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1	HNF-4308		0	Acceptance Test Plan for the 241-AN-105 Multi-Function Corrosion Monitoring System	Q S	2	1	1

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D OR N/A (See WHC-CM-3-5, Sec. 12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION
(See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Design Authority	<i>Robert D. Hill</i>	5/3/99	55-05						
		Design Agent									
1	1	Cog. Eng. G. L. Edgemon	<i>G. L. Edgemon</i>	4/15/99	R1-30						
1	1	Cog. Mgr. D. B. Smet	<i>D. B. Smet</i>	4/12/99	56						
1	1	QA G. A. Sams	<i>G. A. Sams</i>	4/9/99	55-15						
1	1	Safety M. B. Sams	<i>M. B. Sams</i>	4/12/99	57-34						
		Env.									

18. G. L. Edgemon Signature of EDT Originator Date 4/5/99		19. S. H. Rifaey Authorized Representative for Receiving Organization Date 4/13/99		20. D. B. Smet Design Authority/Cognizant Manager Date 4/12/99		21. DOE APPROVAL (if required) Ctrl No. _____ ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
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Acceptance Test Plan for the 241-AN-105 Multi-Function Corrosion Monitoring System

G. L. Edgemon

Lockheed Martin Hanford Corporation

Richland, WA 99352

U.S. Department of Energy Contract DE-AC06-96RL13200

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Abstract: ATP for 241-AN-105 corrosion monitoring system.

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4/13/99
Release Approval Date

Approved For Public Release

1.0 PURPOSE

This Acceptance Test Procedure (ATP) will document the satisfactory operation of the corrosion probe tree assembly destined for installation into tank 241-AN-105. This ATP will be performed by the manufacturer prior to delivery to the site..

2.0 TEST OBJECTIVES

The objective of this procedure is to demonstrate and document the acceptance of the corrosion probe tree assembly to be installed into tank 241-AN-105. The test will consist of a pressure test to verify leak tightness of the probe tree body, a continuity test of the probe tree wiring, a test of the high level detector wiring, a test of the operation of the Type K thermocouples along the probe body, and verification of operation of corrosion monitoring computer and instrumentation.

3.0 REFERENCES

- HNF-4285 "Design of Multi-Function Hanford Tank Corrosion Monitoring System"

4.0 RESPONSIBILITIES

4.1 LIFE EXTENSION EQUIPMENT ENGINEERING

A Life Extension Equipment Engineering Test Engineer shall be responsible for the coordination, scheduling, performance and documentation of this test procedure.

4.2 TEST WITNESSES

Life Extension Equipment Engineering Test Engineer shall perform the function of test witness. All corrosion probe tree assembly testing shall be witnessed, verified and approved with the Test Engineers signature

5.0 DOCUMENTATION

5.1 TEST RECORD

Any personnel involved in the performance of this test including the Test Engineer shall fill out a line in Section 8.0 RECORDS.

Test results shall be recorded by the Test Engineer. Unacceptable conditions or readings are to be referred to Section 9.0 EXCEPTIONS. A complete working copy of this procedure and all exception records shall be maintained as permanent records in accordance with HNF-PRO-210, Rev. 0, "Records Management Program.Standards"

5.2 EXCEPTIONS

Exceptions by step number, and other notes are to be recorded under Section 9.0. This section must be dispositioned (including the generation of any required ECNs) and signed off by the Test Engineer prior to final ATP acceptance. If no exceptions are encountered, this section shall be so noted and closed out with the signature of the Test Engineer. During the performance of this test errors in text may be encountered which require correction/adjustment to complete the test. The correction is to be noted in the ATP and listed as an exception in Section 9.0.

5.3 TEST EXECUTION RECORD

Approval of the ATP results shall be accepted by the Test Engineer as indicated by signature in Section 10.0.

6.0 TEST EQUIPMENT

- Multimeter
- Air compressor
- Pressure Gauge
- Constant Voltage/Current Source

7.0 ACCEPTANCE TEST

NOTE: Small leakage in the test apparatus is acceptable. Leakage from any component of the probe tree assembly is not acceptable (i.e. seal pins, fittings, welded joints, etc.). Test the final wired assembly with all fittings and seal pins in final configuration.

7.1 LEAK TEST

- 7.1.1 Record model, serial number, and calibration expiration date of pressure gauge below.

Instrument: _____ SN: _____

Calibration Expiration Date: _____

- 7.1.2 Place an appropriate air fitting on one end of the probe body.
- 7.1.3 Connect air supply to fitting and fill probe body with air.
- 7.1.4 Pressurize probe body to between 20 psig minimum or 30 psig maximum.

- 7.1.5 Hold pressure for 10 minutes or longer.
- 7.1.6 Apply "snoop" solution to each fitting and welded joint.
- 7.1.7 Check for the formation of bubbles at fittings and joints.
- 7.1.8 If bubbles are detected at any of the joints, tighten the joint, if still leaking, disassemble joints that leaked and replace fitting, or seal pin. Rework any welds that are found to leak. Perform pressure testing steps again.
- 7.1.9 Test Engineer sign off that steps 7.1.1 through 7.1.8 are complete.

Test Engineer	Date

7.2 CONTINUITY TEST

Using a standard multimeter, electrical continuity shall be verified between each of the 24 corrosion probe electrodes and its respective pin in the 15 pin D-type connector at the point of connection with the corrosion monitoring instrumentation. Continuity will also be checked between each of the two high level detector elements and its respective wire termination point in the enclosure at the top of the probe. To perform this continuity check make the necessary connections from the 35 pin connector at top of the probe through the intrinsic safety barriers to the computer cables that will plug directly into the corrosion monitoring instrumentation. Use the data cable that will be used in the final field installation for this test. The continuity check will be performed starting with detector 1, and ending with detector 4. With the exception of detector 1, each detector contains six glass to metal seals leading to six pins in the 35 pin connector at the top of the probe body. Detector 1 contains eight glass to metal seals, six leading to the 35 pin connector at the top of the probe, and two which serve as the high level detector and lead to two wires in the weathertight enclosure at the top of the probe.

NOTE: Check continuity between the electrode after it is attached to the stud on its feed-through on the probe body and its respective pin in the 15 pin D-type connector at the point of connection with the corrosion monitoring instrumentation. Check that each pin is electrically isolated from all remaining pins. Check that each pin is electrically isolated from the stainless steel probe body. This will verify that no unwanted continuity or shorts are present.

- 7.2.1 Record model, serial number, and calibration expiration date of multimeter below.

Instrument: _____ SN: _____

Calibration Expiration Date: _____

- 7.2.2 Check continuity of detector #1. Circle Yes or No in regard to whether continuity exists.

<u>Pin #</u>	<u>Continuity</u>
a	Yes/No
Z	Yes/No
Y	Yes/No
X	Yes/No
W	Yes/No
V	Yes/No

Upper High Level Detector Element	Yes/No
---	--------

Lower High Level Detector Element	Yes/No
---	--------

- 7.2.3 Check continuity of detector #2. Circle Yes or No in regard to whether continuity exists.

<u>Pin #</u>	<u>Continuity</u>
U	Yes/No
T	Yes/No
S	Yes/No
R	Yes/No
P	Yes/No
N	Yes/No

- 7.2.4 Check continuity of detector #3. Circle Yes or No in regard to whether continuity exists.

<u>Pin #</u>	<u>Continuity</u>
M	Yes/No
L	Yes/No
K	Yes/No
J	Yes/No
H	Yes/No
G	Yes/No

- 7.2.5 Check continuity of detector #4. Circle Yes or No in regard to whether continuity exists.

<u>Pin #</u>	<u>Continuity</u>
F	Yes/No
E	Yes/No
D	Yes/No
C	Yes/No
B	Yes/No
A	Yes/No

- 7.2.6 Test Engineer sign that steps 7.2.1 through 7.2.5 are complete.

_____/_____
 Test Engineer Date

7.3 THERMOCOUPLE TEST

Using a multimeter or other calibrator, check operation of thermocouples that run from each detector to termination block in weathertight enclosure at top of probe.

NOTE: Acceptance/rejection decision shall be based on results of manufacturers final calibration prior to shipping in conjunction with successful recording of ambient air temperature of air in probe shipping container (4" PVC pipe or equivalent).

- 7.3.1 Record model, serial number, and calibration expiration date of multimeter below.

Instrument: _____ SN: _____

Calibration Expiration Date: _____

- 7.3.2 Check ambient air temperature in shipping tube on thermocouples.

<u>Thermocouple #</u>	<u>Temperature (°F)</u>
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	_____

9	_____
10	_____
11	_____
12	_____
13	_____
14	_____
15	_____
16	_____
17	_____
18	_____
19	_____
20	_____
21	_____
22	_____
23	_____

7.3.3 Test Engineer sign that steps 7.3.1 through 7.3.2 are complete.

_____ / _____
Test Engineer Date

7.4 INSTRUMENTATION OPERATION TEST

Using a constant current and constant voltage source of between 0.1 - 10 μ A and 0.1 to 10 mV respectively, check operation of corrosion monitoring instrumentation by putting instrumentation in measuring configuration and properly measuring/recording the known signal provided by the source. Constant current and voltage source should be checked for accuracy with calibrated multimeter prior to start of testing. Constant current and voltage source should be measured by corrosion monitoring software/hardware using the actual cables to be used in the final field installation. Constant current and voltage source should be measured after passing through the intrinsic safety barrier system to be used in final field installation.

NOTE: Connect constant current/voltage source to appropriate pins at end of data cable to be connected to 35 pin connector at top of corrosion probe in final field installation. This cable should run back through the intrinsic safety barriers and be properly connected to corrosion monitoring instrumentation per vendor instruction. Launch corrosion monitoring software and record on each channel for a minimum of one minute to verify that known current/voltage signal is being properly recorded by software.

7.4.1 Record model, serial number, and calibration expiration date of multimeter used to check constant current/constant voltage source below.

Instrument: _____ SN: _____

Calibration Expiration Date: _____

7.4.2 Check known constant current/voltage signal against measured current/voltage value on corrosion monitoring software/hardware.

Channel	Constant Current Source Value	Constant Voltage Source Value	Instrument Recorded Current Value	Instrument Recorded Voltage Value
1	_____	_____	_____	_____
2	_____	_____	_____	_____
3	_____	_____	_____	_____
4	_____	_____	_____	_____
5	_____	_____	_____	_____
6	_____	_____	_____	_____
7	_____	_____	_____	_____
8	_____	_____	_____	_____

7.4.3 Test Engineer sign that steps 7.4.1 through 7.4.2 are complete.

_____/_____
Test Engineer Date

8.0 RECORDS

TEST WITNESSES

Test Personnel Attendance Sign In:

_____/_____
 Test Engineer Date

Other Personnel Present:

Print Name	Signature	Position	Date
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

9.0 EXCEPTIONS

ITEM	STEP	DESCRIPTION	DISPOSITION

TEST APPROVED WITH/WITHOUT EXCEPTIONS:

_____/_____
 Test Engineer Date

10.0 TEST EXECUTION RECORD

Section	Accept/Reject	Remarks
7.1		
7.2		
7.3		
7.4		

_____/_____
 Test Engineer Date