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# Cathodic Protection- Addition of 6 Anodes to Existing Rectifier 31

Gina A. Symons

SGN Eurisys Services Corporation (SESC), Richland, WA 99352 U.S. Department of Energy Contract DE-ACO6-87RL10930

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Abstract: Acceptance test report for Cathodic Protection - Addition of 6 Anodes to existing Rectifier 31 for Project W-320

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STA: 37 COLLAGE 10:

DATE:

Release Stamp

**Approved for Public Release** 

# ACCEPTANCE TEST PROCEDURE WHC-SD-W320-ATR-002 TEST TITLE Cathodic Protection - Addition of (6) Anodes to Existing Rectifier 31 LOCATION West side of 241-AY Tank Farm outside of west fence 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-ACO6-93RL12359

PROCEDURE APPROVAL			
ICF KAISER HANFORD COMPANY (ICI	KH) 4/14/95		SPS 414/95
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Projects Department	Date Aua	lity Assurance	Date
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Safety '	Date Ope	erations	Date

GAS 12/5/96

# **EXECUTION AND TEST APPROVAL**

EXECUTED BY  Machael   Ramon   ECS  Test Director/Organization  Recorder/Organization		MMRacler Test Operator/Organization	
WITNESSES  N.A.  Witness/Organization  N.A.  Witness/Organization		Title III Inspector  N.A.  Witness/Organization	/0/2/FL Date
A-E APPROVAL  ICF Kaiser Hanford Company (ICF Without exceptions X resolution)  Acceptance Inspection  Acceptance Inspection  Project Manager	exceptions	With exceptions outstanding	 wal <u>d Jo/j<i>S/</i>96</u> Date
TEST APPROVAL AND ACCEPTANCE Westinghouse Hanford Company (Without With exceptions resolu	exceptions	With exceptions outstanding	
Title or Departments  Property Kingspunk  Treact	12-4-96 Date 12/5-14 Date	Cathodic Protection Engineer	12/4/96 Date 12/5/96 Date

GAS 12/5/96

W320002.ATP.2323

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 $\ensuremath{\mathsf{NOTE}}\xspace$  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 additions are installed, connected, and function as required by project criteria.

# 2 REFERENCES

#### 2.1 DRAWINGS

H-2-818708, Sh 1, Rev 0 Electrical - Cathodic Protection Plan #3

H-2-818708, Sh 2, Rev 0 Electrical - Cathodic Protection Details

#### 2.2 SPECIFICATIONS

W-320-C7, 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.

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- 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, reverifies 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.

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#### 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 test shall be stopped until the ECN is approved. However, this does not prevent the running of another portion of the test unaffected by the change.

# 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.

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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 in the 241-AY Tank Farm 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. 0605 Expiration Date  $\frac{3/28/69}{6}$ 

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- 7.2.2 Waveform Analyzer: Hand held instrument with display of ON-OFF pipeto-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 100 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	PIPE TEST	CONDUCTORS, NATIVE POTENTIALS, ANODES, AND	SYSTEM OPERATION
	NOTE: The	e steps shown in Paragraphs 8.1 and 8.2 may	be done concurrently.
8.1 Ch 10-1-98	designate with the each cond	wing steps will verify pipe test conductors d terminals in accordance with the Drawings pipe number or reference electrode. Record uctor is connected.  206 (-cv-244)  Test Station T(31-204)	5. (2) labeled correctly
		4 inch SL-100-M9 w/6 inch ENC-M26a	Terminals $\underline{I}$ and $\underline{Z}$
		4 inch SN-200-M9 w/6 inch ENC-M26a	Terminals $3$ and $4$
		4 inch 225# STM W/10" ENC (UNPRODUCTION)	Terminals $6$ and $8$
		Reference Electrode 20126 5-28-96	Terminal <u>5</u>
Ch 10.1-9/	8.1.2	701 13cn-244 55 5-6-96 Test Station T(31-205)	
		4 inch SL-100-M9 w/6 inch ENC-M26a	Terminals $1$ and $2$
		6 inch PSW - S505	Terminals $7$ and $9$
		6 inch PSW - S508	Terminals $6$ and $8$
		3 inch PW-4513	Terminals $3$ and $4$
		Reference Electrode	Terminal <u>5</u>
8.2	Using a Videntified less than	OM, measure and record resistance between a d as being connected to the same pipe. Res 1 ohm.	all conductors that are sistance measured shall be
Ch 10-1-46	8.2.1	Record the following VOM data:	
	*	Manufacturer	Fluke
		Model	802413
		Serial Number	0005
	•	Calibration Sticker Data	3-28-97
ch 10-196	8.2.2	206 <sub>ECN-244</sub> FT Test Station T(31- <del>204</del> ) 5-6-86	
		4 inch SL-100-M9 w/6 inch ENC-M26a	ohms
		4 inch SN-200-M9 w/6 inch ENC-M26a	ohms
		4 inch 225# STM w/Lo" ENC (UNROTTCIED)	$\underline{.3}$ ohms
		ECN 326 ET 5-28-96	, <del>M</del> 20 ) E

1 10/1/91	8.2.3	207 Test Station T(31- <del>205)</del> ECN-244 EF 5-6-96	
FOR CL 10	-1-96	4 inch SL-100-M9 w/6 inch ENC-M26a	, 3ohms
		6 inch PSW - S505	.5 ohms
		6 inch PSW - S508	. <u>4</u> ohms
		3 inch PW-4513	, <u>5</u> ohms
1 10/7/96		Open the input circuit breaker on Rectifier 31.	
1 10/1/96		Connect the 6 coiled and taped anode lead cables, in Anodo Distribution box ADB(31-7), to spare terminals.	<b>e</b>
110/1/91		A(31-331) Anode Lead Cable	
10/2/11		A(31-332) Anode Lead Cable	
10/1/96	8.4.3	A(31-333) Anode Lead Cable	
1 4/1/46		A(31-334) Anode Lead Cable	
1 10/1/96		A(31-335) Anode Lead Cable	
1 6/1/44	8.4.6	A(31-336) Anode Lead Cable	
	NOTE:	Anode ground bed tests (voltage output tests of each anod be required by this ATP since the majority of anodes are and their voltage output would affect the output of the n which would result in erroneous voltage values for the ne	existing, ew anodes
8.5		wing steps will provide the native potential of each new p permanent reference electrode and a portable reference ele n.	
	NOTE:	Connect the pipe test conductor to the positive terminal Form Analyzer and the lead from the permanent or portable electrode to the common terminal of the Wave Form Analyze mode switch, on the Wave Form Analyzer, to the DC positio the portable reference electrode directly above the pipe tests that require the use of the portable reference electrode	reference r. Turn the n. (Place for those
1 10/1/91	8.5.1	206 Test Station T(31- <del>204)</del> ECN-244 <b>氏 5-6-96</b>	<u>Volts</u>
		Permanent Reference Electrode and 4-inch SL-100-M9 w/6" ENC-M26a	673
		Portable Reference Electrode and 4-inch SL-100-M9 w/6" ENC-M26a	673
		Permanent Reference Electrode and 4-inch SN-200-M9 w/6" ENC-M26a	-,672

	SN-200-M9 w/6" ENC-M2			6/2
1 10/1/46 8.5	.2 Test Station T(31- <del>205</del>	) 13cr-244 ES	5-6-96	
	Permanent Reference E SL-100-M9 w/6" ENC-M2			39/
	Portable Reference El SL-100-M9 w/6" ENC-M2			39/
8.6 The sys	following steps will verify tem: ECN 522	proper operation of	f the cathodic pro	tection /
8.6		fier control panel)	as follows: SW1,	2./and 3
8.6	.2 Close Rectifier 31 in been energized for 24	put circuit breaker hours prior to the	and verify the re following test.	ctifier has
8.6	Measure and record the protected pipe by use equal to or more nega ON values should be I these values are not electrode, a portable unprotected pipe ther for record purposes.	of the Waveform Ana tive than (-)0.85 V 00 mV more negative attainable by use of reference electrode	alyzer. Off value dc (ie. (-)0.86 V than the OFF valu f the permanent re e may be used. Fo	s should be dc) or the es. If ference r
NOT	E: Connect positive term electrode terminal an to the pipe test cond OFF position to the W position.  200. 3.1 Test Station T(31-204	d the common termina uctor terminal. Tu FA position, record	al on the Waveform rn the Mode switch	Analyzer from the
8.0	Reference Electrode a 4-inch SL-100-M9 w/6-inch ENC-M26a		On Off	
	Reference Electrode a 4-inch SN-200-M9 w/6-inch ENC-M26a	nd (	On Off	
	Reference Electrode a 4-inch 225# STM (Unpr		On Off	
				GNS 12/

8.6.3.2	7 Test Station T(31-205) 13cn-244	5-6-96	
,	Reference Electrode and 4-inch SL-100-M9 w/6-inch ENC-M26a	On	0ff
	Reference Electrode and 6-inch PSW-S508 (Unprotected)	On	Off
	Reference Electrode and 3-inch PW-4513 (Unprotected)	On	Off
	Reference Electrode and 6-inch PSW-S505 (Unprotected)	On	0ff
8.7	Testing complete, secure from test.		
/-	DELETS ECN 522 5-23-96		
	END OF TEST		

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EXCEPTION NO.	Project No.			ATP No.		Rev.		
Recorded by			Organization		Date Recorded	ATP P	ATP Page No.	
Step No. Requirement								
Description of Problem	<u> </u>			***************************************				
			12211111		<del> </del>			
			******					
Objector 1 (Name/Organization) Objector 2 (Name/Organization)								
Planned Action	<del></del> :				0			
	<del></del>			$\sqrt{1}$	1/2			
			. <	100				
Action Taken		^ (	11/1	111				
		$\neg \Box$	111	170				
		C/12	7/7	<u></u>				
			ECUTION	AND ACCEP	TANCE			
Retest Installation Contract	ctor	Qate /		Recorder	•	Date	•	
Witness 1 (Name/Organiza	tion)	Date		Witness 2 (Na	me/Organization)	Det	•	
Field Engineering		Date		Test Director (Name/Organization)				
Design Engineering (Autho	r of ATP)	Date		A-E Project Engineer				
	APPRO	AL AND AC	CEPTANC	E - OPERAT	ING CONTRACTOR			
Retest Approved an	nd Accepted		□ E	xception Accept	ted-as-is "		Other*	
* Explanation								
Approver 1		Date		Appropr 7		Dan		
Approver t	Uate		Approver 2					
Approver 3	Date		Approver 4		Dan			

GNS 12/5/96