channels which make up the COMMON FAULT ALARMS group cause the alarm strobe on the top of the cabinet to flash when alarmed. Upon operator acknowledgement the alarm strobe will go off until another new alarm is received. When a channel alarms, it's icon will have a flashing red light indicating the alarm level. Upon acknowledgement the red light will either glow steadily if condition still exists, or disappear if the alarm condition has cleared.

OP/CE__/__/ 7.4.6 PRESS VTP-SS-2201B VAC PUMP START SW AND verify button returns to OUT position and light goes off.

NOTE: After approximately 5 minutes the alarm beacon will flash indicating flow variance alarms on channels 31 and 33.
7.4.7 ACKNOWLEDGE common fault alarm as follows:

7.4.7.1 PRESS COMMON FAULT ALARMS group anywhere in box. Outside of box will turn yellow.

7.4.7.2 PRESS GOTO key located at bottom right of display. COMMON FAULT ALARMS group will occupy entire screen.

7.4.7.3 PRESS ACK key located at top right of screen.

7.4.7.4 VERIFY that external alarm strobe has turned off.

7.4.7.5 PRESS MULTI-GROUP key to return data logger screen to normal appearance.

7.4.8 PRESS VTP-SS-2201B VAC PUMP START SW AND verify button locks into IN position and light goes on.

NOTE: After 90 seconds a vacuum pump will start. In approximately 5 minutes flow variance alarm conditions on channels 31 and 33 will clear.

7.4.9 VERIFY that flow variance alarms clear.

7.4.10 PRINT Alarm Summary to Chart as follows:

7.4.10.1 PRESS ALARM SUMMARY key.

7.4.10.2 PRESS Print Key from ALARM SUMMARY menu.

7.4.10.3 PRESS MULTI-GROUP key to return data logger screen to normal appearance.

7.5 PLACING EXHAUSTER BACK TO STANDBY MODE

7.5.1 DEPRESS Stop pushbutton on VTP-PNL-2202B, Var Freq Dr Control Pnl.

7.5.2 POSITION valves located on exhauster skid as follows:

- VTP-V-2228B, Flt Bank Inlet Iso Vlv  CLOSE
- VTP-V-2229B, Flt Bank Outlet Iso Vlv  CLOSE
- VTP-V-2209B, Cond Drn Vlv.  OPEN

7.6 AUTOMATIC SHUTDOWN INTERFACE TO TRUCK

NOTE: This section is to performed when called out within either WHC-SD-WM-OTP-174 REV 0-B "Operability Test Procedure for Rotary Mode Core Sampling System 3" or WHC-SD-WM-OTP-175 REV 0-B "Operability Test Procedure for Rotary Mode Core Sampling System 4".
7.6.1 START Exhauster per section 7.3

7.6.2 PLACE switch VTP-SS-2208B into UNATTENDED position.

7.6.3 PRESS VTP-SS-2201B VAC PUMP START SW AND verify button returns to OUT position and light goes off.

NOTE: After approximately 5 minutes the alarm beacon will flash indicating flow variance alarms on channels 31 and 33.

7.6.4 VERIFY that Core Sample Truck automatically shuts down after alarm beacon flashes.

7.7 PLACE EXHAUSTER INTO SHUTDOWN FROM STANDBY

7.7.1 TURN OFF Data Logger.

7.7.2 TURN the following switches inside monitoring cabinet OFF:

- VTP-SS-2204B, Air Cond No. 1 Pwr Sw
- VTP-SS-2211B, Samp Flo Inst
- VTP-SS-2210B, Analyzer Pwr Sw
- VTP-SS-2205B, Air Cond No. 2 Pwr Sw

7.7.3 DRAIN seal-pot by PRESSING VTP-PB-2204B, Seal Pot Pp ON until seal-pot is empty.

7.7.4 CLOSE the following valves:

- VTP-V-2209B, Cond Drn Vlv
- VTP-V-2232B, HEPA 2 Cond Drn Vlv
- VTP-V-2233B, HEPA 1 Cond Drn Vlv

7.7.5 PIC REQUEST Electrician SWITCH the following components OFF:

- VTP-DS-2201B Var Freq Disconnect 480 V 3 Ph
- VTP-DS-2202B Htr Disconnect 480 V 3 Ph
- Main breaker in VTP-DP-2201B Dist Pnl For Vent Equip

7.8 EQUIPMENT TAKE DOWN

7.8.1 PIC REQUEST Electrician perform the following:

7.8.1.1 PLACE Rotary Exhauster 480 VAC 40 AMPS switchgear at RMCS Generator to OFF.

7.8.1.2 DISCONNECT 480V power cable from RMCS generator.
7.8.1.3 **DISCONNECT** Skid and platform grounding cables.

7.8.2 PIC REQUEST Instrument Technician **PERFORM** the following:

7.8.2.1 **DISCONNECT** Pressure Shutdown Cable from instrument stand on flange ring assembly.

7.8.2.2 **DISCONNECT** photohelic piping from riser equipment **AND**

**CAP or PLUG** all openings.

7.8.3 **REMOVE** instrument stand.

7.8.4 **DISCONNECT** Seal-Pot drain and vent lines from riser equipment.

7.8.5 **REMOVE** flexible duct support stands.

7.8.6 PIC REQUEST Fitter **REMOVE** riser bolts from flange ring assembly.

7.8.7 **REMOVE** flex duct flange ring assembly with flexible duct from riser.

7.8.8 **PLACE** blank flange with neoprene gasket over opening on flange ring assembly **AND**

**BOLT** pieces together hand tight.

7.8.9 **REMOVE** pressure adapter ring.

7.8.10 PIC REQUEST Fitter to remove heater adapter ring with flexible duct from exhauster heater inlet.

7.8.11 PIC REQUEST Fitter to place blank flange with neoprene gasket on heater adapter ring **AND**

**BOLT** pieces together hand tight.

7.8.12 PIC REQUEST Fitter to place blank flange with neoprene gasket on exhauster heater inlet **AND**

**BOLT** pieces together hand tight.

7.8.13 PIC REQUEST Fitter **TIGHTEN** bolts hand tight.
8.0 EXHAUSTER #4 TEST PROCEDURE

8.1 EQUIPMENT SETUP

8.1.1 PIC REQUEST Rigger place exhauster within 20 feet of riser to allow flexible duct connection to riser.

8.1.2 PLACE leveling jacks on wooden blocks.

8.1.3 LEVEL exhauster.

8.1.4 PLACE portable monitoring cabinet platform in front of monitoring cabinet doors.

8.1.5 PLACE 12 inch gasket and pressure adapter ring on top of simulated tank riser flange.

8.1.6 PLACE 12 inch flange ring assembly on top of pressure adapter ring.

8.1.7 PIC REQUEST Fitter bolt flange ring assembly though pressure adapter ring to riser.
8.1.8 INSTALL instrument stand on flange ring assembly.

8.1.9 PIC REQUEST Instrument Technician CONNECT pressure shutdown cable from exhauster skid to Instrument Stand Junction Box.

8.1.10 PIC REQUEST Instrument Technician CONNECT tubing from high port of photohelic VTP-PDI-2202B, Tank Press, to flange ring assembly.

8.1.11 CONNECT flexible duct between flange ring assembly and exhauster inlet.

8.1.12 PLACE support stands below flexible duct to minimize sagging and low points.

8.1.13 CONNECT Seal Pot Pump outlet line to Pressure Adapter Ring.

8.1.14 CONNECT Seal Pot vent line to Pressure Adaptor Ring.

8.1.15 PIC REQUEST Electrician CONNECT Skid and platform grounding cables.

8.1.16 PIC REQUEST Electrician ENSURE the following components are OFF:

- Rotary Exhauster 480 VAC 40 AMPS switchgear at RMCS Generator
- VTP-DS-2201C, Var Freq Disconnect 480 V 3 PH (at exhauster)
- VTP-DS-2202C, Htr Disconnect 480 V 3 PH (at exhauster).

8.1.17 PIC REQUEST Electrician CONNECT 480V power cable between portable generator and exhauster.

8.1.18 PIC REQUEST Electrician PLACE Rotary Exhauster 480 VAC 40 AMPS switchgear on portable Generator ON.

8.2 INITIAL PLACEMENT INTO STANDBY MODE

8.2.1 PERFORM system lineup per SYSTEM LINEUP LIST (on next page).
<table>
<thead>
<tr>
<th>COMPONENT NO.</th>
<th>DESCRIPTION</th>
<th>REQUIRED CONDITION</th>
<th>INITIAL POSITIONER (Initials/Date)</th>
<th>INDEPENDENT VERIFICATION (Initials/Date)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VTP-DP-2201C</td>
<td>DIST PNL FOR VENT EQUIP</td>
<td>ALL BREAKERS ON</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-DS-2201C</td>
<td>VAR FREQ DISCONNECT 480V 3 PH</td>
<td>ON</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-DS-2202C</td>
<td>HTR DISCONNECT 480V 3 PH</td>
<td>ON</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2211C</td>
<td>ALPHA SAMP FCV INLET ISO VLV</td>
<td>CLOSED</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2212C</td>
<td>REC SAMP FCV INLET ISO VLV</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2213C</td>
<td>BETA SAMP FCV INLET ISO VLV</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2217C</td>
<td>ALPHA SAMP FCV OUTLET ISO VLV</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2219C</td>
<td>REC SAMP FCV OUTLET ISO VLV</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2218C</td>
<td>BETA SAMP FCV OUTLET ISO VLV</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-SS-2201C</td>
<td>VAC PUMP START SW</td>
<td>IN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-SS-2206C</td>
<td>VAC Pd CONT CKT PWR SW</td>
<td>ON</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-SS-2207C</td>
<td>FCV CKT PWR SW</td>
<td>ON</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-SS-2204C</td>
<td>AIR COND NO 1 PWR SW</td>
<td>ON</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-SS-2211C</td>
<td>SAMP FLO INST</td>
<td>ON</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-SS-2208C</td>
<td>AUTO SHUTDOWN BYP SW</td>
<td>ATTENDED</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-SS-2210C</td>
<td>ANALYZER PWR SW</td>
<td>ON</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-SS-2205C</td>
<td>AIR COND NO 2 PWR SW</td>
<td>ON</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2209C</td>
<td>COND DRN VLV</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2232C</td>
<td>HEPA 2 COND DRN VLV</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2233C</td>
<td>HEPA 1 COND DRN VLV</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2202C</td>
<td>COND DRN VLV TO SEAL POT (on heater)</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2228C</td>
<td>FLT BANK INLET ISO VLV</td>
<td>CLOSED</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2229C</td>
<td>FKT BANK OUTLET ISO VLV</td>
<td>CLOSED</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2234C</td>
<td>SEAL POT FUNNEL ISO VLV</td>
<td>CLOSED</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>VTP-V-2210C</td>
<td>VTP-PI-2202B INST ISO VLV</td>
<td>OPEN</td>
<td>/</td>
<td>/</td>
</tr>
</tbody>
</table>

**OPICE ____/____ 8.2.2** OPEN VTP-V-2234C, Seal Pot Funnel Iso Valve.

**OPICE ____/____ 8.2.3** ADD water to Seal-Pot funnel UNTIL pump activates.

**OPICE ____/____ 8.2.4** CLOSE VTP-V-2234C, Seal Pot Funnel Iso Valve.

**OPICE/QC ____/____/____ 8.2.5** PIC REQUEST Instrument Technician ENSURE alarm setpoints are set as follows:

- VTP-PDI-2202C, Tank Press -3" WG
- VTP-PDI-2203C, Hepa Flt Total D/P 5.5" WG.

**OPICE ____/____ 8.2.6** TURN on Data Logger.
8.3 STARTING EXHAUSTER FROM STANDBY MODE

8.3.1 POSITION valves located on exhauster skid as follows:

- VTP-V-2228C, Flt Bank Inlet Iso Vlv  OPEN
- VTP-V-2229C, Flt Bank Outlet Iso Vlv  OPEN
- VTP-V-2209C, Cond Drn Vlv.  CLOSED

8.3.2 DEPRESS Stop pushbutton TWICE on VTP-PNL-2202C, Var Freq Dr Control Pnl.

8.3.3 DEPRESS AND HOLD Start pushbutton for 2 minutes, 15 seconds, on VTP-PNL-2202C, Var Freq Dr Control Pnl.

8.4 DATA LOGGER OPERATION AND ALARM RESPONSE

NOTE: Data logger's initial display mode is PLANT SUMMARY. All exhauster information is contained within 4 groups, titled OPERATION STATUS, EQUIPMENT STATUS, RUN TIME LOG, and COMMON FAULT ALARMS. In the MULTI-GROUP display mode, all exhauster channel values can be viewed simultaneously. Channel numbers are displayed on chart printout and on alarm summary screen, but not on display screen. Channels on display screen are identified by a descriptive tag and units displayed.

8.4.1 PRESS the MULTI-GROUP key.

8.4.2 RECORD values for the OPERATION STATUS group into the following table AND VERIFY values are acceptable.

| OPERATION STATUS |
|------------------|---|---|-----------------|---|---|
| TAG | UNITS | CH | DESCRIPTION | RANGE | ACCEPTABLE |
| STACK | SCFM | 1 | Stack Flow Rate | 0 - 391 | 200 ± 10 |
| ALPHA | SCFM | 3 | Alpha Samp Flow Rate | 0 - 3.00 | 1.53 ± .10 |
| RECORD | SCFM | 4 | Recrd Samp Flow Rate | 0 - 3.00 | 1.53 ± .10 |
| BETA | SCFM | 5 | Beta Samp Flow Rate | 0 - 3.00 | 1.53 ± .10 |
| STACK | °F | 2 | Stack Temperature | 0 - 150 | 0 - 150 |
| SAMPLE | °F | 6 | Sample Temperature | 0 - 150 | 0 - 150 |
| PUMP | in wg | 7 | Pump Static Pressure | 0 - (-136) | -100 ± 10 |
OP/CE/QC __/__/ 8.4.3 RECORD values for the EQUIPMENT STATUS group into the following table AND VERIFY values are acceptable.

<table>
<thead>
<tr>
<th>TAG</th>
<th>CH</th>
<th>DESCRIPTION</th>
<th>RANGE</th>
<th>ACCEPTABLE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>STACK</td>
<td>14</td>
<td>Stack Fan (On-Off)</td>
<td>ON, OFF</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>PUMP P1</td>
<td>15</td>
<td>Pump P1 (On-Off)</td>
<td>ON, OFF</td>
<td>One pump ON, and other pump OFF</td>
<td></td>
</tr>
<tr>
<td>PUMP P2</td>
<td>18</td>
<td>Pump P2 (On-Off)</td>
<td>ON, OFF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMPFAIL</td>
<td>19</td>
<td>Pump Fail</td>
<td>NORMAL, FAILED</td>
<td>NORMAL</td>
<td></td>
</tr>
<tr>
<td>HTRELEM</td>
<td>21</td>
<td>Heater Element Fail</td>
<td>NORMAL, FAILED</td>
<td>NORMAL</td>
<td></td>
</tr>
<tr>
<td>HTRTEMP</td>
<td>22</td>
<td>Heater Overtemp Alm</td>
<td>NORMAL, OVERTMP</td>
<td>NORMAL</td>
<td></td>
</tr>
</tbody>
</table>

OP/CE/QC __/__/ 8.4.4 RECORD values for the COMMON FAULT ALARMS group into the following table AND VERIFY values are acceptable.

<table>
<thead>
<tr>
<th>TAG</th>
<th>UNITS</th>
<th>CH</th>
<th>DESCRIPTION</th>
<th>RANGE</th>
<th>ACCEPTABLE</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUMID</td>
<td>%</td>
<td>23</td>
<td>HEPA Inlet Humidity</td>
<td>5 - 95</td>
<td>5 - 75</td>
<td></td>
</tr>
<tr>
<td>TEMP</td>
<td>°F</td>
<td>24</td>
<td>HEPA Inlet Temp</td>
<td>32 - 212</td>
<td>32 - 195</td>
<td></td>
</tr>
<tr>
<td>ALPHVAR</td>
<td>N/A</td>
<td>31</td>
<td>Alpha Samp Flow Var</td>
<td>NORMAL, ALARMED</td>
<td>NORMAL</td>
<td></td>
</tr>
<tr>
<td>REC VAR</td>
<td>N/A</td>
<td>33</td>
<td>Record Samp Flow Var</td>
<td>NORMAL, ALARMED</td>
<td>NORMAL</td>
<td></td>
</tr>
</tbody>
</table>

OP/CE/QC __/__/ 8.4.5 VERIFY that run time and total flow values in the RUN TIME LOG are incrementing.

NOTE: The channels which make up the COMMON FAULT ALARMS group cause the alarm strobe on the top of the cabinet to flash when alarmed. Upon operator acknowledgement the alarm strobe will go off until another new alarm is received. When a channel alarms, its icon will have a flashing red light indicating the alarm level. Upon acknowledgement the red light will either glow steadily if condition still exists, or disappear if the alarm condition has cleared.

OP/CE __/__ 8.4.6 PRESS VTP-SS-2201C VAC PUMP START SW AND verify button returns to OUT position and light goes off.

NOTE: After approximately 5 minutes the alarm beacon will flash indicating flow variance alarms on channels 31 and 33.
8.4.7 ACKNOWLEDGE common fault alarm as follows:

OP/CE ___/___

8.4.7.1 PRESS COMMON FAULT ALARMS group anywhere in box. Outside of box will turn yellow.

OP/CE ___/___

8.4.7.2 PRESS GOTO key located at bottom right of display. COMMON FAULT ALARMS group will occupy entire screen.

OP/CE ___/___

8.4.7.3 PRESS ACK key located at top right of screen.

OP/CE ___/___

8.4.7.4 VERIFY that external alarm strobe has turned off.

OP/CE ___/___

8.4.7.5 PRESS MULTI-GROUP key to return data logger screen to normal appearance.

OP/CE ___/___

8.4.8 PRESS VTP-SS-2201C VAC PUMP START SW AND verify button locks into IN position and light goes on.

NOTE: After 90 seconds a vacuum pump will start. In approximately 5 minutes flow variance alarm conditions on channels 31 and 33 will clear.

OP/CE ___/___

8.4.9 VERIFY that flow variance alarms clear.

8.4.10 PRINT Alarm Summary to Chart as follows:

OP/CE ___/___

8.4.10.1 PRESS ALARM SUMMARY key.

OP/CE ___/___

8.4.10.2 PRESS Print Key from ALARM SUMMARY menu.

OP/CE ___/___

8.4.10.3 PRESS MULTI-GROUP key to return data logger screen to normal appearance.

8.5 PLACING EXHAUSTER BACK TO STANDBY MODE

OP/CE ___/___

8.5.1 DEPRESS Stop pushbutton on VTP-PNL-2202C, Var Freq Dr Control Pnl.

OP/CE ___/___

8.5.2 POSITION valves located on exhauster skid as follows:

- VTP-V-2228C, Flt Bank Inlet Iso Vlv CLOSE
- VTP-V-2229C, Flt Bank Outlet Iso Vlv CLOSE
- VTP-V-2209C, Cond Drn Vlv. OPEN

8.6 AUTOMATIC SHUTDOWN INTERFACE TO TRUCK

NOTE: This section is to performed when called out within either WHC-SD-WM-OTP-174 REV 0-B "Operability Test Procedure for Rotary Mode Core Sampling System 3" or WHC-SD-WM-OTP-175 REV 0-B "Operability Test Procedure for Rotary Mode Core Sampling System 4".
8.6.1  START Exhauster per section 7.3

8.6.2  PLACE switch VTP-SS-2208B into UNATTENDED position.

8.6.3  PRESS VTP-SS-2201B VAC PUMP START SW AND verify button returns to OUT position and light goes off.

**NOTE:** After approximately 5 minutes the alarm beacon will flash indicating flow variance alarms on channels 31 and 33.

8.6.4  VERIFY that Core Sample Truck automatically shuts down after alarm beacon flashes.

8.7  PLACE EXHAUSTER INTO SHUTDOWN FROM STANDBY

8.7.1  TURN OFF Data Logger.

8.7.2  TURN the following switches inside monitoring cabinet OFF:
   - VTP-SS-2204C, Air Cond No. 1 Pwr Sw
   - VTP-SS-2211C, Samp Flo Inst
   - VTP-SS-2210C, Analyzer Pwr Sw
   - VTP-SS-2205C, Air Cond No. 2 Pwr Sw

8.7.3  DRAIN seal-pot by PRESSING VTP-PB-2204C, Seal Pot Pp ON until seal-pot is empty.

8.7.4  CLOSE the following valves:
   - VTP-V-2209C, Cond Drn Vlv
   - VTP-V-2232C, HEPA 2 Cond Drn Vlv
   - VTP-V-2233C, HEPA 1 Cond Drn Vlv

8.7.5  PIC REQUEST Electrician SWITCH the following components OFF:
   - VTP-DS-2201C Var Freq Disconnect 480 V 3 Ph
   - VTP-DS-2202C Htr Disconnect 480 V 3 Ph
   - Main breaker in VTP-DP-2201C Dist Pnl For Vent Equip

8.8  EQUIPMENT TAKE DOWN

8.8.1  PIC REQUEST Electrician perform the following:

8.8.1.1  PLACE Rotary Exhauster 480 VAC 40 AMPS switchgear at RMCS Generator to OFF.

8.8.1.2  DISCONNECT 480V power cable from RMCS generator.
8.8.1.3 DISCONNECT Skid and platform grounding cables.

8.8.2 PIC REQUEST Instrument Technician PERFORM the following:

8.8.2.1 DISCONNECT Pressure Shutdown Cable from instrument stand on flange ring assembly.

8.8.2.2 DISCONNECT photohelic piping from riser equipment AND CAP or PLUG all openings.

8.8.3 REMOVE instrument stand.

8.8.4 DISCONNECT Seal-Pot drain and vent lines from riser equipment.

8.8.5 REMOVE flexible duct support stands.

8.8.6 PIC REQUEST Fitter REMOVE riser bolts from flange ring assembly.

8.8.7 REMOVE flex duct flange ring assembly with flexible duct from riser.

8.8.8 PLACE blank flange with neoprene gasket over opening on flange ring assembly AND BOLT pieces together hand tight.

8.8.9 REMOVE pressure adapter ring.

8.8.10 PIC REQUEST Fitter to remove heater adapter ring with flexible duct from exhauster heater inlet.

8.8.11 PIC REQUEST Fitter to place blank flange with neoprene gasket on heater adapter ring AND BOLT pieces together hand tight.

8.8.12 PIC REQUEST Fitter to place blank flange with neoprene gasket on exhauster heater inlet AND BOLT pieces together hand tight.

8.8.13 PIC REQUEST Fitter TIGHTEN bolts hand tight.
OTP Exception / Resolution Data Sheet

<table>
<thead>
<tr>
<th>STEP #</th>
<th>DESCRIPTION OF PROBLEM</th>
<th>RESOLUTION TO PROBLEM</th>
<th>COG INITIALS</th>
<th>QC INITIALS</th>
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25
Test Completion Sign-Off Sheet

All tests have been completed as described in this OTP. All exceptions have been documented and resolved as indicated on the "OTP Exception / Resolution Sheet". The Exhausters can be operated in a safe manner and pose no unacceptable hazards to the operator.

<table>
<thead>
<tr>
<th>NAME</th>
<th>ORGANIZATION</th>
<th>SIGNATURE</th>
<th>DATE</th>
</tr>
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<tbody>
<tr>
<td>J. S. Lee</td>
<td>Core Sampling Operations</td>
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<tr>
<td>M. L. McElroy</td>
<td>Quality Assurance</td>
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<td>M. E. Huda</td>
<td>Safety</td>
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<tr>
<td>P. J. Martell</td>
<td>Effluent Emissions Monitoring</td>
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<td>J. S. Schofield</td>
<td>Characterization Plant Engineering</td>
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<td>T. D. Jarecki</td>
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<tr>
<td>E. J. Waldo</td>
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