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241T107 INTERIM STABILIZATION FLAMMABLE GAS
MONITOR SYSTEM SAFETY CLASS 3 ACCEPTANCE TEST
REPORT

Pages: 50

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JAN 25 '96

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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		3. Information	6. Dist. (Receipt Acknow. Required)	3. Disapproved w/comment	6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
(G)	(H)	(J) Name (K) Signature (L) Date (M) MSIN				(J) Name (K) Signature (L) Date (M) MSIN				(G)	(H)
Reason	Disp.									Reason	Disp.
1	1	Cog. Eng. M. R. Koch				VC Boyle 1/25/96 RI-49					
1	1	Cog. Mgr. D. B. Engelman				VC Boyle 1/25/96 RI-49					
		QA									
		Safety									
		Env.									

18. Signature of EDT Originator Date		19. Authorized Representative Date for Receiving Organization VC Boyle 1/25/96		20. Cognized Manager Date VC Boyle 1/25/96		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
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241-T-107 INTERIM STABILIZATION FLAMMABLE GAS MONITOR SYSTEM (SAFETY CLASS 3), ACCEPTANCE TEST REPORT

B. J. Webb

Westinghouse Hanford Company, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

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Flammable Gas Monitor
TWRS

Abstract: This Acceptance Test Report provides the acceptance test to be performed at the vendor prior to delivery to Westinghouse Hanford Company.

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Kara J. Bore
Release Approval
Date 1/25/96

DATE:
STA: 4		
JAN 25 1996		

Release Stamp

Approved for Public Release

TANK FARM
ACCEPTANCE TEST PROCEDURE

SYSTEM
INTERIM STABILIZATION

ATR FOR THE BELHAVEN FLAMMABLE GAS MONITOR

TANK FARM ACCEPTANCE TEST PROCEDURE

TEST EXECUTION SHEET

Date: 1/11/96 1/13/96		Document Number: WHC-SD-WM-ATR-163 REV. 0	
FGM Unit Number: FGM 4			
TEST PERSONNEL			
WHC PROJECT ENGINEER: MICHAEL R. KOCH Brent J Webb		TEST DIRECTOR: Brent J Webb	
RECORDER: MICHAEL R. KOCH Brent J Webb		WITNESSES: RANDY DUKEMAN	
TEST EXECUTION			
Brent J Webb 1/13/96 Test Director Date		Brent J Webb 1/13/96 Project Engineer Date	
TEST WITNESS			
Dan O'Driscoll 1/13/96 Witness Date		Dan O'Driscoll 1-13-96 Witness Date	
TEST APPROVAL AND ACCEPTANCE			
Westinghouse Hanford Company			
Without Exception		With Exception/Resolved	
☒		☐	
With Exception/Outstanding		☐	
Brent J Webb 1/13/96 Test Director Date		Quality Assurance Date	
Witness Date		Muhl R. H. 1/22/96 Project Engineer Date	

EXCEPTION #1

1/13/96

2:34 PM
Saturday
Jan 13 1996

T-107 BJW
1/25/96

TANK FARM ACCEPTANCE TEST PROCEDURE

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TANK FARM ACCEPTANCE TEST PROCEDURE

1.0 PURPOSE

- 1.1 There is a concern that flammable gases may exceed the LFL during interim stabilization. Therefore, there is a need for a system that will measure the flammable gas concentration and shut down all required pump pit pumping equipment (e.g. all equipment considered to be a potential sparking source such as the electric centrifugal pump) when the LFL criteria is exceeded. This ATP will test and verify the operability of the Flammable Gas Monitor system.

2.0 INFORMATION

2.1 REFERENCES

- 2.1.1 The following documents were used to write or are referenced in this procedure:
- WHC-CM-CM-10-1, SAFETY MANUAL, "WKS-15, ELECTRICAL WORK SAFETY"
 - WHC-CM-6-1 EP 4.2., STANDARD ENGINEERING PRACTICE "TESTING PRACTICES"
 - WHC-IP-1026 APPX M, ENGINEERING PRACTICE GUIDELINES "ACCEPTANCE TEST PROCEDURES AND REPORTS"
 - Appropriate vendor (Belhaven) documents and drawings.

TANK FARM ACCEPTANCE TEST PROCEDURE

2.2 TERMS AND DEFINITIONS

- 2.2.1 ADC - Analog to Digital Converter
- 2.2.2 ATR - Acceptance Iest Report
- 2.2.3 ATP - Acceptance Iest Procedure
- 2.2.4 FGM - Flammable Gas Monitor
- 2.2.5 MMI - Man Machine Interface
- 2.2.6 PLC - Programmable Logic Controller
- 2.2.7 QC - Quality Control
- 2.2.8 SST - Single Shell Ianks

2.3 SAFETY

Warning - Energized circuits and leads are contained inside the cabinet. Observe appropriate electrical precautions.

2.4 GENERAL INFORMATION

- 2.4.1 Complete each procedure step in the given order, unless otherwise noted or as directed by the Test Director.
- 2.4.2 All entries recorded in this procedure shall be made in black ink except for those noted using the redline method.
- 2.4.3 Any non-conformance of the instrumentation, unexpected results or exceptions during testing shall be sequentially numbered and recorded in the ATP EXCEPTION LOG. Thus, case-by-case resolution, recording, approval, and distribution of each exception will be achieved.
- 2.4.4 Do not perform any part of this procedure on faulty equipment. If faulty equipment is discovered, STOP the execution of this procedure and resolve the problem (i.e. repair equipment or write up faulty equipment as an exception and continue).
- 2.4.5 This procedure DOES NOT contain any separate data/verification sheets. Verification of procedural steps and validity of the data is incorporated into the specific section.

TANK FARM ACCEPTANCE TEST PROCEDURE

2.4 GENERAL INFORMATION (continued)

- 2.4.6 ATP will be performed by the vendor, Belhaven, and witnessed by personnel from WHC.
- 2.4.7 ATP will be witnessed by an ICF KH title 3 Acceptance Inspector.
- 2.4.8 For this ATP the use of sound deadening materials (i.e., a rag stuffed in the horn) shall be allowed.

2.5 SYSTEM DESCRIPTION

- 2.5.1 The FGM system consists of an air operated vacuum pump, a catalytic bead flammable gas sensor, programmable logic controller, NIST traceable calibration gas bottle and associated piping, valving and electrical connections. The air operated vacuum pump provides a system vacuum so that sample and calibration gases can flow through the catalytic bead flammable gas sensor. A mixture of air, sample gas (from the cognizant SST pump pit), and calibration gas (Methane) will flow into the sensor where the hydrogen concentration is measured via a temperature rise in the catalytic bead flammable gas sensor. A resultant voltage is produced that is linear to the temperature rise.

TANK FARM ACCEPTANCE TEST PROCEDURE

3.0 RESPONSIBILITIES

3.1 WHC Project Engineer is responsible for:

- Designation of a test director.
- Coordinate testing with facility management.
- Act as liaison between the participants in acceptance testing.
- Distribute the approved testing schedule as soon as possible, but at least two days prior to testing.
- Ensure field testing and inspection has been completed.
- Schedule and conduct a pre-ATP meeting with test participants prior to start of testing.
- Notify the persons performing and witnessing the test prior to the start of testing.
- Notify all concerned parties when a change is made in the testing schedule.
- Sign Test Execution Sheet when ATP is approved and accepted.
- Take necessary action to clear exceptions to the ATP.
- Sign Exception Sheet when exception has been resolved.
- Provide a distribution list for the approved and accepted ATP.

3.2 Test Director is responsible for:

- Coordinate all acceptance testing.
- Confirm that field testing and inspection of the system or portion of the system to be tested has been completed.
- Stop any test which may cause damage to the system until the test procedure has been revised.
- Approve field changes to the ATP.
- Obtain revisions to the ATP, as necessary, to comply with authorized field changes or to accommodate existing field conditions.
- Evaluate recorded data, discrepancies, and exceptions.
- Obtain from the WHC project engineer, any information or changes necessary to clear or resolve objections.

TANK FARM ACCEPTANCE TEST PROCEDURE

3.0 RESPONSIBILITIES (continued)

- Sign Test Execution Sheet when ATP has been performed.
- Sign Test Exception Sheet when retest has been executed and accepted.
- Obtain required signatures on the ATP master prior to reproduction and distribution.
- Record and print names of all designated personnel on the working copy of ATP prior to the start of testing.
- Observe tests, record test data and maintain test log.
- Sign and date every procedure section on the working copy as it is completed.
- Record authorized field changes to the ATP.
- Record exceptions and test steps that are not performed on the ATP EXCEPTION RECORD. Have the information transferred in ink or typed to the Master Exception Sheet(s). Additional ATP EXCEPTION RECORD sheets are to be added as needed.
- Assign and/or make corrections, as necessary, to the ATP EXCEPTION RECORD sheet(s) page number(s) after ATP is complete.
- Transfer the final test results with Quality Control's signatures and dates for each section to the master in ink or type. Retain the working copy and a copy of the master in the field project files.

3.3 Witness(es) is (are) responsible for:

- Witness the tests.
- Evaluate results of testing.
- Assist the Test Director when requested.
- Sign Test Exception Sheet as a witness.
- Sign Test Exception Sheet as a witness when retest has been executed and accepted.

TANK FARM ACCEPTANCE TEST PROCEDURE

4.0 PREREQUISITES

EXCEPTION # 2 4.1 The following supplies shall be available at the test site:

- Stopwatch
 - Pressure Gauge BEL-96-3
 - Ohmmeter
- Expiration Date: 1/13/97 B/W

Calibration No. BEL-1295-27 Expiration Date 9/15/96

- NIST traceable Menthane gas.

Gas concentration as defined by the LFL percentage: 25 % LFL

- NIST traceable Hydrogen gas.

Gas concentration as defined by the LFL percentage: 25 % LFL

4.2 The following documents are required to be at the test site, before and during the performance of this procedure:

- ATP FOR THE BELHAVEN FLAMMABLE GAS MONITOR, WHC-SD-WM-ATP-163

4.3 The following conditions must be met before this test may commence:

exception #3

4.3.1 A pre-job safety meeting has been held before performing this procedure.

[Signature]
Test Director

[Signature]
Date 1/11/96 1/13/96

4.3.2 Verify that all voltage checks have been performed on the required instrument and electrical systems. This can be achieved by reviewing the vendor supplied ETL checklist that is contained within the procurement package.

[Signature]
Test Director Signature

[Signature]
Date 1/13/96

EXCEPTION # 4

4.3.3 Verify that leak tests on the pneumatic systems have been performed. Provide test documentation.

[Signature]
Test Director

[Signature]
Date 1/13/96

TANK FARM ACCEPTANCE TEST PROCEDURE

4.0 PREREQUISITES (continued)

- 4.3.4 Verify that all personnel responsible for directing and witnessing the ATP have read and understand appropriate vendor information and/or the Flammable Gas Monitor system procurement package.

[Signature]
Test Director Signature

1/13/96
Date

NOTE - QC Inspector shall verify current calibration by inspecting calibration stickers on the required instruments at the test site. In the event a sticker is missing or a device is out of calibration, consult the vendor to obtain the corresponding certification of calibration.

EXCEPTION #5

- 4.3.5 QC Inspector shall verify the current ^{system} calibration and, ^{Bio} record the calibration date and calibration due date on the table below.

INSTRUMENT	CALIBRATION DATE	CALIBRATION DUE DATE
CATALYTIC BEAD SENSOR SMC4101-02		
ANALOG TO DIGITAL CONVERTER E204AD-1	9/15/95	9/15/96

~~At Mit Amp Meter 8060 Fluke BEC 1095 27 9/16/95 9/15/96~~
Flammable Gas Monitor FGM4 1/13/96 1/15/96

EXCEPTION #6

- 4.3.6 QC Inspector SHALL VERIFY that section 4.0 has been COMPLETED by SIGNING below.

Mark N. Brown
QC Inspector Signature

1-13-96
Date

- 4.3.7 Test Director SHALL VERIFY that section 4.0 has been COMPLETED by SIGNING below.

[Signature]
Test Director

1-13-96
Date

TANK FARM ACCEPTANCE TEST PROCEDURE

5.0 PROCEDURE

5.1 POWER SYSTEM CHECK

5.1.1 INSPECT the FGM system AND VERIFY that all equipment is properly CONNECTED. ☒

5.1.2 START the FGM system by PLUGGING in the power cord to the nearest available power source. ☒

EXCEPTION #7

5.1.3 VERIFY that there is power to the FGM system BY OBSERVING if the FGM system MMI screen ~~light is ILLUMINATED.~~ *display is active.* ☒

"System Warning OK"

WARNING

Energized circuits and leads are contained inside the cabinet.
Observe appropriate electrical precautions.

5.1.4 REMOVE the flammable gas sensor's cover. ☒

5.1.5 WAIT approximately five (5) minutes for the Flammable Gas sensor calibration red light to CLEAR.

EXCEPTION #8

5.1.5.a *Bring System under Normal operating conditions.* ☒

5.1.6 Test Director SHALL VERIFY that section 5.1 is COMPLETE by SIGNING below.

[Signature]
Test Director Signature

1/13/96
Date

5.1.7 QC Inspector SHALL VERIFY that section 5.1 is COMPLETE by SIGNING below.

Mad N Boon
QC Inspector Signature

1-13-96
Date

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TANK FARM ACCEPTANCE TEST PROCEDURE

5.2 PNEUMATIC SYSTEMS CHECK

5.2.1 CONNECT the air driven vacuum pump to the nearest compressed air supply. ☒

5.2.2 ENSURE there is air flow to the vacuum pump. ☒

EXCEPTION # 9

5.2.3 ENSURE that the NIST traceable Methane calibration gas bottle is ~~75% to 100% FULL~~ *greater than 250 psi.* ☒

*Bottle pressure 490 psi.
Bottle Volume: 103 Liters*

~~5.2.4 OPEN the calibration gas bottle valve one FULL TURN.~~ ☐

EXCEPTION # 10

~~5.2.5 VERIFY that there is calibration gas flow by OBSERVING the ILLUMINATION of the FGM system PLC green indicating light.~~ ☐

~~5.2.6 VERIFY sample gas is flowing by OBSERVING a flow INDICATION on the FGM system FI-1 rotameter.~~ ☐

EXCEPTION # 11

~~5.2.7 RECORD sample gas flow on the table below.~~ ☐

Pressure
SAMPLE GAS FLOW AS INDICATED BY
ROTAMETER FI-1

490 psi.

5.2.8 Test Director SHALL VERIFY that section 5.2 is COMPLETE by SIGNING below.

[Signature]
Test Director Signature

1/13/95
Date

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TANK FARM ACCEPTANCE TEST PROCEDURE

5.2 PNEUMATIC SYSTEMS CHECK (continued)

5.2.9 QC Inspector SHALL VERIFY that section 5.2 is COMPLETE by SIGNING below.

Mark N. Brown
QC Inspector Signature

Date 1-13-96

TANK FARM ACCEPTANCE TEST PROCEDURE

5.3 FGM SYSTEM TEST

NOTE - The "dry contacts" are defined as the relay that will cut power to the appropriate skid equipment.

5.3.1 CONNECT an ohmmeter to the "dry contacts".

WARNING

Energized circuits and leads are contained inside the cabinet.
Observe appropriate electrical precautions.

EXCEPTION #12

EXCEPTION #13

~~5.3.1.a. Bring system under normal operations.~~

5.3.2 OPEN the FGM system PLC ADC loop. by lifting wire in VCSB, TB-1, Number 28.

5.3.3 VERIFY the FGM system PLC ADC responds to a loss of loop condition by OBSERVING the following:

5.3.3.1 Ohmmeter reading indicates that the "dry contacts" are OPEN.

5.3.3.2 Horn is SOUNDING.

5.3.4 ACKNOWLEDGE horn by PRESSING the ALARM SILENCE pushbutton located on the MMI.

EXCEPTION #14

5.3.4.a Restore PLC ADC loop, and restart system.

5.3.5 ENSURE that the FGM system setpoint is SET to 10% LFL.

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TANK FARM ACCEPTANCE TEST PROCEDURE

EXCEPTION # 15

NOTE - The FGM system PLC should start to respond in 30 seconds but, it will take up to 52 seconds for a ~~full scale~~ reading.

~~25 LFL~~ 25-2 LFL

5.3.6 TEST the FGM system by PERFORMING the following:

EXCEPTION # 14

5.3.6.1 SIMULTANEOUSLY INTRODUCE a ^{Sample} two (2) second burst of Methane gas into the sample line AND START the stopwatch.

5.3.6.2 RECORD the data as INDICATED by the table below.

METHANE GAS FGM SYSTEM TEST	FGM SYSTEM RESPONSE TIME	HORN ANNUNCIATES (YES/NO)	% LFL THAT GIVES AN ALARM INDICATION	OHMMETER READING OF THE "DRY CONTACTS" (RELAY)
TEST 1	29 Sec 35 Sec	Yes, 39 Sec Yes, 42 Sec	12.0 12.0	Open Open
TEST 2	28 Sec 29 Sec	Yes, 36 Sec Yes	10.5	Open
TEST 3	29 Sec	Yes, 37 Sec	11.6	Open
TEST 4	31 Sec	Yes, 40 Sec	10.4	Open
TEST 5	32 Sec	Yes, 41 Sec	11.2	Open
FGM SYSTEM RESPONSE TIME AVERAGE	~30 Sec			

5.3.6.3 ACKNOWLEDGE the horn by PRESSING the ALARM SILENCE pushbutton located on the MMI.

5.3.6.4 VERIFY that the MMI screen light is FLASHING.

5.3.6.5 RESET the FGM system.

TANK FARM ACCEPTANCE TEST PROCEDURE

5.3 FGM SYSTEM TEST (continued)

5.3.6.6 VERIFY that the MMI screen DISPLAYS 0% LFL. ☒

5.3.6.7 REPEAT steps 5.3.6.1 through 5.3.6.6 four (4) more times AND RECORD the data as test 2 through test 5 in the table provided in step 5.3.6.2. ☒

5.3.7 AVERAGE FGM system response times AND RECORD in the space provided in the table above. ☒

EXCEPTION # 17

OK
5/24

~~5.3.8 IF ^{average} ~~any~~ of the FGM system response times are ~~≥~~ thirty (30) seconds, PERFORM the following:~~

~~30~~ ⁴⁰
~~30~~ ⁴⁰
B12
11

~~5.3.8.1 DETERMINE the cause of the abnormal FGM system response time.~~ ☐

~~5.3.8.2 LOG AND RECORD the abnormal FGM system response time and the resolution on the ATP EXCEPTION LOG and ATP EXCEPTION RECORD respectively.~~ ☐

~~5.3.8.3 REPEAT steps 5.3.5 through 5.3.7.~~ ☐

5.3.9 ENSURE that the FGM system setpoint is SET to 10% LFL. ☒

5.3.10 ALLOW the sample line to CLEAR by WAITING approximately one (1) minute before proceeding to the next step. ☒

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TANK FARM ACCEPTANCE TEST PROCEDURE

5.3 FGM SYSTEM TEST (continued)

NOTE - The FGM system PLC should start to respond in 30 seconds but, it will take up to 52 seconds for a full scale reading.

5.3.11 TEST the FGM system by PERFORMING the following:

EXCEPTION # 18

5.3.11.1 SIMULTANEOUSLY INTRODUCE a two ^{Sample} (2) second burst of Hydrogen gas into the sample line AND START the stopwatch.

5.3.11.2 RECORD the data as INDICATED by the table below.

HYDROGEN GAS FGM SYSTEM TEST	FGM SYSTEM RESPONSE TIME	HORN ANNUNCIATES (YES/NO)	% LFL THAT GIVES AN ALARM INDICATION	OHMMETER READING OF THE "DRY CONTACTS" (RELAY)
TEST 1	28 sec	36 sec, yes	10.2	open
TEST 2	27 sec	32 sec, yes	10.6	open
TEST 3	29 sec	34 sec, yes	11.2	open
TEST 4	27 sec	35 sec, yes	10.4	open
TEST 5	27 sec	34 sec, yes	10.6	open
FGM SYSTEM RESPONSE TIME AVERAGE	~28 sec			

5.3.11.3 ACKNOWLEDGE the horn by PRESSING the ALARM SILENCE pushbutton located on the MMI.

5.3.11.4 VERIFY that the MMI screen light is FLASHING.

TANK FARM ACCEPTANCE TEST PROCEDURE

5.3 FGM SYSTEM TEST (continued)

5.3.11.5 RESET the FGM system.

5.3.11.6 VERIFY that the MMI screen DISPLAYS 0% LFL.

5.3.12 REPEAT steps 5.3.11.1 through 5.3.11.6 four (4) more times AND RECORD the data as test 2 through test 5 in the table provided in step 5.3.11.2.

5.3.13 AVERAGE FGM system response times AND RECORD in the space provided in the table above.

EXCEPTION # 19

5.3.14 IF any of the FGM system response times are $\geq$ ~~thirty (30)~~ ^{thirty (30)} seconds, PERFORM the following: _{Forty (40)}

5.3.14.1 DETERMINE the cause of the abnormal FGM system response time.

5.3.14.2 LOG AND RECORD the abnormal FGM system response time and the resolution on the ATP EXCEPTION LOG and ATP EXCEPTION RECORD respectively.

5.3.14.3 REPEAT steps 5.3.9 through 5.3.13.

5.3.15 PLUG the sample line AND SIMULTANEOUSLY START the stopwatch.

5.3.16 WHEN horn ANNUNCIATES, STOP the stopwatch.

5.3.17 WHEN horn ANNUNCIATES, OBSERVE the %LFL reading on the MMI.

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TANK FARM ACCEPTANCE TEST PROCEDURE

5.3 FGM SYSTEM TEST (continued)

5.3.18 VERIFY that the horn ANNUNCIATES.

5.3.19 RECORD the time, the "dry contacts" ohmmeter reading, and % LFL reading on the table below.

STOPWATCH TIME FROM STEP 5.3.16	13 sec
DRY CONTACTS (RELAY) OHMMETER READING	open
MMI % LFL READING	0%

5.3.20 Test Director SHALL VERIFY that section 5.3 is COMPLETE by SIGNING below.

[Signature]

Test Director Signature

1/13/96

Date

5.3.21 QC Inspector SHALL VERIFY that section 5.3 is COMPLETE by SIGNING below.

Malcolm Brown

QC Inspector Signature

1-13-96

Date

TANK FARM ACCEPTANCE TEST PROCEDURE

5.4 SHUTDOWN OF THE FGM SYSTEM

5.4.1 CLOSE the calibration gas bottle valve.

EXCEPTION #20

5.4.2 ALLOW the FGM system to CLEAR of flammable gases by WAITING approximately ~~five (5)~~ minutes before proceeding to the next step.
two (2)

5.4.3 VERIFY that the MMI is INDICATING 0% LFL.

5.4.4 REMOVE the power cord from the power source.

5.4.5 DISCONNECT the vacuum pump from the compressed air supply.

5.4.6 REPLACE the Flammable Gas sensor cover.

5.4.7 Test Director SHALL VERIFY that section 5.4 is COMPLETE by SIGNING below.

[Signature]
Test Director Signature

1/13/96
Date

5.4.8 QC Inspector SHALL VERIFY that section 5.4 is COMPLETE by SIGNING below.

Mal D. Brown
QC Inspector Signature

1/13-96
Date

TANK FARM ACCEPTANCE TEST PROCEDURE

ATP EXCEPTION LOG

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TANK FARM ACCEPTANCE TEST PROCEDURE

ATP EXCEPTION RECORD

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ATP step number:	ATP Exception Log Number:
Description of Exception:	
Resolution of Exception:	
Date of Resolution:	
Test Director signature:	
Project Engineer signature:	
Quality Assurance signature:	

Date 1/13/96
Company WHC
Project FGM4-UNIT 1
E-CAB
V-CAB

WHC-SD-WM-ATR-163 Rev. 0

	Pass	Fail	
1	<u>7</u>	—	Hardware secure
2	<u>7</u>	—	Component Tags
3	<u>7</u>	—	Correct AWG, wire, color, Temp, Rating, Voltage
4	<u>7</u>	—	Wire Markers (all control conductors)
5	<u>7</u>	—	Main Ground
6	<u>7</u>	—	Manuals & Drawings
7	<u>N/A</u>	—	High Voltage Placard if applicable
8	<u>7</u>	—	Model #/Serial #/Voltage - Frequency - Phase
9	<u>7</u>	—	Door Ground Strap
10	<u>7</u>	—	Control Circuit Function Test
11	<u>7</u>	—	Check Full Load Current of Control Circuit
12	<u>7</u>	—	Proper Voltage Output from DC power Supplies
13	<u>N/A</u>	—	Check Function of Disconnect
14	<u>7</u>	—	Proper Overloads / Overload Settings
15	<u>7</u>	—	Proper Fuse Values
16	<u>7</u>	—	Line Isolation Test
17	<u>7</u>	—	Non-Listed Non-Recognized Checked For Proper Over Current Protection
18	<u>7</u>	—	Non-Listed Non-Recognized Checked Components Used Recorded In Proper File
19	<u>7</u>	—	Dielectric Voltage-Withstand Test (1min @ 2Xv+1000) Test Voltage <u>2400 VAC</u>
20	<u>7</u>	—	Approval Label Affixed Number _____ Date of Manufacture <u>1/13/96</u>

checked 1/13/96

CERTIFICATE OF ANALYSIS

Norco
Kennewick Warehouse
102 E. Columbia Dr.
Kennewick, WA 99336-0000

Date: January 16, 1996

Cylinder Type: One 103 Liter Cylinder

PO Number: None

Norco Order Number: 683371-00

Component	Reported Concentration	Requested Concentration
Methane	1.26% (25% L.E.L.)	1.25%
Air	Balance	

Analysis +/- 2 %

Lot #: 5-331-15

Approved: _____

John Hettinger
Senior Lab Technician

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CERTIFICATE OF ANALYSIS

Norco
Kennewick Warehouse
102 E. Columbia Dr.
Kennewick, WA 99336-0000

Date: January 17, 1996

Cylinder Type: One 103 Liter Cylinder

PO Number: None

Norco Order Number: 690153-00

Component	Reported Concentration	Requested Concentration
Hydrogen	1.0% (25% L.E.L.)	1.0%
Air	Balance	

Analysis +/- 2 %

Lot #: 5-093-15

Approved: _____

John Hettinger
Senior Lab Technician

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Number	Date	Description
001	01/13/96	Page 2, Test Execution Sheet, Signatures and Test Date changed.
002	01/13/96	Page 9, Section 4.0, <u>Prerequisites</u> , Subsection 4.1, Inclusion of Additional Test Articles.
003	01/13/96	Page 9, Section 4.0, <u>Prerequisites</u> , Subsection 4.3, Item 4.3.1, Signatures and Test Date changed.
004	01/13/96	Page 9, Section 4.0, <u>Prerequisites</u> , Subsection 4.3, Item 4.3.3, Inclusion of Additional Test documentation.
005	01/13/96	Page 10, Section 4.0, <u>Prerequisites</u> , Subsection 4.3, Item 4.3.4, Inclusion of the word "system".
006	01/13/96	Page 10, Section 4.0, <u>Prerequisites</u> , Subsection 4.3, Item 4.3.5, Change in Instrument Calibration Description.
007	01/13/96	Page 11, Section 5.0, <u>Procedure</u> , Subsection 5.1, Item 5.1.3, Change in Man-Machine Interface display description.
008	01/13/96	Page 11, Section 5.0, <u>Procedure</u> , Subsection 5.1, Item 5.1.5.a, Inclusion of addition procedural step.
009	01/13/96	Page 12, Section 5.0, <u>Procedure</u> , Subsection 5.2, Item 5.2.3, Clarification of Test Gas Calibration Bottle contents.
010	01/13/96	Page 12, Section 5.0, <u>Procedure</u> , Subsection 5.2, Item 5.2.4 - 7, Deletion of Steps.

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Number	Date	Description
011	01/13/96	Page 12, Section 5.0, <u>Procedure</u> , Subsection 5.2, Item 5.2.7, Data Title Correction.
012	01/13/96	Page 14, Section 5.0, <u>Procedure</u> , Subsection 5.3, Item 5.3.1.a, Step added, then deleted.
013	01/13/96	Page 14, Section 5.0, <u>Procedure</u> , Subsection 5.3, Item 5.3.2, Step clarification.
014	01/13/96	Page 14, Section 5.0, <u>Procedure</u> , Subsection 5.3, Item 5.3.4.a, Inclusion of addition procedural step.
015	01/13/96	Page 15, Section 5.0, <u>Procedure</u> , Subsection 5.3, Note clarification.
016	01/13/96	Page 15, Section 5.0, <u>Procedure</u> , Subsection 5.3, Item 5.3.6.1, Step clarification.
017	01/13/96	Page 16, Section 5.0, <u>Procedure</u> , Subsection 5.3, Item 5.3.8, Step change to average response and time response.
018	01/13/96	Page 17, Section 5.0, <u>Procedure</u> , Subsection 5.3, Item 5.3.11.1, Step clarification.
019	01/13/96	Page 18, Section 5.0, <u>Procedure</u> , Subsection 5.3, Item 5.3.14, Step change to average response and time response.
020	01/13/96	Page 20, Section 5.0, <u>Procedure</u> , Subsection 5.4, Item 5.4.2, Step clarification.

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ATP Step Number: Signature Sheet		ATP Exception Log Number: 001	
Description of Exception: Signatures and Test Date changed.			
Resolution of Exception: Changes accurately reflect performance date and test personnel.			
Date of Resolution:		January 22, 1996	
Test Director signature:		[Signature]	
Project Engineer signature:		Michael L. [Signature] 1/22/96	
Quality Assurance signature:		Mark W. Brown	

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ATP Step Number: 4.1	ATP Exception Log Number: 002
Description of Exception: Inclusion of Additional Test Articles.	
The pressure gauge was necessary to ensure test bottles were charged.	
Resolution of Exception: Change accurately reflects test articles used.	
Pressure Gauge, Calibration No. BEL-96-3, Expiration Date: 1/13/97	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 1/22/96
Quality Assurance signature:	<i>[Signature]</i>

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ATP Step Number: 4.3.1	ATP Exception Log Number: 003
Description of Exception: Signatures and Test Date changed.	
Resolution of Exception: Changes accurately reflect performance date and test personnel.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>M. H. K. 1/22/96</i>
Quality Assurance signature:	<i>M. D. Brown</i>

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ATP Step Number: 4.3.3	ATP Exception Log Number: 004
Description of Exception: Inclusion of Additional Test documentation, of pressure and leak testing at vendor facility is desirable.	
Resolution of Exception: Leak test data is requested to document accurate measurement of loop response time. Added step to request test documentation.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	M. H. R. W. 1/22/96
Quality Assurance signature:	M. A. N. Brown

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ATP Step Number: 4.3.4 5	ATP Exception Log Number: 005
Description of Exception: Inclusion of the word "system".	
Resolution of Exception: Description changed for clarification.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	Michael Koch 1/22/96
Quality Assurance signature:	Michael D. Brown

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ATP Step Number: 4.3.5	ATP Exception Log Number: 006
Description of Exception: Change in Instrument Calibration Description.	
TEST STEP REQUIRED CORRECTION TO REFLECT A SYSTEM CAL.	
TEST RATHER THAN COMPONENT CALIBRATION.	
Resolution of Exception: Flammable Gas Monitor calibrated as a complete unit,	
dates recorded. Documentation required and signed by technician.	
REVISED TEST STEP	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>M. H. Hill</i> 1/22/96
Quality Assurance signature:	<i>M. D. Brown</i>

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ATP step number: 5.1.3	ATP Exception Log Number: 007
Description of Exception: Change in Man-Machine Interface display description, caused test step to be incorrect.	
Resolution of Exception: Flammable Gas Monitor uses a "LCD" display, and software message has been changed during "Warm-Up". Procedure changed to reflect software change.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 1/22/96
Quality Assurance signature:	<i>[Signature]</i>

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ATP step number: 5.1.5.a	ATP Exception Log Number: 008
Description of Exception: Inclusion of addition procedural step. Procedure did not clearly state a system warm up was required.	
Resolution of Exception: Step included for test operator to return Flammable Gas Monitor to "Normal Operating Condition" before proceeding to next system check.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 1/22/96
Quality Assurance signature:	<i>[Signature]</i>

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ATP step number: 5.2.3	ATP Exception Log Number: 009
Description of Exception: Clarification of Test Gas Calibration Bottle contents,	
was required.	
Resolution of Exception: Gas bottle contents are correctly described by pressure	
and volume. Gas bottle pressure should be greater than 250 psi to ensure enough	
calibration gas to perform tests. Procedure modified to correct	
for appropriate gas bottle check.	
Date of Resolution:	6/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 6/22/96
Quality Assurance signature:	<i>[Signature]</i>

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ATP step number: 5.2.4 - 7	ATP Exception Log Number: 010
Description of Exception: Deletion of Steps. These steps are incorrectly placed in the procedure. Self verification mode is not used to determine response time.	
Resolution of Exception: Steps reflect operation of the Flammable Gas Monitor in self verification mode, which was not used in testing of response time in this ATP. modified procedure by deleting steps.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 1/22/96
Quality Assurance signature:	<i>[Signature]</i>

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ATP step number: 5.2.7	ATP Exception Log Number: 011
Description of Exception: Data Title Correction, required.	
Resolution of Exception: Data block to be changed to record calibration gas	
bottle pressure and volume.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 1/22/96
Quality Assurance signature:	<i>[Signature]</i>

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ATP step number: 5.3.1.a	ATP Exception Log Number: 012
Description of Exception: Step added, then deleted.	
Resolution of Exception: Operational step added to Section 5.1 as Item 5.1.5.a.	
A recheck of bringing system to normal operation is	
not required as this was accomplished in previous	
test steps.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 1/22/96
Quality Assurance signature:	<i>[Signature]</i>

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ATP step number: 5.3.2	ATP Exception Log Number: 013
Description of Exception: Step clarification, required, procedure does not include wire and termination numbers.	
Resolution of Exception: Description enhanced to describe how it is to be performed. "Open the FGM system PLC ADC loop by lifting wire in VCAB, TB-1 (terminal block), number 28."	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	Michael Rich 1/22/96
Quality Assurance signature:	M. J. Brown

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ATP step number: 5.3.4.a	ATP Exception Log Number: 014
Description of Exception: Inclusion of addition procedural step, required to restore PLC loop and restore system to operation.	
Resolution of Exception: Step need to ensure PLC ADC Loop is restored and Flammable Gas Monitor is restarted. Added step to procedure.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>Muhl R. L. 1/22/96</i>
Quality Assurance signature:	<i>Mark N. Brown</i>

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ATP step number: 5.3.5 note	ATP Exception Log Number: 015
Description of Exception: Note clarification, required to specify Full	
scale reading.	
Resolution of Exception: The Term "Full Scale" is replaced with calibration	
gas LFL value. (25% LFL)	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>M. J. K. K. 1/22/96</i>
Quality Assurance signature:	<i>M. J. D. Brown</i>

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ATP step number: 5.3.6.1	ATP Exception Log Number: 016
Description of Exception: Step clarification, is required to allow technician some latitude in introducing sample gas. specification of 2 second burst is too stringent.	
Resolution of Exception: A two (2) second burst of test gas is insufficient to ensure alarm response at sensor trip point. Technician is allowed to increase release time to ensure alarm sequence is observed.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>W. J. K. H. 1/22/96</i>
Quality Assurance signature:	<i>Med D. Brown</i>

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ATP step number: 5.3.8	ATP Exception Log Number: 017
Description of Exception: Step change to average response and time response. Test does not allow acceptance of data which indicates response time > 30s. while 2 response times were greater than 30s (31s ; 32s), these times were due to operator gas introduction times. Monitor response acceptable.	
Resolution of Exception: Individual test times may vary by several seconds due to operator error. As such, the average response time is considered representative of the systems true behavior. A forty (40) second response time is considered adequate to meet current accident scenarios. Procedure step modified and troubleshooting steps were deleted.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 1/22/96
Quality Assurance signature:	<i>[Signature]</i>

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ATP step number: 5.3.11.1	ATP Exception Log Number: 018
Description of Exception: Step clarification, required to allow tech latitude in introducing sample gas. 2 second burst to tight.	
Resolution of Exception: A two (2) second burst of test gas is insufficient to ensure alarm response at sensor trip point. Technician is allowed to increase release time to ensure alarm sequence is observed. Procedure modified	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 1/22/96
Quality Assurance signature:	<i>[Signature]</i>

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ATP step number: 5.3.14	ATP Exception Log Number: 019
Description of Exception: Step change to average response and time response. 30s is to tight of tolerance when operator variance considered.	
Resolution of Exception: Individual test times may vary by several seconds due to operator error. As such, the average response time is considered representative of the systems true behavior. A forty (40) second response time is considered adequate to meet current accident scenarios. Procedure modified.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 1/22/96
Quality Assurance signature:	<i>[Signature]</i>

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ATP step number: 5.4.2	ATP Exception Log Number: 020
Description of Exception: Step clarification, required. Allowing 2 minutes	
was sufficient to clear system. 5 minutes was not required	
Resolution of Exception: Samples rates within the Flammable Gas Monitor	
are sufficiently large to allow the sensor to "clear" within one (1) minute after	
completion of the test.	
Date of Resolution:	1/22/96
Test Director signature:	<i>[Signature]</i>
Project Engineer signature:	<i>[Signature]</i> 1/22/96
Quality Assurance signature:	<i>[Signature]</i>