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1	/	Design Authority G.P. Jandacek	<i>[Signature]</i>	1/22/97	S7-12	1		305 Facility Eng. K.S. Witw...	<i>[Signature]</i>	1/22/97	S7-12
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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE OF WHITTAKER ELECTROCHEMICAL CELL

G. F. Vargo, Jr.

SGN Eurisys Services Corporation, Richland, WA 99352
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Abstract: This document is the test procedure to systematically test the Whittaker cells between the temperatures of -20°F and +120°F. These sensors are used on the Rotary Mode Core Sampling (RMCS) flammable gas interlock (FGI), to detect and quantify hydrogen gas. This procedure supports the testing, that is being performed, after cold weather calibration attempts, on the Whittaker cell, failed.

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TEST PROCEDURE FOR MEASUREMENT OF
PERFORMANCE VS TEMPERATURE OF WHITTAKER
ELECTROCHEMICAL CELL

G. F. Vargo, Jr.

SGN Eurisys Services Corporation, Richland, WA 99352
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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE OF WHITTAKER CELL

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE OF WHITTAKER CELL

ACRONYMS AND ABBREVIATIONS

ETL	Engineering Testing Laboratory
T/C	Thermocouple
WEC	Whittaker Electrochemical Cell

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE OF WHITTAKER CELL

1.0 PURPOSE/SCOPE

This procedure will systematically evaluate the performance versus temperature of the Whittaker electrochemical cell in accordance with HNF-SD-WM-TP-527. See Section 2.0 of this document.

This test will be performed in the 305 ETL using the environmental test chamber.

2.0 REFERENCES

- 2.1 HNF-SD-WM-TP-527, *Test Plan for Measurement of Performance vs. Temperature of Whittaker Electrochemical Cell*, Rev. 0, SGN Eurisys Services Corporation, Richland, WA 99352, January 1997.
- 2.2 WHC-SD-WM-SAD-035, *A Safety Assessment of Rotary Mode Core Sampling in Flammable Gas Single Shell Tanks*, Rev 0A, Los Alamos National Laboratory, Los Alamos, New Mexico, August 1996.

3.0 RESPONSIBILITIES

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

- Test Director: The engineer assigned responsibility for the performance of this test.
- Test Personnel: One(1) or more engineers and/or technicians assigned to assist the Test Director during the performance of this test.

The key personnel designated to perform this test are identified in Section 3.1.1.7 of HNF-SD-WM-TP-527. See Attachment 2 of this document.

4.0 DOCUMENTATION RECORD

The appendices of this procedure shall be the document record. They are designated as follows:

- APPENDIX A: MEASUREMENT AND TEST EQUIPMENT RECORD
- APPENDIX B: DATA RECORD
- APPENDIX C: EXCEPTION RECORD
- APPENDIX D: TEST LOG RECORD
- APPENDIX E: GAS BOTTLE RECORD

These appendices designations are as defined in HNF-SD-WM-TP-527. See Attachment 2 of this document.

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5.0 SYSTEM DESCRIPTION

Reference Section(s) 1.0 and 2.0 of HNF-SD-WM-527. See Attachment 2 of this document.

6.0 TEST PREREQUISITES

6.1 Prior to initiation of testing, the following conditions shall be verified:

6.1.1 The job hazards analysis(JHA), for performance activities for this test is 305 ETL, has been performed and all personnel have signed the record sheet.

Verified by: _____ Date _____
(Test Director)

6.1.2 The information for all instruments and test equipment have been recorded in APPENDIX A.

Verified by: _____ Date _____
(Test Director)

6.1.3 The information for all gas bottles have been recorded in APPENDIX E.

Verified by: _____ Date _____
(Test Director)

6.1.4 The test apparatus has been configured, connected, and tested, according to FIGURES 1 and 2 of HNF-SD-WM-TP-527 in the environmental test chamber, the T/C readout for the chamber is operational, and the door of the chamber has been closed. See Attachment 2 of this document.

Verified by: _____ Date _____
(Test Director)

6.1.5 The atmospheric pressure has been verified by calling the Hanford weather service(373-2716) in the 300 area.

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Atmospheric pressure: _____
Reading Time Date

Verified by: _____
(Test Director) Date

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

6.2.1 Two(2) calibrated microvoltmeter(s), capable of measuring circuit voltage to .1 mV +/- .01 mV. Record in Appendix A.

Verified by: _____
(Test Director) Date

NOTE: The 305 ETL Hewlett Packard (HP) microvolt data acquisition system will be used as the microvoltmeter readout device capable of measuring circuit voltage to .1 mV +/- .01 mV. The calibrated microvoltmeters will be used to verify the HP voltage readings.

6.2.2 T/C readout device capable of reading Type K T/C to +/- 3.96° F. Record in Appendix A.

Verified by: _____
(Test Director) Date

NOTE: The 305 ETL Hewlett Packard (HP) T/C data acquisition system will be used as the readout device capable of reading Type K T/Cs to +/- 3.96° F. Furthermore, the 305 ETL Omega temperature calibrator will be used to verify the HP temperature readings.

7.0 TEMPERATURE TEST

7.1 If any step in this section cannot be successfully performed or results in an abnormal condition, then record a description of the condition in Appendix C.

7.1.1 For each discrepancy recorded, enter an identifying number in the "EXCEPTION NUMBER" column of Appendix C.

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**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE OF
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- 7.1.2 Reproduce Appendix C as required, and attach the additional pages to this procedure, to record all discrepancies noted during testing.

WARNING: This test involves the use of bottled gas under high pressure. Operating personnel must be continuously on the alert for leaks from any gas lines, fittings, or devices. Any leaks are to be corrected immediately by appropriate action.

- 7.2 Ensure that the five(5) 3-way solenoid valves(V6,V7,V8,V9,V10) are in the de-energized ("**VENT**") position by opening the five(5) solenoid control switches(S1,S2,S3,S4,S5).

NOTE: When the 3-way solenoid valve(s)(V6,V7,V8,V9,V10) are **DE-ENERGIZED** the gas header is lined up **VENT TO ATMOSPHERE(VENT)** through the manual vent valve(s)(V11,V12,V13,V14,V15).

When the 3-way solenoid valve(s)(V6,V7,V8,V9,V10) are **ENERGIZED** the gas header is lined up to the **WHITTAKER CELL(WEC)**.

- 7.3 Ensure that all the manual vent valves(V11,V12,V13,V14,V15) from the five(5) WECs, are in the closed position by turning each valve operator, on each valve, clockwise and by observing no gas flow on flowmeter(F1).
- 7.4 Energize the environmental test chamber and begin to heat up to 120°F. When temperature is reached and stabilized go to Step 7.5
- 7.5 Ensure power is de-energized to the +24 Vdc system power supply(PS 1) with a zero energy check using a test meter.
- 7.6 Connect a microvolt readout device(HP microvolt data acquisition system)to the output terminals terminating the (+) and (-) leads of the Whittaker cell under test. Plus(+) lead of microvoltmeter device connects to (+) lead from the cell and (-) lead of the microvolt device connects to the (-) lead of the cell.
- 7.7 Connect a microvolt readout device(HP microvolt data acquisition system) to the output terminals terminating the (+) and (-) leads of the respective 9323/10-10-11 Stahl intrinsic voltage isolating repeater, of the Whittaker cell under test. Plus(+) lead of microvoltmeter device connects to (+) lead from the barrier and (-) lead of the microvolt device connects to the (-) lead of the barrier.

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- 7.8 Connect the T/C readout device(HP T/C data acquisition system) to the T/C attached to the Whittaker cell under test.
- 7.9 Energize the +24 Vdc power supply(PS 1) to the system. Verify live power by check with a test meter.
- 7.10 Ensure that the gas divider(G1) is selected to the 0%(100% balance gas) on the selector switch.
- 7.11 Ensure that the balance gas is on by opening the bottle stop valve(V1) and observing the bottle pressure and the header output pressure past the regulator(R1).
- 7.12 Ensure that regulated balance gas pressure is reading 20 psi. by adjustment of the regulator(R1). Clockwise(CW) rotation of the adjustment knob increases the pressure, counter clockwise(CCW) decreases the pressure.
- 7.13 Ensure that the regulated balance gas is energized to the gas divider by opening of the balance gas isolation valve(V3) operator in the CCW direction.
- 7.14 Ensure that the calibration gas is on by opening the bottle stop valve(V2) and observing the bottle pressure and the output pressure past the regulator(R2).
- 7.15 Ensure that regulated calibration gas pressure is reading between 22 and 24 psi. by adjustment of the regulator(R2). CW rotation of the adjustment knob increases the pressure, CCW decreases the pressure.
- 7.16 Ensure that the regulated calibration gas is energized to the gas divider by opening of the calibration gas isolation valve(V4) operator in the CCW direction.
- 7.17 Ensure that the 3 way solenoid valve(V6,V7,V8,V9,V10), to Wittaker cell under test, is in *venting to atmosphere*("VENT") position by opening the respective manual vent isolation valve(V11,V12,V13,V14,V15) operator, in the CCW direction, and by closing(CW), and then re-opening(CCW). When valve is closed there should be a momentary loss of flow observed on flow meter(F1). Adjust the needle flow valve(V5) for 2 cu. ft/hr flow rate and pressure +/- 2.0" W.C.(of atmospheric pressure), by using the in-line flowmeter(F1) indication and the reading from the Rosemount pressure indicating transmitter(PIT 1).
- 7.18 Purge the input gas line to atmosphere, to the Whittaker cell

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under test, for approximately 2 minutes(from Step 7.17).

- 7.19 After 2 minutes of purge energize the solenoid valve(V6,V7,V8,V9,V10), to the Whittaker under test, by actuation of the respective solenoid control switch(S1,S2,S3,S4,S5) to the "WEC" position.
- 7.20 Verify that the 3 way solenoid valve(V6,V7,V8,V9,V10), to the Whittaker cell under test, is energized, and gas is flowing through the cell, by closing, and then re-opening, the respective manual vent isolation valve(V11,V12,V13,V14,V15) for the Whittaker under test. There should be no interruption to gas flowing on flow meter(F1).

NOTE: The 3 way solenoid may not actuate correctly at the extreme test temperatures. If the correct flow of gas cannot be verified, for a particular step in the procedure, actuate the switch from "WEC" to "VENT" until proper flow is observed.

- 7.21 Move selector switch, on gas divider, to 30% position. Start stop watch.
- 7.22 At 2 minutes(120s), at 14 minutes and 30 seconds(870s), and at 15 minutes(900s) record the voltage output from the HP/microvoltmeter system in Appendix B. Also, record one value for the gas pressure from PT 1, the gas flow from F1, the environmental chamber temperature, and the WEC T/C temperature, from the HP, in Appendix B. Reset stop watch.
- 7.23 Move selector switch, on gas divider, to 60% position. Start stop watch.
- 7.24 Repeat Step 7.22
- 7.25 Move selector switch, on gas divider, to 90% position. Start stop watch.
- 7.26 Repeat Step 7.22
- 7.27 Ensure that the gas divider(G1) is selected to the 0%(100% balance gas) on the selector switch.
- 7.28 Purge the Whittaker cell under test for 15 minutes.

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- 7.29 After 15 minutes of purge de-energize the solenoid valve(V6, V7, V8, V9, V10), to the Whittaker under test, by actuation of the respective solenoid control switch(S1,S2,S3,S4,S5) to the "VENT" position.
- 7.30 Verify that the 3 way solenoid valve(V6,V7,V8,V9,V10), to the Whittaker cell under test, is de-energized, and valve is in *venting to atmosphere* position by closing, and then re-opening, the respective manual vent isolation valve(V11,V12,V13,V14,V15) for the Whittaker under test. When the valve is closed there should be a momentary loss of flow observed on flow meter(F1).
- 7.31 Move selector switch, on gas divider, to 100% position.
- 7.32 Purge the input gas line to atmosphere, to the Whittaker cell under test, for approximately 15 minutes.
- 7.33 After 15 minutes of purge energize the solenoid valve(V6,V7,V8,V9,V10), to the Whittaker under test, by actuation of the respective solenoid control switch(S1,S2,S3,S4,S5) to the "WEC" position.
- 7.34 Verify that the 3 way solenoid valve(V6,V7,V8,V9,V10), to the Whittaker cell under test, is energized, and gas is flowing through the cell, by closing, and then re-opening, the respective manual vent isolation valve(V11,V12,V13,V14,V15) for the Whittaker under test. There should be no interruption to gas flowing on flow meter(F1).
- 7.35 At every 15 seconds for 2 minutes(15s, 30s, 45s, 60s, 75s, 90s, 105s, 120s) and at 14 minutes and 30 seconds(870s) and at 15 minutes(900s), record the voltage output from HP/microvoltmeter system in Appendix B. Also, record one value for the gas pressure from PT 1, the gas flow from F1, the environmental chamber temperature, and the WEC T/C temperature, from the HP, in Appendix B.
- 7.36 Ensure that the gas divider(G1) is selected to the 0%(100% balance gas) on the selector switch.
- 7.37 Repeat Steps 7.28 through 7.36 two(2) more times then go to Step 7.38.
- 7.38 After 15 minutes of purge to the Whittaker cell under test, repeat Steps 7.2, 7.3.

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- 7.39 If this is the last Whittaker cell to be tested, at the same temperature, go to Step 7.40. If this is not the last Whittaker cell, to be tested, repeat Steps 7.5 through 7.38 until all Whittaker cells have been tested at the same temperature.
- 7.40 Decrease the temperature to the environmental chamber by 20⁰F. If this temperature IS NOT -20⁰F, and is stable, repeat Steps 7.5 through 7.39. If this temperature IS -20⁰F, and is stable, repeat Steps 7.5 through 7.39, then go to Step 7.41.
- 7.41 Testing as directed by this procedure has been completed. Any discrepancies have been listed on Appendix C.

Test Director: _____ Date: _____

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WHITTAKER CELL

8.0 APPENDIX A: MEASUREMENT AND TEST EQUIPMENT RECORD

[illegible]

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE WHITTAKER CELL
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9.0 APPENDIX B: DATA RECORD

DATA RECORD TEST NUMBER KEY

XYZ

X: Whittaker Identification Number (WIN) 1 -5

Y: Temperature Identification Number (TIN) 1 -8

1: -20°F	5: +60°F
2: 0°F	6: +80°F
3: +20°F	7: +100°F
4: +40°F	8: +120°F

Z: Test Identification Number (TEIN) 1 -4

1: 30%,60%,90%
2: 1st. 100%
3: 2nd. 100%
4: 3rd. 100%

**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.1 DATA RECORD SHEET 111

TEST 111 -20°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.2 DATA RECORD SHEET 112

TEST 112 @-20°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.3 DATA RECORD SHEET 113

TEST 113 0-20°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.4 DATA RECORD SHEET 114

TEST 114 0-20°F (3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.5 DATA RECORD SHEET 121

TEST 121 0°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.6 DATA RECORD SHEET 122

TEST 122 @0°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.7 DATA RECORD SHEET 123

TEST 123 @0°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.8 DATA RECORD SHEET 124

TEST 124 @0°F(3RD. 100% CALIBRATION RATE TEST)															
	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.9 DATA RECORD SHEET 131

TEST 131 +20°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.10 DATA RECORD SHEET 132

TEST 132 @+20°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.11 DATA RECORD SHEET 133

TEST 133 @+20⁰F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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WHITTAKER CELL

9.12 DATA RECORD SHEET 134

TEST 134 @+20°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.13 DATA RECORD SHEET 141

TEST 141 +40°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.14 DATA RECORD SHEET 142

TEST 142 @+40°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.15 DATA RECORD SHEET 143

TEST 143 @+40°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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WHITTAKER CELL

9.16 DATA RECORD SHEET 144

TEST 144 @+40°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.17 DATA RECORD SHEET 151

TEST 151 +60°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.18 DATA RECORD SHEET 152

TEST 152 0+60°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE									GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s				
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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WHITTAKER CELL

9.19 DATA RECORD SHEET 153

TEST 153 @+60°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.20 DATA RECORD SHEET 154

TEST 154 @+60°F (3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.21 DATA RECORD SHEET 161

TEST 161 +80°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.22 DATA RECORD SHEET 162

TEST 162 @+80°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.23 DATA RECORD SHEET 163

TEST 163 @+80°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.24 DATA RECORD SHEET 164

TEST 164 @+80°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.25 DATA RECORD SHEET 171

TEST 171 +100°F(30%, 60%, 90% CALIBRATION GAS)														
	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.26 DATA RECORD SHEET 172

TEST 172 @+100°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.27 DATA RECORD SHEET 173

TEST 173 @+100°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.28 DATA RECORD SHEET 174

TEST 174 @+100°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.29 DATA RECORD SHEET 181

TEST 181 +120°F (30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.30 DATA RECORD SHEET 182

TEST 182 @+120°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.31 DATA RECORD SHEET 183

TEST 183 @+120°F(2ND. 100% CALIBRATION RATE TEST)															
	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.32 DATA RECORD SHEET 184

TEST 184 @+120°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.33 DATA RECORD SHEET 211

TEST 211 -20°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.34 DATA RECORD SHEET 212

TEST 212 0-20°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.35 DATA RECORD SHEET 213

TEST 213 @-20°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.36 DATA RECORD SHEET 214

TEST 214 @-20°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.37 DATA RECORD SHEET 221

TEST 221 0°F(30%, 60%, 90% CALIBRATION GAS)														
	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.38 DATA RECORD SHEET 222

TEST 222 @0°F(1ST. 100% CALIBRATION RATE TEST)															
	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.39 DATA RECORD SHEET 223

TEST 223 @0°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.40 DATA RECORD SHEET 224

TEST 224 00°F (3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.41 DATA RECORD SHEET 231

TEST 231 +20°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.42 DATA RECORD SHEET 232

TEST 232 @+20°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.43 DATA RECORD SHEET 233

TEST 233 @+20°F(2ND. 100% CALIBRATION RATE TEST)															
	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.44 DATA RECORD SHEET 234

TEST 234 @+20°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.45 DATA RECORD SHEET 241

TEST 241 +40°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.46 DATA RECORD SHEET 242

TEST 242 @+40°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.47 DATA RECORD SHEET 243

TEST 243 @+40°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.48 DATA RECORD SHEET 244

TEST 244 @+40°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.49 DATA RECORD SHEET 251

TEST 251 +60°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.50 DATA RECORD SHEET 252

TEST 252 @+60°F(1ST. 100% CALIBRATION RATE TEST)															
	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.51 DATA RECORD SHEET 253

TEST 253 @+60°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.52 DATA RECORD SHEET 254

TEST 254 @+60°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.53 DATA RECORD SHEET 261

TEST 261 +80°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.54 DATA RECORD SHEET 262

TEST 262 @+80°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.55 DATA RECORD SHEET 263

TEST 263 0+80°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.56 DATA RECORD SHEET 264

TEST 264 @+80°F (3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.57 DATA RECORD SHEET 271

TEST 271 +100°F(30%, 60%, 90% CALIBRATION GAS)														
	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.58 DATA RECORD SHEET 272

TEST 272 @+100°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.59 DATA RECORD SHEET 273

TEST 273 @+100°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.60 DATA RECORD SHEET 274

TEST 274 @+100°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.61 DATA RECORD SHEET 281

TEST 281 +120°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.62 DATA RECORD SHEET 282

[illegible]

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.63 DATA RECORD SHEET 283

TEST 283 @+120°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.64 DATA RECORD SHEET 284

TEST 284 @+120°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.65 DATA RECORD SHEET 311

TEST 311 -20°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.66 DATA RECORD SHEET 312

TEST 312 @-20°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.67 DATA RECORD SHEET 313

TEST 313 @-20°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.68 DATA RECORD SHEET 314

TEST 314 @-20°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.69 DATA RECORD SHEET 321

TEST 321 0°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.70 DATA RECORD SHEET 322

TEST 322 @0°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.71 DATA RECORD SHEET 323

TEST 323 @0°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.72 DATA RECORD SHEET 324

TEST 324 @0°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.73 DATA RECORD SHEET 331

TEST 331 +20°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.74 DATA RECORD SHEET 332

TEST 332 @+20°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.75 DATA RECORD SHEET 333

TEST 333 @+20°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.76 DATA RECORD SHEET 334

TEST 334 @+20°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.77 DATA RECORD SHEET 341

TEST 341 +40°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.78 DATA RECORD SHEET 342

TEST 342 @+40°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
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9.79 DATA RECORD SHEET 343

TEST 343 @+40°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.80 DATA RECORD SHEET 344

TEST 344 @+40°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
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9.81 DATA RECORD SHEET 351

TEST 351 +60°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
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9.82 DATA RECORD SHEET 352

TEST 352 @+60°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
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9.83 DATA RECORD SHEET 353

TEST 353 @+60°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
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9.84 DATA RECORD SHEET 354

TEST 354 @+60°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.85 DATA RECORD SHEET 361

TEST 361 +80°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
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9.86 DATA RECORD SHEET 362

TEST 362 @+80°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
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9.87 DATA RECORD SHEET 363

TEST 363 @+80°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.88 DATA RECORD SHEET 364

TEST 364 @+80°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.89 DATA RECORD SHEET 371

TEST 371 +100°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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WHITTAKER CELL

9.90 DATA RECORD SHEET 372

TEST 372 @+100°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.91 DATA RECORD SHEET 373

TEST 373 @+100°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.92 DATA RECORD SHEET 374

TEST 374 @+100°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.93 DATA RECORD SHEET 381

TEST 381 +120°F(30%, 60%, 90% CALIBRATION GAS)														
	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.94 DATA RECORD SHEET 382

TEST 382 @+120°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.95 DATA RECORD SHEET 383

TEST 383 @+120°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.96 DATA RECORD SHEET 384

TEST 384 @+120°F (3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.97 DATA RECORD SHEET 411

TEST 411 -20°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.98 DATA RECORD SHEET 412

TEST 412 0-20°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.99 DATA RECORD SHEET 413

TEST 413 @-20°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.100 DATA RECORD SHEET 414

TEST 414 @-20°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.101 DATA RECORD SHEET 421

TEST 421 0°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.102 DATA RECORD SHEET 422

TEST 422 00°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.103 DATA RECORD SHEET 423

TEST 423 @0°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.104 DATA RECORD SHEET 424

TEST 424 @0°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.105 DATA RECORD SHEET 431

TEST 431 +20°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.106 DATA RECORD SHEET 432

TEST 432 @+20°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.107 DATA RECORD SHEET 433

TEST 433 @+20°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.108 DATA RECORD SHEET 434

TEST 434 @+20°F (3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.109 DATA RECORD SHEET 441

TEST 441 +40°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.110 DATA RECORD SHEET 442

TEST 442 @+40°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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WHITTAKER CELL

9.111 DATA RECORD SHEET 443

TEST 443 @+40°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.112 DATA RECORD SHEET 444

TEST 444 @+40°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.113 DATA RECORD SHEET 451

TEST 451 +60°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.114 DATA RECORD SHEET 452

TEST 452 @+60°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.115 DATA RECORD SHEET 453

TEST 453 @+60°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.116 DATA RECORD SHEET 454

TEST 454 @+60°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.117 DATA RECORD SHEET 461

TEST 461 +80°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.118 DATA RECORD SHEET 462

TEST 462 @+80°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.119 DATA RECORD SHEET 463

TEST 463 @+80°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.120 DATA RECORD SHEET 464

TEST 464 @+80°F(3RD. 100% CALIBRATION RATE TEST)															
	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.121 DATA RECORD SHEET 471

TEST 471 +100°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.122 DATA RECORD SHEET 472

TEST 472 @+100°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.123 DATA RECORD SHEET 473

TEST 473 @+100°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.124 DATA RECORD SHEET 474

TEST 474 @+100°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.125 DATA RECORD SHEET 481

TEST 481 +120°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.126 DATA RECORD SHEET 482

TEST 482 @+120°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.127 DATA RECORD SHEET 483

TEST 483 @+120°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.128 DATA RECORD SHEET 484

TEST 484 @+120°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.129 DATA RECORD SHEET 511

TEST 511 -20°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.130 DATA RECORD SHEET 512

TEST 512 @-20°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.131 DATA RECORD SHEET 513

TEST 513 @-20°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.132 DATA RECORD SHEET 514

TEST 514 0-20°F (3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.133 DATA RECORD SHEET 521

TEST 521 0°F (30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.134 DATA RECORD SHEET 522

TEST 522 @0°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.135 DATA RECORD SHEET 523

TEST 523 @0°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.136 DATA RECORD SHEET 524

TEST 524 @0°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.137 DATA RECORD SHEET 531

TEST 531 +20°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.138 DATA RECORD SHEET 532

TEST 532 @+20°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.139 DATA RECORD SHEET 533

TEST 533 @+20°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.140 DATA RECORD SHEET 534

TEST 534 @+20°F (3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.141 DATA RECORD SHEET 541

TEST 541 +40°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.142 DATA RECORD SHEET 542

TEST 542 @+40°F(1ST. 100% CALIBRATION RATE TEST)															
	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.143 DATA RECORD SHEET 543

TEST 543 @+40°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.144 DATA RECORD SHEET 544

TEST 544 @+40°F (3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.145 DATA RECORD SHEET 551

TEST 551 +60°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.146 DATA RECORD SHEET 552

TEST 552 @+60°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.147 DATA RECORD SHEET 553

TEST 553 @+60°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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WHITTAKER CELL

9.148 DATA RECORD SHEET 554

TEST 554 @+60°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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WHITTAKER CELL

9.149 DATA RECORD SHEET 561

TEST 561 +80°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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WHITTAKER CELL

9.150 DATA RECORD SHEET 562

TEST 562 @+80°F (1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.151 DATA RECORD SHEET 563

TEST 563 @+80°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE									GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s				
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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9.152 DATA RECORD SHEET 564

TEST 564 @+80°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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9.153 DATA RECORD SHEET 571

TEST 571 +100°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

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WHITTAKER CELL

9.154 DATA RECORD SHEET 572

TEST 572 @+100°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.155 DATA RECORD SHEET 573

TEST 573 @+100°F (2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.156 DATA RECORD SHEET 574

TEST 574 @+100°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.157 DATA RECORD SHEET 581

TEST 581 +120°F(30%, 60%, 90% CALIBRATION GAS)

	VOLTAGE @ 30% CAL. GAS			VOLTAGE @ 60% CAL. GAS			VOLTAGE @ 90% CAL. GAS			GAS PRESS	GAS FLOW	CHAMB T/C	CELL T/C	TEST DIR INIT
	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s	T ₁ 120s	T ₂ 870s	T ₃ 900s					
WEC 1														
SIG 1														
WEC 2														
SIG 2														
WEC 3														
SIG 3														
WEC 4														
SIG 4														
WEC 5														
SIG 5														

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.158 DATA RECORD SHEET 582

TEST 582 @+120°F(1ST. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

9.159 DATA RECORD SHEET 583

TEST 583 @+120°F(2ND. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

**TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL**

9.160 DATA RECORD SHEET 584

TEST 584 @+120°F(3RD. 100% CALIBRATION RATE TEST)

	VOLTAGE										GAS PRESS	GAS FLOW	CHAM T/C	CELL T/C	TEST DIR. INIT
	T ₁ 15s	T ₂ 30s	T ₃ 45s	T ₄ 60s	T ₅ 75s	T ₆ 90s	T ₇ 105s	T ₈ 120s	T ₉ 870s	T ₁₀ 900s					
WEC 1															
SIG 1															
WEC 2															
SIG 2															
WEC 3															
SIG 3															
WEC 4															
SIG 4															
WEC 5															
SIG 5															

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WHITTAKER CELL

10.0 APPENDIX C: EXCEPTION RECORD

[illegible]

11.0 APPENDIX D: TEST RECORD

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE WHITTAKER CELL

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE
WHITTAKER CELL

12.0 APPENDIX E: GAS BOTTLE RECORD

[illegible]

TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE OF WHITTAKER CELL

ATTACHMENT 1: FINAL PROCEDURE ACCEPTANCE SHEET

Completion of this procedure has demonstrated that:

- The Whittaker electrochemical cell(s), used on the Rotary Mode Core Sampling (RMCS) flammable gas interlock (FGI), to detect and quantify hydrogen gas, have been systematically tested between the temperature ranges of -20°F and $+120^{\circ}\text{F}$. Furthermore, as required by WHC-SD-WM-SAD-035, Section U.3.1 second bullet, a temperature range has been found that the Whittaker cell voltage output(s) have reached 90% of full scale output, in less than two(2) minutes, when subjected to 100% calibration gas (1% hydrogen). The temperature range is _____ $^{\circ}\text{F}$ $\pm 5^{\circ}\text{F}$ to _____ $^{\circ}\text{F}$ $\pm 5^{\circ}\text{F}$.
- A record of all noted deficiencies was kept on Appendix C, Exception Record, and all recorded exceptions have been resolved and the resolutions approved.

Approved by:

RMCS Exhauster Engineer, E.J. Waldo

Date

NHC Field Engineering Manager, J.S. Scofield

Date

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TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE OF
WHITTAKER CELL

ATTACHMENT 2

TEST PLAN FOR MEASUREMENT OF PERFORMANCE
VS
TEMPERATURE OF WHITTAKER CELL

REFERENCE: HNF-SD-WM-TP-527, Rev 0

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Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
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1	1	Cog. Eng. E.J. Waldo	<i>E.J. Waldo</i>	1/13/96	57-12	Design Authority G.P. Janicek	<i>G.P. Janicek</i>	1/14/97	57-12
1	1	Cog. Mgr. J.S. Schofield	<i>J.S. Schofield</i>	1/13/97	57-07	Gas Char. T.S. Schneider	<i>T.S. Schneider</i>	1/13/97	57-37
1	1	QA M.L. McElroy	<i>M.L. McElroy</i>	1/13/97	57-07	Eng. Mgr. R.E. Raymond	<i>R.E. Raymond</i>	1/13/97	57-12
1	1	Safety J.A. Norvov	<i>J.A. Norvov</i>	1/13/97	57-07	305 Facility Mgr. M.J. [unclear]	<i>M.J. [unclear]</i>	1/13/97	57-13
1	1	305 Facility Eng. K.S. Witwer	<i>K.S. Witwer</i>	1/13/97	57-13	CB Bryan - CPO	<i>CB Bryan</i>	1/13/97	57-13
1	1	Eng. Author G. F. Vargo, Jr.	<i>G.F. Vargo</i>	1/13/97	57-13				
1	1	Eng. Author Mgr. C. E. Hanson	<i>C.E. Hanson</i>	1/13/97	57-13				

18. Signature of Originator <i>G.F. Vargo</i> Date 1/13/97		19. Authorized Representative for Receiving Organization <i>J.S. Schofield</i> Date 1/14/97		20. Cognizant Manager <i>J.S. Schofield</i> Date 1/14/97	
				21. DOE APPROVAL (if required) Ctrl. No. N/A ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	

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TEST PLAN FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE OF WHITTAKER ELECTROCHEMICAL CELL

G. F. Vargo, Jr.

SGN Eurisys Services Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

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Key Words: Whittaker, chamber, electrochemical, interlock

Abstract: This document is the test plan to test the Whittaker cells, used on the Rotary Mode Core Sampling (RMCS) flammable gas interlock (FGI), to detect and quantify hydrogen gas. This plan supports the test that is being performed after cold weather calibration attempts, on the Whittaker cell, failed.

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Marie L. Williams
Release Approval

1/17/97
Date

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Rev 0

TEST PLAN FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE OF WHITTAKER ELECTROCHEMICAL CELL

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SGN Eurisys Services Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930
January 1997

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ACRONYMS AND ABBREVIATIONS

CPO	Characterization Project Operations
DUT	Device Under Test (Whittaker cell)
EDT	Engineering Data Transmittal
ETL	Engineering Test Laboratory
FGI	Flammable Gas Interlock
GCS	Gas Characterization System
GMS	Gas Monitoring System
NHC	Numatec Hanford Company
OSHA	Occupational Safety and Health Administration
PPM	Parts Per Million
RMCS	Rotary Mode Core Sampling
SHMS	Standard Hydrogen Monitoring System
RSSEE	Remote Sensing and Sampling Equipment Engineering
SD	Supporting Document
T/C	Thermocouple
WEC	Whittaker Electrochemical Cell

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TEST PLAN
FOR MEASUREMENT OF
PERFORMANCE VS TEMPERATURE
OF WHITTAKER
ELECTROCHEMICAL CELL

1.0 INTRODUCTION

The purpose of this test plan is to define the methodology used to test the performance of the WEC with changes in temperature. This cell is used on the FGI, for RMCS, to detect and quantify the presence of hydrogen gas concentration. Since, the WEC on the FGI is not mounted in a protected enclosure, recent calibration of the WEC has been degraded due to the cold weather.

This test will be performed using the guidelines as defined in EP-4.2, Section 2.2.1, "Development testing". The main purpose of the test is to resolve the engineering issues regarding the performance of the Whittaker cell through the range of temperatures that may be experienced during Hanford Site tank farm deployment. This test will not resolve issues of flow through the WEC. The parameters for the test will be the recommended parameters gained from the experience by the gas characterization team (GCT) while developing the GCSs. The WECs configuration, inlet pressure, and flow rates will not be the same as used during actual use in the FGI system. The test parameters used are best suited to test the response of the WECs to the calibration gas at the test temperatures.

2.0 DESCRIPTION

The test will be conducted in the 305 ETL, in the 300 area of the Hanford Site, Richland, Washington, using the environmentally controlled test chamber. Five(5) WECs will be placed in the chamber, simultaneously, with the temperature cycled between -20°F and 120°F. Output will be checked at 20°F increments from -20°F to +120°F. All voltage outputs shall be recorded at two(2) minutes and at fifteen(15) minutes. The configuration of the WECs will be connected to the intrinsic voltage repeaters replicating the configuration of the FGI.

Each Whittaker cell/intrinsic barrier combination will be tested individually a minimum of three times. Only one cell at a time is connected to the carrier and calibration gas system. The 4(four) other cells will be in the chamber and at temperature but will be configured off-line. Each of the 5(five) WECs will be instrumented with a type K T/C that is individually displayed on a handheld digital thermometer.

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Using 20°F increments, the output voltage of the DUT and of the intrinsic voltage repeater will be measured, manually, using precision microvoltmeters and then recorded. Also, The T/C temperature output of the digital thermometer attached to the DUT, will be manually recorded. Furthermore, the output voltage, when subjected to three different calibration gas/carrier gas percentages of 30%, 60%, and 90%, will be manually recorded. These percentages will be achieved by adjustment of the gas percentage selector switch on the front of the gas divider. This instrument allows the test gas stream to be adjusted varied from 0-100% calibration gas, by the selector switch.

Also The response, or change in output voltage verses time when subjected to an instantaneous input of 100% calibration gas, will be manually recorded. Full scale output shall be defined as the WEC output at 15 minutes.

Other equipment used includes carrier gas bottles of nitrogen(100% pure) and calibration gas bottles of hydrogen(1% hydrogen, 99% others), a precision flow meter, pressure transducer, power supply, and a gas divider. will be used (Reference Figure(s) 1 and 2). The mixture of gas entering the environmental chamber will be equalized to the temperature of the chamber by passage through a 5-10 ft. helix copper coil before entering the DUT.

The instruments will be the same type of instruments as used in the 306 gas characterization laboratory and will be located outside of the test chamber.

The GCS team recommended test values of flow and pressure, by the GCS team, to be used in this test. The flow rates for the measurements in the test chamber will be set to 2cu ft./hr using the flowmeter. The pressure input to the DUT will be measured by a precision pressure transmitter to assure that the cell pressures are consistent during the test.

A T/C and calibrated readout device will be used as the verification instrument to verify the test temperature of the chamber. Furthermore, a computerized data logger will be monitoring and trending the test chamber temperature during all phases of testing.

"Test Procedure for Measurement of Performance vs Temperature of Whittaker Electrochemical Cell", HNF-SD-WM-TC-072, will define the test set-up and testing sequence. This will include the chamber configuration to insure proper venting of the balance and calibration gasses.

All readings will be recorded manually in Appendix B of "Test Procedure for Measurement of Performance vs Temperature of Whittaker Electrochemical Cell", HNF-SD-WM-TC-072.

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3.0 REQUIREMENTS

3.1 GENERAL REQUIREMENTS

3.1.1 TEST CONTROLS

This test shall be conducted under the guidelines set forth in this document. Furthermore, "Test Procedure for Measurement of Performance vs Temperature of Whittaker Electrochemical Cell", HNF-SD-WM-TC-072, shall define the sequence of operations.

3.1.1.1 RETEST REQUIREMENTS

Any portion of the test may be re-ran or re-started. However, no previously recorded data shall be destroyed and all data shall be included in the test report. Additionally, it shall be the policy of this test plan to start the test from the beginning of the test sequence and complete the test to the end of the test sequence. All activities for retest shall be at the approval of the test director.

3.1.1.2 DEVIATIONS FROM THE TEST PLAN/PROCEDURE

3.1.1.2.1 DEVIATIONS FROM THE TEST PLAN

Deviations are allowed to the test plan if they are approved by the test director, cognizant RMCS exhaustor engineer, and the 305 ETL manager, or his designee. The cognizant RMCS exhaustor engineer's approval may be acquired by telephone. Furthermore, any deviations/exceptions, and if approval was acquired by telephone, must be documented in Appendix C of the "Test Procedure for Measurement of Performance vs Temperature of Whittaker Electrochemical Cell", HNF-SD-WM-TC-072, and the test report.

3.1.1.2.2 DEVIATIONS FROM THE TEST PROCEDURE

Deviations are allowed to the test procedures if they are approved by the test director, cognizant RMCS exhaustor engineer, and the 305 ETL manager, or his designee. This approval shall be documented by initialing of the test procedure, by the test director and cognizant engineer, at the appropriate place in the procedure. The cognizant RMCS exhaustor engineer's approval may be acquired by telephone. However, this shall be noted next to the authorizing initials. Furthermore, any deviations/exceptions must be documented in Appendix C of the "Test Procedure for Measurement of Performance

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vs Temperature of Whittaker Electrochemical Cell", HNF-SD-WM-TC-072, and the test report.

3.1.1.3 MEASUREMENT AND TEST EQUIPMENT

All measurement and test equipment shall be in calibration with proof of calibration sticker affixed to the equipment. Furthermore, the sticker shall bear the date calibration expires as well as an authenticating signature or initial. The type, manufacturer, model, measurement and test equipment serial number, and calibration expiration date for each instrument and sensor used in this test shall be recorded in Appendix A of "Test Procedure for Measurement of Performance vs Temperature of Whittaker Electrochemical Cell", HNF-SD-WM-TC-072.

3.1.1.4 GAS BOTTLE RECORD

The pedigree of all gas bottles used in this test shall be documented in Appendix E of the "Test Procedure for Measurement of Performance vs Temperature of Whittaker Electrochemical Cell", HNF-SD-WM-TC-072. This shall include the manufacturer, date of manufacture, type of gas, and concentration in PPM. As part of the supporting documentation a copy of the manufacturers' specification tag/sheet, for any bottle used, shall be included in the test report.

3.1.1.5 TRAINING

Training shall be given to the testing personnel pertaining to the operation of the environmental chamber. This training shall be provided by the 305 ETL cognizant engineer or his representative. A record of the personnel shall be maintained, on file, by the 305 ETL cognizant engineer. A copy of this record shall be attached to the test report. No other training is required.

3.1.1.6 FACILITY IDENTIFICATION

The testing facility shall be the 305 ETL, 300 area, Hanford site, Richland, Washington. The environmental chamber is located in this facility.

3.1.1.7 SAFETY REQUIREMENTS

The 305 ETL cognizant engineer shall instruct the testing personnel, pertaining to safety, within the 305 ETL as well as safety practices pertaining to operation of the environmental chamber. All personnel, present

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during testing in the 305 ETL, shall abide by these requirements. These include:

- wearing of OSHA approved eye protection at all times
- wearing of OSHA approved hardhat protection when crane operations are overhead
- utilizing the "buddy system" when performing work in the facility.

3.1.1.8 PERSONNEL IDENTIFICATION

The key personnel identified for the performance of this task are as follows:

- Test responsible engineering manager: C. E. Hanson
- 305 ETL responsible manager: M. J. Schliebe
- Cognizant RMCS exhaustor engineer: E. J. Waldo/J. D. Robinson
- Cognizant 305 ETL engineer: K. S. Witwer
- Test Director: G. F. Vargo, Jr.

Other support personnel shall be supplied, as necessary, from 305 ETL or RSSEE.

3.1.1.9 APPROVAL DESIGNATORS

As a minimum, this test plan shall be approved by Lockheed Martin Hanford Company Design Authority, Quality Assurance, Industrial Safety, Numatec Hanford 305 ETL engineer, and technical peer review. The personnel assigned for the peer review shall be as designated by the cognizant RMCS exhaustor engineer. They include the NHC Cognizant Engineer and Cognizant Manager. These approvals and reviews shall be authenticated by signature on the EDT for this plan.

3.1.1.10 TEST PROCEDURES/REVISIONS

"Test Procedure for Measurement of Performance vs Temperature of Whittaker Electrochemical Cell", HNF-SD-WM-TC-072, defines the test sequence and test order. It is the intent of this plan that the test procedure be followed to complete the test under the test criteria defined in Section 5. However, the test setup, sequence, or test order may be changed with the approval of the cognizant RMCS exhaustor engineer, the test director, and the 305 ETL manager, or his designee See Section 3.1.1.2

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4.0 ORGANIZATIONAL RESPONSIBILITIES

4.1 OVERALL CUSTOMER

The overall customer for this test is the Lockheed Martin Hanford Characterization Project CPO. The responsible engineering organization, for RMCS, is Lockheed Numatec Hanford Company. The exhauster, and supporting flammable gas interlock, supports RMCS.

Characterization Project Cognizant Manager:	M. A. Payne
Program Manager(NHC):	R. E. Raymond

4.2 REMOTE SENSING AND SAMPLING EQUIPMENT ENGINEERING (RSSEE)

The RSSEE organization will be responsible for the test. This includes the generation of the test plan, test procedures, test report, execution of the test in the 305 ETL, and interface with the 305 ETL engineering and management personnel.

Manager:	C. E. Hanson
Test Director:	G. F. Vargo, Jr.
Cognizant RMCS exhauster engineer(alternate):	J. D. Robinson
Supporting Personnel:	As Required

4.2.1 TEST DIRECTOR

The test director will be responsible for all interface to perform the test. This includes the generation of the test plan, test procedures, test report, minutes of the pre-test meeting in the 305 ETL minutes of the design review, expeditor for all document signature reviews/approvals, execution and direction of the test, and all signature and log entries to the procedure.

4.3 NUMATEC HANFORD COMPANY (NHC) GAS CHARACTERIZATION

NHC will be responsible to assist RSSEE in the preparation of the test plan, test procedures, and the test setup. Additionally, NHC will be available as consultants in the matters of gas characterization and analysis.

Manager:	W. C. Miller
Supporting Engineer:	T. C. Schneider

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4.4 NUMATEC HANFORD COMPANY (NHC) 305 ETL

NHC is the custodian of the 305 ETL. They will be responsible to assist RSSEE in the preparation of the test plan, test procedures, assist the test director in the execution of the test, 305 ETL building safety training and orientation, technician support, and the test setup. This will include the supplying of T/Cs for the WECs and test instrumentation.

Manager:	M. J. Schliebe
Facility Cognizant Engineer:	K. S. Witwer

4.5 NUMATEC HANFORD COMPANY (NHC) FIELD ENGINEERING

NHC field engineering will be responsible for use of the FGI in the field. The cognizant RMCS exhaustor engineer will be from this organization.

Manager:	J. S. Schofield
Cognizant RMCS Exhaustor Engineer:	E. J. Waldo

4.5.1 COGNIZANT RMCS EXHAUSTOR ENGINEER

The cognizant RMCS exhaustor engineer will have the overall responsibility of the test. has the overall technical responsibility for the exhaustor field equipment. For this testing he will have signature approval of all test documentation and test changes or deviations. designator authority for peer reviewers, and the final authority on any aspects of the test.

An alternate cognizant RMCS exhaustor may be used. This engineer will be supplied from Remote Sensing and Sampling Equipment Engineering (RSSEE).

5.0 CRITERIA

This equipment is intended to operate in the temperature range of 10⁰F to 100⁰F. However, for purposes of this test, the temperature range beyond the expected temperature range of operation shall be incorporated.

5.1 TEST CRITERIA

- The test apparatus configuration shall be such that the test pressure at the WEC under test shall remain within +/- 2" W.C., of atmospheric pressure, during the test.
- Voltage output of WEC(s) shall be linear at the three(3) different hydrogen gas concentrations. Output will be checked at 20⁰F increments from -20⁰F to +120⁰F. All voltage outputs shall be recorded at two(2)

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minutes and at fifteen(15) minutes.

- Voltage output of WEC(s), when instantaneously subjected to 100% calibration gas (1% hydrogen), shall reach 90% of full scale output voltage in less than two(2) minutes. after checking at 20°F increments from -20°F to +120°F. The voltage outputs/inputs shall be recorded at two(2) minutes and at fifteen(15) minutes.
- Voltage output verses voltage input of the intrinsic isolating voltage repeater(s) 9323/10-10-11 shall be the same value (+/- .1%) after checking at 20°F increments from -20°F to +120°F. The voltage outputs/inputs shall be recorded at two(2) minutes and at fifteen(15) minutes.
- Voltage output from the WEC(s) shall be repeatable within +/-10%, for a repetition of the same test. At a minimum three(3) identical tests shall be performed on each WEC.
- The WEC output at 14 minutes 30 seconds shall be 99.9% of the WEC output at 15 minutes.

In the event that these criteria cannot be met at all temperatures the same criteria shall be used to identify that temperature range, within +/- 5°F, that will allow each WEC to meet acceptance criteria.

5.2 ACCEPTANCE CRITERIA

The WEC under test, when instantaneously subjected to 100% calibration gas (1% hydrogen), shall have a response time requirement of reaching 90% of full scale output voltage in less than two(2) minutes at all temperatures tested. Reference SAD-035, Section V.31 second bullet. See Section 9.0 of this document.

While operating in the temperature range determined by these test results the criteria in Section 5.1, the WEC shall reach 90% of full-scale output within two minutes, as required by WHC-SD-WM-SAD-035.

6.0 TEST REVIEWS

After the test plan and test procedures have been generated and released a meeting will be held to review the plan, procedures, design, safety, quality assurance (QA), setup, and overall test configuration before initiation of the test. Meeting minutes will document the results. These minutes will be included in the test report.

During the test execution there will be two(2) technical peer, QA, and safety reviews that will be visits to the test location in the 305 ETL. The

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results of these reviews will be entered in Appendix D of the "Test Procedure for Measurement of Performance vs Temperature of Whittaker Electrochemical Cell", HNF-SD-WM-TC-072 by the test director. These reviews will be selected at random and spaced accordingly (See attached schedule), to ensure that the execution of the test is in accordance with the plan and the procedures. The personnel to perform these reviews will be identified by the cognizant RMCS exhaustor engineer during the pretest meeting.

7.0 TEST DOCUMENTATION

The documentation for this test will consist of the following:

- Test plan
- Test procedures
- Test report

The test procedure will contain a Test Log (Appendix D) that will log events pertaining to the test. This section will substitute for the keeping of a separate test log. Entries to this section will be entered only by the test director.

8.0 SCHEDULE

See APPENDIX A.

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9.0 REFERENCES

WHC-CM-6-1, *Standard Engineering Practices, EP-4.2, Testing Requirements*, Westinghouse Hanford Company, Richland, Washington, July 31, 1996.

WHC-SD-WM-SAD-035, *A Safety Assessment of Rotary Mode Core Sampling in Flammable Gas Single Shell Tanks*, Rev 0A, Los Alamos National Laboratory, Los Alamos, New Mexico, August 1996.

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FIGURE 1

WHITTAKER CELL TEMPERATURE TEST
PIPING CONFIGURATION

FIGURE 2

WHITTAKER CELL TEMPERATURE TEST
WIRING DIAGRAM

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APPENDIX A

ID	Activity	Early	Early	Total	Resp	Date
20021164	BRUSH	11	30	41		NOV 15 1996
20021165	BRUSH	3	31	34		NOV 16 1996
20021166	BRUSH	3	31	34		NOV 17 1996
20021167	BRUSH	5	33	38		NOV 18 1996
20021168	BRUSH	6	34	40		NOV 19 1996
20021169	BRUSH	1	30	31		NOV 20 1996
20021170	BRUSH	1	30	31		NOV 21 1996
20021171	BRUSH	1	30	31		NOV 22 1996
20021172	BRUSH	1	30	31		NOV 23 1996
20021173	BRUSH	1	30	31		NOV 24 1996
20021174	BRUSH	1	30	31		NOV 25 1996
20021175	BRUSH	1	30	31		NOV 26 1996
20021176	BRUSH	1	30	31		NOV 27 1996
20021177	BRUSH	1	30	31		NOV 28 1996
20021178	BRUSH	1	30	31		NOV 29 1996
20021179	BRUSH	1	30	31		NOV 30 1996
20021180	BRUSH	1	30	31		NOV 31 1996
20021181	BRUSH	1	30	31		NOV 32 1996
20021182	BRUSH	1	30	31		NOV 33 1996
20021183	BRUSH	1	30	31		NOV 34 1996
20021184	BRUSH	1	30	31		NOV 35 1996
20021185	BRUSH	1	30	31		NOV 36 1996
20021186	BRUSH	1	30	31		NOV 37 1996
20021187	BRUSH	1	30	31		NOV 38 1996
20021188	BRUSH	1	30	31		NOV 39 1996
20021189	BRUSH	1	30	31		NOV 40 1996
20021190	BRUSH	1	30	31		NOV 41 1996
20021191	BRUSH	1	30	31		NOV 42 1996
20021192	BRUSH	1	30	31		NOV 43 1996
20021193	BRUSH	1	30	31		NOV 44 1996
20021194	BRUSH	1	30	31		NOV 45 1996
20021195	BRUSH	1	30	31		NOV 46 1996
20021196	BRUSH	1	30	31		NOV 47 1996
20021197	BRUSH	1	30	31		NOV 48 1996
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20021199	BRUSH	1	30	31		NOV 50 1996
20021200	BRUSH	1	30	31		NOV 51 1996
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20021202	BRUSH	1	30	31		NOV 53 1996
20021203	BRUSH	1	30	31		NOV 54 1996
20021204	BRUSH	1	30	31		NOV 55 1996
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20021206	BRUSH	1	30	31		NOV 57 1996
20021207	BRUSH	1	30	31		NOV 58 1996
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20021209	BRUSH	1	30	31		NOV 60 1996
20021210	BRUSH	1	30	31		NOV 61 1996
20021211	BRUSH	1	30	31		NOV 62 1996
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20021218	BRUSH	1	30	31		NOV 69 1996
20021219	BRUSH	1	30	31		NOV 70 1996
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20021234	BRUSH	1	30	31		NOV 85 1996
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20021236	BRUSH	1	30	31		NOV 87 1996
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20021242	BRUSH	1	30	31		NOV 93 1996
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20021355	BRUSH	1	30	31		NOV 206 1996
20021356	BRUSH	1	30	31		NOV 207 1996
20021357	BRUSH	1	30	31		NOV 208 1996
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APPENDIX A

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Attachment 2
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1. The first step is to identify the key components of the system. This includes understanding the hardware, software, and data involved. For example, in a web application, this might involve identifying the server, database, and client-side code.

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APPENDIX A

DISTRIBUTION SHEET

To DISTRIBUTION	From G. F. Vargo Jr., 08E00	Page 1 of 1
		Date 1/21/97
Project Title/Work Order		EDT No. 619113
TEST PROCEDURE FOR MEASUREMENT OF PERFORMANCE VS TEMPERATURE OF WHITTAKER ELECTROCHEMICAL CELL		ECN No. NA

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
C. B. Bryan	S7-01	X			
C. E. Hanson	S7-12	X			
J. A. Harvey	S7-07	X			
G. P. Janicek	S7-12	X			
T. D. Jarecki	S7-03	X			
M. L. McElroy	S7-07	X			
R. E. Raymond	S7-12	X			
M. J. Schliebe	L6-13	X			
T. C. Schneider	L6-37	X			
J. S. Schofield	S7-12	X			
D. D. Tate	L6-37	X			
G. F. Vargo Jr.	H5-09	X			
C. V. Vo	L6-37	X			
E. J. Waldo	S7-12	X			
K. S. Witwer	L6-13	X			
Central Files	A3-88	X			