

Attachment 2





ATTENDANCE ROSTER

COURSE NAME(s): 2012 Kettleman CPUC Review		COURSE CODE(s): CORROSION CONTROL OF GAS FACILITIES O-16		LOCATION NAME/ADDRESS: Kettleman Compressor Station		Date: 1/9/13	
INSTRUCTOR: Redacted		INSTRUCTOR'S PERNER #:		LAN ID: Redacted		Notes: Review Section B and CPA FOLLOW-UP ACTION PLAN	
						INSTRUCTOR SIGNATURE: Redacted	

Check for Non-PG&E	Legal First & Last Name (NO NICK NAMES)	Signature	Personnel # REQUIRED	LAN ID REQUIRED	PCC	Supervisor Name	Pass/Fail (If Applicable)
<input type="checkbox"/>	Redacted		72222	Redacted	10277	Redacted	<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<input type="checkbox"/>			243132		10277		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<input type="checkbox"/>			48092		10277		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<input type="checkbox"/>			48767		10277		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<input type="checkbox"/>			1239522		10277		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<input type="checkbox"/>			238036		10277		<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<input type="checkbox"/>	7.						<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<input type="checkbox"/>	8.						<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<input type="checkbox"/>	9.						<input type="checkbox"/> Pass <input type="checkbox"/> Fail
<input type="checkbox"/>	10.						<input type="checkbox"/> Pass <input type="checkbox"/> Fail

Notes: LEGIBILITY IS IMPORTANT TO ENSURE YOU RECEIVE CREDIT FOR ATTENDANCE. If you do not check pass or fail, we will assume the student passed.

Prepared by: JZB1

	CORROSION CONTROL OF GAS FACILITIES		O-16
	Asset Type: Gas Transmission and Distribution Issued by: Redacted	 Original Signed By	Function: Maintenance Date: 03-27-09
Rev. #14: This document replaces Revision #13. For a description of the changes, see Page 16.			

This document also appears in the following manuals:

- *Gas Applicant Design Manual*
- *Gas Distribution Maintenance Manual*

Purpose and Scope

This numbered document describes PG&E's corrosion control program for all gas facilities, including PG&E-owned gas gathering lines, gas transmission facilities, and gas distribution facilities.

Acronyms

AWG:	American wire gauge
ac:	alternating current
CFR:	<i>Code of Federal Regulations</i>
CP:	cathodic protection
CPA:	cathodic protection area
CPUC:	California Public Utilities Commission
dc:	direct current
ETS:	electrolysis test station
E&M:	Estimating and Mapping
GT&D:	Gas Transmission and Distribution
HMWPE:	high molecular weight polyethylene
HVac:	high voltage alternating current
IGIS:	Integrated Gas Information System
kV:	kilovolts
LPR:	linear polarization resistance
mA:	milliamperes
MMscf:	million standard cubic feet
MSDS:	Material Safety Data Sheet
mV:	millivolts
NACE:	National Association of Corrosion Engineers
OM&C:	Operations, Maintenance and Construction
PCM:	pipeline current mapper
PLM:	PipeLine Maintenance (computer scheduling and data program)
P/S:	pipe-to-soil
RSPA:	Research and Special Programs Administration
Vac:	volts alternating current
WRO:	work at the request of others (a budgeting term)

Definitions

IR Drop:	The voltage change that results from current flow through a resistance
%LEL:	The concentration of an explosive gas in air as a percentage of the lower explosive limit for the gas

Corrosion Control of Gas Facilities

- Installing impressed current shallow bed anodes (see Numbered Documents O-13 and O-13.4).
- Installing galvanic anodes (see Numbered Document O-13.1).

Any of the above mentioned actions, if taken, shall be documented in the respective CPA records.

- (3) If the CPA restoration work is (or is expected to be) over 30 days, the “CPA Follow-Up Action Plan” form (Attachment B) must be used and developed within 30 calendar days from the date the CPA is found below adequate levels of protection, as defined by the current 49 CFR 192, Subpart I. Please note that action plans shall also be established and maintained for short-term remedial actions that are in place for over 30 days. The action plan shall list and document the extenuating circumstance(s) to the extent known, the cause of the CPA problem (to the extent the cause is known), the desired solution(s), the actions needed to implement the solution, the estimated time to take those actions, and the employees who will perform those actions. The action plan shall be updated in intervals not exceeding 30 calendar days by an employee knowledgeable of the restoration work and reviewed by the operating supervisor, until the CPA restoration work is completed and the CPA shows adequate levels of protection. If the action plan exceeds 90 days, the action plan needs to be reviewed and approved by corrosion engineering personnel, the area superintendent, and the manager of technical services within 120 days. Updates to the action plan shall document the incremental work that has been completed to date, detailed status updates of needed actions that have not had any significant progress from previous updates, and the work that needs to be completed to achieve adequate protection. (Reference: WIN. DOT - DOT RSPA Interpretation Letter #16 for 49 CFR 192.465 – May 19, 1989.)
- (4) Attachment B is the “CPA Follow-Up Action Plan” form. When using this action plan, file it with the respective CPA P/S maintenance worksheet. Document routine circumstances using the back of the “Standard Cathodic Protection Maintenance Report,” Attachment D.

B. Cathodic Protection Restoration for Backbone Transmission and Gathering Lines

- (1) Schedule CPAs for restoration on backbone transmission and gathering lines when the areas show P/S on-potentials to be below adequate levels of protection. Check and record rectifier readings on the “Standard Cathodic Protection Maintenance Report,” Attachment D, or in PLM before restoring a CPA. Restore areas within 60 calendar days from the date they are found to be inadequately protected, as defined by the current version of 49 CFR 192, Subpart I (barring acceptable extenuating circumstances). Document the reason(s) for any delays in the restoration work. Once restored, an area shall have approximately the same P/S on-potentials and rectifier output as existed before the level dropped, unless re-evaluation of the system indicates that different values are more appropriate. After the CPA has been restored and re-polarized, record final P/S on-potential and rectifier measurements on the “Standard Cathodic Protection Maintenance Report,” Attachment D, or in PLM.
- (2) Extenuating circumstances may cause a CPA’s restoration to go beyond the 60-calendar-day timeframe. Examples of acceptable extenuating circumstances may include employee safety, public safety, population density, environmental concerns, climatic conditions, material availability, government permitting processes, and land acquisition requirements. The operating supervisor along with the operator qualified employee shall determine if CPA restoration work is being delayed by an acceptable extenuating circumstance.

Some suggested interim, or in some cases, permanent steps that can be taken to resolve or mitigate the down time or the extent of the down area are:

- Bonding the CPA to an adjacent CPA. When bonding to an adjacent CPA for temporary restoration, the “CPA Follow-Up Action Plan” form (Attachment B) must be used and maintained until the bond is removed and/or a permanent repair is made.
- Appropriately increasing rectifier output (see Item 4F on Page 8).
- Installing impressed current shallow bed anodes (see Numbered Documents O-13 and O-13.4).
- Installing galvanic anodes (see Numbered Document O-13.1).

Any of the above mentioned actions, if taken, shall be documented in the respective CPA records.

- (3) If the CPA restoration work is (or is expected to be) over 60 days, the “CPA Follow-Up Action Plan” form (Attachment B or equivalent) must be used and developed within 60 calendar days from the date the CPA is found below adequate levels of protection, as defined by the current 49 CFR 192, Subpart I. Please

Corrosion Control of Gas Facilities

note that action plans shall also be established and maintained for short-term remedial actions that are in place for over 60 days. The action plan shall list and document the extenuating circumstance(s), to the extent known, the cause of the CPA problem (to the extent the cause is known), the desired solution(s), the actions needed to implement the solution, the estimated time to take those actions, and the employees who will perform those actions. The action plan shall be updated in intervals not exceeding 60 calendar days by an employee knowledgeable of the restoration work and reviewed by the operating supervisor, until the CPA restoration work is completed and the CPA shows adequate levels of protection. If the action plan exceeds 120 days, the action plan needs to be reviewed and approved by corrosion engineering personnel, area superintendent, and manager of technical services within 150 days. Updates to the action plan shall document the incremental work that has been completed to date, detailed status updates of needed actions that have not had any significant progress from previous updates, and the work that needs to be completed to achieve adequate protection. (Reference: WIN. DOT – DOT RSPA Interpretation Letter #16 for 49 CFR 192.465 – May 19, 1989.)

(4) Attachment B is the “CPA Follow-Up Action Plan” form. When using this action plan, file it with the current file folder for the respective cathodic protection system. See Item 10B on Page 15.

7. Voltage (IR) Drop Considerations

The IR drop in the measurement circuit must be considered when interpreting the results of P/S on-potential measurements. Elements of the measuring circuit that may cause IR drop include the voltmeter, reference cell placement, reference cell contact resistance, test leads, coating resistance, and pipe and soil resistance.

- A. Voltmeters: Take all P/S on-potential measurements with an approved electronic voltmeter, having an input impedance equal to or greater than 10 megohms.
- B. Reference Cell Placement: Place the reference cell as close as possible over the pipe. At risers, place the reference cell approximately 6” to 12” from the riser and over the service.
- C. Reference Cell Contact Resistance: If sufficient moisture is not present, moisten the ground at a location where the P/S on-potential measurement is being taken.
- D. Test Leads: Since only approved voltmeters are used for making P/S on-potential measurements, IR drop in the test leads is insignificant.
- E. CP Current Flow: Current flow on a pipeline from cathodic protection can cause an IR drop in the pipe and in the soil. When conducting close-interval surveys, refer the data to corrosion engineering personnel to determine if and how the IR drop in the pipe should be considered.
- F. Soil: Evaluate the IR drop in the soil using the following considerations:
 - (1) The 850 mV criterion for cathodic protection was developed with an allowance of at least 50 mV for IR drop and other measurement errors.
 - (2) The IR drop from a galvanic anode system is usually insignificant due to the small amount of current flow. Typically, the reference cell is placed over the pipe and away from the galvanic anode.

8. Inspection and Leak Repair

Inspect a pipeline for evidence of external corrosion and take remedial action, as appropriate, any time it is exposed.

- A. Make a written report of each inspection as outlined in Utility Standard S4110. Use Form 62-4060, “Leak Survey, Repair, Inspection, and Gas Quarterly Incident Report,” for all distribution and transmission pipeline facilities and services. Do not mark “Corrosion” as the cause of leakage unless it is observed. If in doubt, contact corrosion engineering personnel.
- B. Repair, replace, or recoat corrosion-damaged pipe according to the applicable numbered documents and utility standards.
- C. Do not install anodes at leak repairs in cathodically protected areas unless they are part of a cathodic protection improvement plan or approved by corrosion engineering personnel. If anodes are installed they are to be installed per Numbered Document O-13.1.
- D. Where an external corrosion leak occurs on a buried gas transmission line, a corrosion mechanic (or operator qualified person) must take a P/S on-potential measurement and a soil resistivity measurement at the leak repair site. In order to minimize the IR drop, this measurement must be taken in the ditch adjacent to the pipe surface. If it is safe and practical, immediately take the P/S on-potential reading at the corroded site as the



CPA FOLLOW-UP ACTION PLAN

(Form must be completed in Non-erasable Ink)

GT&D
01/09
FO-16-B

CPA AREA _____ CPA LOCATION _____

Corrosion Mechanic _____ Office _____ Date _____ Page # _____

OBJECTIVE: This follow-up action plan facilitates completing actions needed to restore a CPA to adequate levels of cathodic protection and to meet the requirements for documenting extenuating circumstances as required in Gas Standard O-16, Section 3, Item A. The action plan shall be updated in intervals not exceeding 30 calendar days by an employee knowledgeable of the restoration work, until the CPA restoration work is completed and the CPA shows adequate levels of protection. If the action plan exceeds 90 days, the action plan needs to be reviewed and approved by corrosion engineering personnel, the area superintendent, and the manager of technical services within 120 days. Updates to the action plan shall document the incremental work that has been completed to date, detailed status updates of needed actions that have not had any significant progress from previous updates, and the work that needs to be completed to achieve adequate protection.

Date CPA Was Found Below Adequate Levels of Cathodic Protection: _____ Date of Action Plan: _____

Suspected Cause of CPA Problem: _____

Short-term Remedial Action / Long-term Corrective Action _____

	Action Plan Review Date	Recommended Action / Status Update (include extenuating circumstances)	Estimated Completion Date	Corrosion Mechanic		Supervisor	
				Initials	LAN ID	Initials	LAN ID
1							
2							
3							
4							

Date CPA Area Restored _____

Action Plan Prepared by _____ Lan ID _____ Date _____

Supervisor Final Reviewed _____ Lan ID _____ Date _____

ED M&C Superintendent Review _____ Lan ID _____ Date _____

CETS Manager Review _____ Lan ID _____ Date _____



CPA FOLLOW-UP ACTION PLAN

(Form must be completed in Non-erasable Ink)

GT&D
01/09
FO-16-B

CPA AREA _____ CPA LOCATION _____
 Corrosion Mechanic _____ Office _____ Date _____ Page # _____

#	Action Plan Review Date	Recommended Action / Status Update (include extenuating circumstances)	Estimated Completion Date	Corrosion Mechanics		Supervisor	
				Initials	LAN ID	Initials	LAN ID
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							