

#67
JUN 1 1995
Sta 31

ENGINEERING DATA TRANSMITTAL

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5. Proj./Prog./Dept./Div.: W-320/77360	6. Cog. Engr.: W. M. Lane	7. Purchase Order No.: N/A
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		13. Permit/Permit Application No.: N/A
		14. Required Response Date: June 8, 1995

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(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-W320-ATP-003	All	0	Cathodic Protection - Rectifier 47	SQ	1	N/A	N/A

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	4. Review	1. Approved	4. Reviewed no/comment
		2. Release	5. Post-Review	2. Approved w/comment	5. Reviewed w/comment
		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	(G)	(H)		
Reason	Disp.											Reason	Disp.		
1,3	1	Cog. Eng.: W. M. Lane				<i>W.M. Lane</i>				6/1/95	S6-12	D. E. Bowers		S6-01	3
1	1	Cog. Mgr.: J. P. Harris				<i>J.P. Harris</i>				6-1-95	S6-12	F. W. Bradshaw		S3-10	3
1,3	1	QA: J. J. Huston				<i>J.J. Huston</i>				6-1-95	S6-12	T. H. May		S6-12	3
1,3	1	Safety: M. N. Islam				<i>M.N. Islam</i>				6/1/95	R3-08	Project W-320 Files		S2-48	3
1	1	Cathodic Cog. Eng.: J. M. [unclear]				<i>J.M. [unclear]</i>				6/5/95	R1-30	Central Files (orig. +2)		L8-04	3
3	<i>16</i>	Env.: D. J. Carrell									H6-22	<i>OJTI (2)</i>		<i>A3-36</i>	
3		E. G. Allen									S6-12				
3		J. W. Bailey									S6-12				

18. Signature of EDT Originator <i>W.M. Lane</i> Date: <i>6/1/95</i>	19. Authorized Representative for Receiving Organization Date: _____	20. Cognizant Manager <i>J.P. Harris</i> Date: <i>6-1-95</i>	21. DOE APPROVAL (if required) Ctrl. No. <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/comments <input type="checkbox"/> Disapproved w/comments
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RELEASE AUTHORIZATION

Document Number: WHC-SD-W320-ATP-003, Rev. 0

Document Title: Cathodic Protection - Rectifier 47

Release Date: June 8, 1995

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:


V.L. Birkland

June 8, 1995

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SUPPORTING DOCUMENT

1. Total Pages **24**

2. Title

Cathodic Protection - Rectifier 47

3. Number

WHC-SD-W320-ATP-003

4. Rev No.

0

5. Key Words

Project W-320, cathodic protection, rectifier

6. Author

Name: W. M. Lane

W.M. Lane
Signature

Organization/Charge Code 77360/D2M58

7. Abstract

Acceptance test procedure for Cathodic Protection - Rectifier 47 for Project W-320.

8. RELEASE STAMP

OFFICIAL RELEASE
BY WHC
DATE JUN 14 1995
Sta. 31 #67

TEST TITLE Cathodic Protection - Rectifier 47

LOCATION 200-E Area, Tank 241-C-106

PROJECT NUMBER W-320 WORK ORDER ER4319

PROJECT TITLE Tank 241-C-106 Sluicing

Prepared By
ICF Kaiser Hanford Company
Richland, Washington

For the U.S. Department of Energy
Contract DE-AC06-93RL12359

PROCEDURE APPROVAL

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_{for C. Mates} 9/26/94
Date

C. Sublett ^{4/14/95}
_{for C. Sublett} 9/26/94
Date

RF Meringer ^{RFM 4/17/95}
11/4/94
Date

J. W. Busha ^{4/18/95}
11/11/94
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William M. Lane ^{4/18/95}
4/18/95
Date

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4/27/95
Date

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SPJ for JE Breed
J. E. Breed
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Date

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Date

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Quality Engineering 11-3-94
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11/11/94
Date

J. W. Busha
Quality Assurance 4-18-95
Date

T. N. Shum
Operations 4-19-95
Date

EXECUTION AND TEST APPROVAL

EXECUTED BY

<u>Test Director/Organization</u>	<u>Date</u>	<u>Test Operator/Organization</u>	<u>Date</u>
<u>Recorder/Organization</u>	<u>Date</u>		

WITNESSES

<u>Witness/Organization</u>	<u>Date</u>	<u>Title III Inspector</u>	<u>Date</u>
<u>Witness/Organization</u>	<u>Date</u>	<u>Witness/Organization</u>	<u>Date</u>

A-E APPROVAL

ICF Kaiser Hanford Company (ICF KH)

Without exceptions _____ With exceptions resolved _____ With exceptions outstanding _____

<u>Acceptance Inspection</u>	<u>Date</u>	<u>Design Engineer</u>	<u>Date</u>
<u>Project Manager</u>	<u>Date</u>		

TEST APPROVAL AND ACCEPTANCE

Westinghouse Hanford Company (WHC)

Without exceptions _____ With exceptions resolved _____ With exceptions outstanding _____

<u><Title or Department></u>	<u>Date</u>	<u><Title or Department></u>	<u>Date</u>
<u><Title or Department></u>	<u>Date</u>	<u>Cathodic Protection Engineer</u>	<u>Date</u>

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NOTE: At completion of test, enter pages added during performance of test to this Table of Contents.

1 PURPOSE

This Acceptance Test Procedure (ATP) has been prepared to demonstrate that the cathodic protection system functions as required by project criteria.

2 REFERENCES

2.1 DRAWINGS

H-2-818705, Sh 1, Rev 0 Electrical Cathodic Protection Plan

H-2-818705, Sh 2, Rev 0 Electrical Cathodic Protection Details

2.2 SPECIFICATIONS

W-320-C5, Rev 0 Construction Specification (Section 16640)

2.3 ENGINEERING CHANGE NOTICES (ECN)

Prior to final test approval, enter ECNs written against this ATP.

3 RESPONSIBILITIES

3.1 GENERAL

Each company or organization participating in this ATP will designate personnel to assume the responsibilities and duties as defined herein for their respective roles. The designees shall become familiar with this ATP and the systems involved to the extent that they can perform their assigned duties.

3.2 WHC PROJECT ENGINEER

3.2.1 Designates a Test Director.

3.2.2 Coordinates testing with the Facility Manager.

3.2.3 Acts as liaison between the participants in acceptance testing.

3.2.4 Distributes the approved testing schedule before start of testing.

3.2.5 Schedules and conducts a pretest kickoff meeting with test participants when necessary.

3.2.6 Notifies the persons performing and witnessing the test 2 days before the start of testing.

3.2.7 Schedules a dry run when necessary.

3.2.8 Notifies concerned parties when a change is made in the testing schedule.

3.2.9 Signs Execution and Test Approval page when test is approved and accepted.

- 3.2.10 Takes necessary action to clear exceptions to the test.
- 3.2.11 Signs Exception Form when exception has been resolved.
- 3.2.12 Provides a distribution list for the approved and accepted ATP(ATR).

3.3 TEST DIRECTOR

- 3.3.1 Coordinates and directs acceptance testing.
- 3.3.2 Confirms that field testing and inspection of the system or portion of the system to be tested has been completed.
- 3.3.3 Stops any test which, in his or her judgment, may cause damage to the system until the problem has been resolved.
- 3.3.4 After verifying there is no adverse impact, may alter the sequence in which systems or subsystems are tested.
- 3.3.5 Ensures that required environmental conditions are maintained.
- 3.3.6 If a test is to be suspended for a period of time, ensures that the system is left in a safe mode.
- 3.3.7 Before restarting suspended test, re-verifies the test prerequisites.
- 3.3.8 Initiates ECNs to document required changes to the ATP.
- 3.3.9 Reviews recorded data, discrepancies, and exceptions.
- 3.3.10 Obtains information or changes necessary to clear or resolve objections during the performance of the test.
- 3.3.11 Signs Execution and Test Approval page when test has been performed.
- 3.3.12 Signs Exception Form when exception has been resolved.
- 3.3.13 Obtains required signatures on the ATP Master prior to reproduction and distribution.

3.4 WITNESSES (Provided by Participating Organizations. One witness shall be a Title III acceptance inspector.)

- 3.4.1 Witness the tests.
- 3.4.2 Review results of testing.
- 3.4.3 Assist the Test Director when requested.
- 3.4.4 Sign Execution and Test Approval page when test has been performed.
- 3.4.5 Sign Exception Form when exception has been resolved.

- 3.5 RECORDER (Provided by ICF KH)
 - 3.5.1 Prepares a Field copy from the ATP Master.
 - 3.5.2 Records names of all designated personnel on Field copy of ATP prior to start of testing.
 - 3.5.3 Records test instrument identification numbers and calibration expiration dates.
 - 3.5.4 Initials and dates every test step on the Field copy as it is completed next to the step number or on a data sheet, when provided. Records test data. On data sheets where there is not room for both the initial and date, date may be entered at bottom of column.
 - 3.5.5 Records objections and exceptions on an Exception form. Uses additional Exception forms as needed. Notifies the Test Director at time the objection is made.
 - 3.5.6 Signs Execution and Test Approval page when test has been performed.
 - 3.5.7 After test is finished, assigns alpha numeric page numbers to added data sheets and Exception forms. Records page numbers in the Table of Contents.
 - 3.5.8 Transfers Field copy entries for each step to the Master in ink or type, signs, and dates. Transmits the completed Master to the Test Director for approval signature routing. Transmits the Field copy to Construction Document Control for inclusion in the official project file.
 - 3.5.9 Signs Exception Form when exception has been resolved and transmits to Test Director.
- 3.6 TEST OPERATOR
 - 3.6.1 Performs test under direction of the Test Director.
 - 3.6.2 Provides labor, equipment, and test instruments required for performing tests which have not been designated as being provided by others.
 - 3.6.3 Requests in writing from the Test Director those services, materials, or equipment that have been designated as being supplied by others.
 - 3.6.4 Confirms that all equipment required for performing test will be available at the start of testing.
 - 3.6.5 Signs the Execution and Test Approval page.
- 3.7 DESIGN ENGINEER ACCEPTANCE INSPECTION
 - 3.7.1 Evaluate results.
 - 3.7.2 Sign for A-E Approval on Execution and Test Approval page.

4 CHANGE CONTROL

Required changes to this ATP must be processed on ECNs in accordance with company procedures. If a need for change is discovered in the course of running the test, the affected section of the test shall be stopped until the ECN is approved. However, other sections may be tested per direction from the test director.

5 EXECUTION

5.1 OCCUPATIONAL SAFETY AND HEALTH

Individuals shall carry out their assigned work in a safe manner to protect themselves and others from undue hazards and to prevent damage to property and environment. Facility line managers shall assure the safety of activities within their areas to prevent injury, property damage, or interruption of operation. Performance of test activities shall always include safety and health aspects.

5.2 PERFORMANCE

5.2.1 Conduct testing in accordance with ICF KH Procedure CON 3.5 (Performance and Recording of Acceptance Test Procedures).

5.2.2 Perform test following the steps and requirements of this procedure.

6 EXCEPTIONS

6.1 GENERAL

Exceptions to the required test results are sequentially numbered and recorded on individual Exception forms. This enables case-by-case resolution and approval of each exception.

Errors/exceptions in the ATP itself shall NOT be processed as test exceptions (see Section 4 CHANGE CONTROL).

6.2 RECORDING

6.2.1 Number each exception sequentially as it occurs and record it on an Exception Form (KEH-428), sample appended.

6.2.2 Enter name and organization of objecting party for each exception.

6.2.3 Enter planned action to resolve each exception when such determination is made.

6.3 RETEST/RESOLUTION

Record the action taken to resolve each exception. Action taken may not be the same as planned action.

6.3.1 When action taken results in an acceptable retest, sign and date Retest Execution and Acceptance section of the Exception Form.

6.3.2 When action taken does not involve an acceptable retest, strike out the Retest Execution and Acceptance section of the Exception Form.

6.4 APPROVAL AND ACCEPTANCE

WHC provides final approval and acceptance of exceptions by checking one of the following on Exception Form:

6.4.1 Retest Approved and Accepted: Applicable when Retest Execution and Acceptance section is completed.

6.4.2 Exception Accepted-As-Is: Requires detailed explanation.

6.4.3 Other: Requires detailed explanation.

WHC signs and dates the Exception Form and obtains other WHC internal approvals, if required.

6.5 DISTRIBUTION

A copy of the approved Exception Form is distributed to each participant. The signed original is attached to the ATP Master.

7 PREREQUISITES, EQUIPMENT/INSTRUMENTS, AND ABBREVIATIONS

7.1 PREREQUISITES

The following conditions shall exist at start of testing for that portion of the system being tested.

7.1.1 Buried piping, associated with this project, in Tank Farm 241-C and the cathodic protection system have been inspected for compliance with construction documents.

7.1.2 Reference documents (including this ATP) have been verified for correct revision number and outstanding ECNs.

7.1.3 A Prejob Safety Analysis has been prepared and a Prejob Safety Meeting has been conducted.

7.1.4 Test instruments (except Waveform Analyzer) have a valid calibration stamp attached. Test instrument identification numbers and calibration expiration dates have been recorded in Para 7.2.

7.2 EQUIPMENT/INSTRUMENTS

Supplied by Test Operator unless otherwise noted. {Delete items not required. Add any additional necessary items.}

7.2.1 Voltohmmeter (VOM): Digital, portable, 0-150 V ac/dc.

Instrument No. _____ Expiration Date _____

- 7.2.2 Waveform Analyzer: Hand held instrument with display of ON-OFF pipe-to-soil potential, DC potential or AC potential, MCMiller Co, Model WFA-1.
- 7.2.3 Test leads with insulated covers for wire clips.
- 7.2.4 Portable test reel, containing a minimum of 200 feet of test wire, 600 V, No. 18 AWG minimum.
- 7.2.5 Portable copper-copper sulphate reference electrode.
- 7.2.6 Pipe locator.

7.3 ABBREVIATIONS

ECN Engineering Change Notice

8 RECTIFIER, CABLES, PIPE TEST CONDUCTORS, NATIVE POTENTIALS AND SYSTEM OPERATION

8.1 The following steps will verify (1) rectifier nameplate data, (2) rectifier input wiring is correctly terminated and color coded, and (3) anode feeder cable, anode loop cable, and negative return cables are properly labeled and connected.

_____ 8.1.1 Record nameplate data for Rectifier 47.

Make _____

Model _____

Serial Number _____

AC Line Input Voltage _____

AC Line Frequency _____

Number of Phases _____

DC Output Voltage _____

DC Output Current _____

8.1.2 Verify the following on rectifier.

_____ 8.1.2.1 Tank gasket is not damaged and is in place.

_____ 8.1.2.2 There are no loose electrical connections or frayed wires.

_____ 8.1.2.3 There are no oil leaks.

_____ 8.1.3 Open the disconnect switch that supplies ac input power to Rectifier 47.

_____ 8.1.4 Verify that rectifier input circuit breaker is OPEN.

_____ 8.1.5 Verify no dc voltage at rectifier output terminals.

_____ 8.1.6 Verify the rectifier case is filled with oil to the indicated level and that oil is CLEAR.

8.1.7 Verify the ac wiring from the disconnect switch is terminated on the ac input terminals of rectifier.

_____ 8.1.7.1 Line 1 (Red or Black).

_____ 8.1.7.2 Neutral (White or Gray)

_____ 8.1.7.3 Ground (Green)

8.1.8 Verify the rectifier output cables are properly labeled.

_____ 8.1.8.1 (+) FR47 (Anode Feeder Cable).

- _____ 8.1.8.2 (+) LR47 (Anode Loop Cable).
- _____ 8.1.8.3 (-) R47 (Negative Return Cable).
- 8.1.9 Verify the anode feeder and anode loop cables are terminated at the rectifier positive terminals.
- _____ 8.1.9.1 (+) FR47 (Anode Feeder Cable).
- _____ 8.1.9.2 (+) LR47 (Anode Loop Cable).
- _____ 8.1.10 Verify the negative return cable (-) R47 is connected to rectifier negative terminal.
- _____ 8.1.11 Verify the rectifier case is connected to the ground rod.

NOTE: The steps shown in Paragraphs 8.2 and 8.3 may be done concurrently.

8.2 The following steps will verify pipe test conductors are (1) terminated on designated terminals in accordance with the Drawings and (2) labeled correctly with the pipe number or reference electrode. Record terminal number to which each conductor is connected.

- _____ 8.2.1 Test Station T(47-1)
 - 4-inch SN-200-M9 Terminals _____ and _____
w/6-inch ENC-M26a
 - 4-inch SL-100-M9 Terminals _____ and _____
w/6-inch ENC-M26a
 - 2-inch S-M2 Terminals _____ and _____
 - Reference Electrode Terminal _____
- _____ 8.2.2 Test Station T(47-2)
 - 4-inch SL-100-M9 Terminals _____ and _____
w/6-inch ENC-M26a
 - 1-inch A-M5 Terminals _____ and _____
 - 2-inch RW-M5 Terminals _____ and _____
 - 3/8-inch A&RW-M5 Terminals _____ and _____
 - Reference Electrode Terminal _____

_____ 8.2.3	Test Station T(47-3)		
	4-inch SN-200-M9 w/6-inch ENC-M26a	Terminals _____	and _____
	4-inch SL-100-M9 w/6-inch ENC-M26a	Terminals _____	and _____
	3-inch P-M21	Terminals _____	and _____
	1-1/2 inch P-M21	Terminals _____	and _____
	Reference Electrode	Terminal _____	
_____ 8.2.4	Test Station T(47-4)		
	3-inch CWS-M5	Terminals _____	and _____
	3-inch CWR-M5	Terminals _____	and _____
	2-inch RW-M5	Terminals _____	and _____
	Reference Electrode	Terminal _____	
_____ 8.2.5	Test Station T(47-5)		
	1-inch IA(100#)M7	Terminals _____	and _____
	2-inch CO ₂ -M5	Terminals _____	and _____
	Reference Electrode	Terminal _____	
_____ 8.2.6	Test Station T(47-6)		
	4-inch SN-200-M9 w/6-inch ENC-M26a	Terminals _____	and _____
	4-inch SL-100-M9 w/6-inch ENC-M26a	Terminals _____	and _____
	1/2-inch IA(80#)M7	Terminals _____	and _____
	2-inch RAW-M5 w/4-inch ENC-M26a	Terminals _____	and _____
	Reference Electrode	Terminal _____	
_____ 8.2.7	Test Station T(47-7)		
	4-inch SN-201-M9 w/6-inch ENC-M26a	Terminals _____	and _____
	4-inch SL-101-M9 w/6-inch ENC-M26a	Terminals _____	and _____
	Reference Electrode	Terminal _____	

- _____ 8.2.8 Test Station T(47-8)
- 4-inch SN-201-M9 Terminals _____ and _____
w/6-inch ENC-M26a
- 3-inch 8256 Terminals _____ and _____
w/8-inch ENC
- Reference Electrode Terminal _____
- _____ 8.2.9 Test Station T(47-9)
- 4-inch SN-201-M9 Terminals _____ and _____
w/6-inch ENC-M26a
- 2-inch 8029 P-12(A) Terminals _____ and _____
- 1-inch RW-M5 Terminals _____ and _____
- Reference Electrode Terminal _____
- _____ 8.2.10 Test Station T(47-10)
- 3-inch DR-301-M9 Terminals _____ and _____
w/6-inch ENC-M26a
- 3-inch DR-302-M9 Terminals _____ and _____
w/6-inch ENC-M26a
- 2-inch M5 Terminals _____ and _____
w/4-inch ENC
- Reference Electrode Terminal _____

8.3 Using a VOM, measure and record resistance between each set of pipe test conductors that are identified as being connected to the same pipe. Resistance measured shall be less than 1 ohm.

- _____ 8.3.1 Record the following VOM data:
- Manufacturer _____
- Model _____
- Serial Number _____
- Calibration Sticker Data _____

- _____ 8.3.2 Test Station T(47-1)
- 4-inch SN-200-M9 w/6-inch ENC-M26a _____ ohms
- 4-inch SL-100-M9 w/6-inch ENC-M26a _____ ohms
- 2-inch S-M2 _____ ohms

_____ 8.3.3	Test Station T(47-2)	
	4-inch SL-100-M9 w/6-inch ENC-M26a	_____ ohms
	1-inch A-M5	_____ ohms
	2-inch RW-M5	_____ ohms
	3/8-inch A&RW-M5	_____ ohms
_____ 8.3.4	Test Station T(47-3)	
	4-inch SN-200-M9 w/6-inch ENC-M26a	_____ ohms
	4-inch SL-100-M9 w/6-inch ENC-M26a	_____ ohms
	3-inch P-M21	_____ ohms
	1-1/2 inch P-M21	_____ ohms
_____ 8.3.5	Test Station T(47-4)	
	3-inch CWS-M5	_____ ohms
	3-inch CWR-M5	_____ ohms
	2-inch RW-M5	_____ ohms
_____ 8.3.6	Test Station T(47-5)	
	1-inch IA(100#)M7	_____ ohms
	2-inch CO ₂ -M5	_____ ohms
_____ 8.3.7	Test Station T(47-6)	
	4-inch SN-200-M9 w/6-inch ENC-M26a	_____ ohms
	4-inch SL-100-M9 w/6-inch ENC-M26a	_____ ohms
	1/2-inch IA(80#)M7	_____ ohms
	2-inch RAW-M5 w/4-inch ENC-M26a	_____ ohms
_____ 8.3.8	Test Station T(47-7)	
	4-inch SN-201-M9 w/6-inch ENC-M26a	_____ ohms
	4-inch SL-101-M9 w/6-inch ENC-M26a	_____ ohms
_____ 8.3.9	Test Station T(47-8)	
	4-inch SN-201-M9 w/6-inch ENC-M26a	_____ ohms
	3-inch 8256 w/8-inch ENC	_____ ohms

<u> </u>	8.3.10	Test Station T(47-9)	
		4-inch SN-201-M9 w/6-inch ENC-M26a	_____ ohms
		2-inch 8029 P-12(A)	_____ ohms
		1-inch RW-M5	_____ ohms
<u> </u>	8.3.11	Test Station T(47-10)	
		3-inch DR-301-M9 w/6-inch ENC-M26a	_____ ohms
		3-inch DR-302-M9 w/6-inch ENC-M26a	_____ ohms
		2-inch M5 w/4-inch ENC	_____ ohms

8.4 The following steps will provide the native potential of each new pipe using both the permanent reference electrode and a portable reference electrode for comparison.

NOTE: Connect the pipe test conductor to the positive terminal of the Wave Form Analyzer and the lead from the permanent or portable reference electrode to the common terminal of the Wave Form Analyzer. Turn the mode switch, on the Wave Form Analyzer, to the DC position. (Place the portable reference electrode directly above the pipe for those tests that require the use of the portable reference electrode).

<u> </u>	8.4.1	Test Station T(47-1)	<u>Volts</u>
		Permanent Reference Electrode and 4-inch SL-100-M9 w/6" ENC-M26a	_____
		Portable Reference Electrode and 4-inch SL-100-M9 w/6" ENC-M26a	_____
		Permanent Reference Electrode and 4-inch SN-200-M9 w/6" ENC-M26a	_____
		Portable Reference Electrode and 4-inch SN-200-M9 w/6" ENC-M26a	_____
<u> </u>	8.4.2	Test Station T(47-2)	
		Permanent Reference Electrode and 4-inch SL-100-M9 w/6" ENC-M26a	_____
		Portable Reference Electrode and 4-inch SL-100-M9 w/6" ENC-M26a	_____
<u> </u>	8.4.3	Test Station T(47-3)	
		Permanent Reference Electrode and 4-inch SL-100-M9 w/6" ENC-M26a	_____

Portable Reference Electrode and 4-inch
SL-100-M9 w/6" ENC-M26a

Permanent Reference Electrode and 4-inch
SN-200-M9 w/6" ENC-M26a

Portable Reference Electrode and 4-inch
SN-200-M9 w/6" ENC-M26a

8.4.4 Test Station T(47-6)

Permanent Reference Electrode and 4-inch
SL-100-M9 w/6" ENC-M26a

Portable Reference Electrode and 4-inch
SL-100-M9 w/6" ENC-M26a

Permanent Reference Electrode and 4-inch
SN-200-M9 w/6" ENC-M26a

Portable Reference Electrode and 4-inch
SN-200-M9 w/6" ENC-M26a

8.4.5 Test Station T(47-7)

Permanent Reference Electrode and 4-inch
SL-101-M9 w/6" ENC-M26a

Portable Reference Electrode and 4-inch
SL-101-M9 w/6" ENC-M26a

Permanent Reference Electrode and 4-inch
SN-201-M9 w/6" ENC-M26a

Portable Reference Electrode and 4-inch
SN-201-M9 w/6" ENC-M26a

8.4.6 Test Station T(47-8)

Permanent Reference Electrode and 4-inch
SN-201-M9 w/6" ENC-M26a

Portable Reference Electrode and 4-inch
SN-201-M9 w/6" ENC-M26a

8.4.7 Test Station T(47-9)

Permanent Reference Electrode and 4-inch
SN-201-M9 w/6" ENC-M26a

Portable Reference Electrode and 4-inch
SN-201-M9 w/6" ENC-M26a

8.4.8 Test Station T(47-10)

Permanent Reference Electrode and 4-inch
DR-301-M9 w/6" ENC-M26a

Portable Reference Electrode and 4-inch
DR-301-M9 w/6" ENC-M26a

Permanent Reference Electrode and 4-inch
DR-302-M9 w/6" ENC-M26a

Portable Reference Electrode and 4-inch
DR-302-M9 w/6" ENC-M26a

8.5 The following steps will verify proper operation of Rectifier 47.

8.5.1 Verify Rectifier 47 input circuit breaker is OPEN.

8.5.2 Verify COARSE and FINE transformer taps on rectifier are set at the lowest levels (Coarse - A and Fine - 1).

8.5.3 Close the disconnect switch that supplies ac input power to Rectifier 47.

8.5.4 Close rectifier input circuit breaker. Using the meter on the rectifier, record volts and amperes, and then open input the circuit breaker. Set fine tap to next higher setting and leave coarse tap as previously set. Close input circuit breaker again and record volts and amperes, then open the input circuit breaker. Continue adjusting the output of the rectifier in steps until either the dc volts or dc amperes (whichever is first) approaches, but does not exceed, the nameplate rating of rectifier.

<u>Transformer Taps</u>		<u>dc Output</u>	
<u>Coarse</u>	<u>Fine</u>	<u>Volts</u>	<u>Amp</u>
A	1	_____	_____
A	2	_____	_____
A	3	_____	_____
A	4	_____	_____
A	5	_____	_____
B	1	_____	_____
B	2	_____	_____
B	3	_____	_____
B	4	_____	_____
B	5	_____	_____

C	1	_____	_____
C	2	_____	_____
C	3	_____	_____
C	4	_____	_____
C	5	_____	_____
D	1	_____	_____
D	2	_____	_____
D	3	_____	_____
D	4	_____	_____
D	5	_____	_____

_____ 8.5.5 Open the rectifier input circuit breaker.

8.6 The following steps will verify that if either the Anode Feeder Cable or the Anode Loop Cable is severed, the cathodic protection system will continue to function properly.

_____ 8.6.1 Close rectifier input circuit breaker and record the current shown on the rectifier ammeter. _____ amperes.

_____ 8.6.2 Open rectifier input circuit breaker.

_____ 8.6.3 Disconnect Anode Feeder Cable (+) FR47 from the positive terminal of rectifier, leaving the Anode Loop Cable (+) LR47 connected.

_____ 8.6.4 Close the rectifier input circuit breaker and record the current shown on the rectifier ammeter. _____ amperes.

_____ 8.6.5 Open the rectifier input circuit breaker and disconnect the Anode Loop Cable (+) LR47 and reconnect the Anode Feeder Cable (+) FR47.

_____ 8.6.6 Close the rectifier input circuit breaker and record the current shown on the rectifier ammeter. _____ amperes.

_____ 8.6.7 Open the rectifier input circuit breaker and reconnect the Anode Loop Cable (+) LR47.

8.7 The following steps will verify proper operation of the ground bed system.

_____ 8.7.1 Verify the Mode switch, on the Wave Form Analyzer, is in the OFF position.

_____ 8.7.2 Connect the positive terminal of the Wave Form Analyzer to a protected pipeline test conductor through a portable test reel at various convenient test stations for the following procedure.

_____ 8.7.3 Connect common terminal of the Wave Form Analyzer to a portable copper-copper sulfate reference electrode.

_____ 8.7.4 Turn the Mode switch, on the Wave Form Analyzer, from the OFF position to the DC position.

_____ 8.7.5 Record the following portable reference electrode data:

Manufacturer _____

Model and type _____

_____ 8.7.6 Close the rectifier input circuit breaker, place the portable reference electrode over each anode location and measure the pipe-to-soil potential using the Wave Form Analyzer. Record the pipe-to-soil potential at each anode location. Values should be more negative than (-) 0.85 V dc (ie, (-)0.86 V dc).

NOTE: A pipe locator may be used to locate anodes if necessary.

_____ 8.7.7

<u>Anode</u>	<u>Volts</u>	<u>Anode</u>	<u>Volts</u>
A(47-1)	_____	A(47-13)	_____
A(47-2)	_____	A(47-14)	_____
A(47-3)	_____	A(47-15)	_____
A(47-4)	_____	A(47-16)	_____
A(47-5)	_____	A(47-17)	_____
A(47-6)	_____	A(47-18)	_____
A(47-7)	_____	A(47-19)	_____
A(47-8)	_____	A(47-20)	_____
A(47-9)	_____	A(47-21)	_____
A(47-10)	_____	A(47-22)	_____
A(47-11)	_____	A(47-23)	_____
A(47-12)	_____	A(47-24)	_____

_____ 8.7.8 Turn the Mode switch, on the Wave Form Analyzer, to the OFF position and disconnect the leads.

_____ 8.7.9 Open the disconnect switch at the rectifier.

8.8 The following steps will verify proper operation of the cathodic protection system:

- _____ 8.8.1 Position the 10-position DIP switch on the Pulse Generator (located in the rectifier control panel) as follows: SW1, 2, and 3 in the OFF position and SW4, 5, 6, 7, 8, 9, and 10 in the ON position.
- _____ 8.8.2 Close Rectifier 47 input circuit breaker and the supply disconnect switch and verify the rectifier has been energized for 24 hours prior to the following test.
- _____ 8.8.3 Measure and record the ON and OFF pipe-to-soil potential of each protected pipe by use of the Waveform Analyzer. For protected pipe, the OFF values should be equal to or more negative than (-)0.85 V dc or the ON values should be 100 mV greater negative than the OFF values. If these values are not attainable by use of the existing permanent reference electrode a portable reference electrode may be used. For unprotected pipe, there is no criteria and the values will be recorded for record purposes. The unprotected pipes are designated below.

NOTE: Connect positive terminal of the Waveform Analyzer to the reference electrode terminal and the common terminal on the Waveform Analyzer to the pipe test conductor terminal. Turn the Mode switch from the OFF position to the WFA position, record values, then turn to the OFF position.

		<u>Volts</u>	
_____ 8.8.3.1	Test Station T(47-1)		
	Reference Electrode and 4-inch SN-200-M9 w/6-inch ENC-M26a	On _____	Off _____
	Reference Electrode and 4-inch SL-100-M9 w/6-inch ENC-M26a	On _____	Off _____
	Reference Electrode and 2-inch S-M2 (Unprotected Pipe)	On _____	Off _____
_____ 8.8.3.2	Test Station T(47-2)		
	Reference Electrode and 4-inch SL-100-M9 w/6-inch ENC-M26a	On _____	Off _____
	Reference Electrode and 1-inch A-M5 (Unprotected Pipe)	On _____	Off _____
	Reference Electrode and 2-inch RW-M5 (Unprotected Pipe)	On _____	Off _____
	Reference Electrode and 3/8-inch A&RW-M5 (Unprotected Pipe)	On _____	Off _____

_____ 8.8.3.3	Test Station T(47-3)		
	Reference Electrode and 4-inch SN-200-M9 w/6-inch ENC-M26a	On _____	Off _____
	Reference Electrode and 4-inch SL-100-M9 w/6-inch ENC-M26a	On _____	Off _____
	Reference Electrode and 3-inch P-M21 (Unprotected Pipe)	On _____	Off _____
	Reference Electrode and 1-1/2 inch P-M21 (Unprotected Pipe)	On _____	Off _____
_____ 8.8.3.4	Test Station T(47-4)		
	Reference Electrode and 3-inch CWS-M5 (Unprotected Pipe)	On _____	Off _____
	Reference Electrode and 3-inch CWR-M5 (Unprotected Pipe)	On _____	Off _____
	Reference Electrode and 2-inch RW-M5 (Unprotected Pipe)	On _____	Off _____
_____ 8.8.3.5	Test Station T(47-5)		
	Reference Electrode and 1-inch IA(100#)M7 (Unprotected Pipe)	On _____	Off _____
	Reference Electrode and 2-inch CO ₂ -M5 (Unprotected Pipe)	On _____	Off _____
_____ 8.8.3.6	Test Station T(47-6)		
	Reference Electrode and 4-inch SN-200-M9 w/6-inch ENC-M26a	On _____	Off _____
	Reference Electrode and 4-inch SL-100-M9 w/6-inch ENC-M26a	On _____	Off _____
	Reference Electrode and 1/2-inch IA(80#)M7	On _____	Off _____
	Reference Electrode and 2-inch RAW-M5 w/4-inch ENC-M26a	On _____	Off _____
_____ 8.8.3.7	Test Station T(47-7)		
	Reference Electrode and 4-inch SN-201-M9 w/6-inch ENC-M26a	On _____	Off _____
	Reference Electrode and 4-inch SL-101-M9 w/6-inch ENC-M26a	On _____	Off _____
_____ 8.8.3.8	Test Station T(47-8)		

Reference Electrode and 4-inch SN-201-M9 w/6-inch ENC-M26a On _____ Off _____

Reference Electrode and 3-inch 8256 w/8-inch ENC (Unprotected Pipe) On _____ Off _____

_____ 8.8.3.9 Test Station T(47-9)

Reference Electrode and 4-inch SN-201-M9 w/6-inch ENC-M26a On _____ Off _____

Reference Electrode and 2-inch 8029 P-12(A) (Unprotected Pipe) On _____ Off _____

Reference Electrode and 1-inch RW-M5 (Unprotected Pipe) On _____ Off _____

_____ 8.8.3.10 Test Station T(47-10)

Reference Electrode and 3-inch DR-301-M9 w/6-inch ENC-M26a On _____ Off _____

Reference Electrode and 3-inch DR-302-M9 w/6-inch ENC-M26a On _____ Off _____

Reference Electrode and 2-inch M5 w/4-inch ENC (Unprotected Pipe) On _____ Off _____

_____ 8.8.3.11 Turn the mode switch on the Waveform Analyzer to the OFF position and disconnect leads.

_____ 8.8.4 Open input circuit breaker on Rectifier 47.

_____ 8.8.5 Testing complete, secure from test.

END OF SECTION 8

EXCEPTION NO.		Project No.		ATP No.		Rev.	
Recorded by			Organization		Date Recorded		ATP Page No.
Step No.		Requirement					
Description of Problem							
Objector 1 (Name/Organization)				Objector 2 (Name/Organization)			
Planned Action							
Action Taken							
RETEST EXECUTION AND ACCEPTANCE							
Retest Installation Contractor		Date		Recorder		Date	
Witness 1 (Name/Organization)		Date		Witness 2 (Name/Organization)		Date	
Field Engineering		Date		Test Director (Name/Organization)		Date	
Design Engineering (Author of ATP)		Date		A-E Project Engineer		Date	
APPROVAL AND ACCEPTANCE – OPERATING CONTRACTOR							
<input type="checkbox"/> Retest Approved and Accepted		<input type="checkbox"/> Exception Accepted-as-is*			<input type="checkbox"/> Other*		
* Explanation							
Approver 1		Date		Approver 2		Date	
Approver 3		Date		Approver 4		Date	

SAMPLE

KEH-428 (6-85)