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Comments

Pacific Gas and Electric Company
Gas Supply

GS Recommended Practice

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SUBJECT:
GUIDE FOR THE PREPARATION OF OPERATION AND MAINTENANCE INSTRUCTIONS FOR MAJOR GAS FACILITIES

SCOPE

This document provides a guide for the preparation of an Operation and Maintenance Instruction (O&MI) as required by GS Standard S-4431, "Operation and Maintenance Instruction Requirements".

The procedure outlined in this document is intended for preparing an O&MI of a relatively simple station. The content of this Recommended Practice shall be a minimum content. For complex stations, or stations with unique equipment, a more detailed O&MI may be required.

REQUIREMENTS

The manual shall be structured to contain only essential information. By keeping the manual condensed, the usability will be greatly enhanced and the updating will be simplified. The O&MI manuals are required to be reviewed and updated on an annual basis.

Although the O&MI should not contain station drawings and manufacturer's literature (foreign prints), the manual should contain a listing of all drawings and foreign prints associated with the station. Drawings and foreign prints are normally available either at the facility or at the appropriate maintenance office. The drawing and foreign print list can easily be generated by using the DocuTrak program. This list will help inventory station drawings and assist the field in requesting station drawings from the Records Section of GSTS.

The O&MI shall contain an enhanced Operating Diagram which shows the maximum allowable operating pressure (MAOP) limits within the station, as well as, identifies any valves that are required to be closed based on code requirements. This enhanced Operating Diagram will provide a valuable tool for personnel to operate the station safely. The enhanced Operating Diagram will eliminate much of the uncertainty when gas routing changes are made within the station.

For example and minimum content of Operation and Maintenance Instruction see attached Supplement A.

ORIGINATOR

GS Standard Technical Committee 21 on Station Equipment

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RESPONSIBILITY OF O&MI

The Facility or Pipeline Engineer assigned the engineering responsibility for the facility and the Foreman responsible for the maintenance and operations of the station shall approve the O&MI. The Title Sheet should be initialed by the appropriate Engineer and Foreman.

SUPPLEMENT

Supplement A - Operation and Maintenance Instruction Preparation Guide

REFERENCES

CES Standard C-T&CS-S0351, "District Regulator Station Maintenance"

Gas Standards & Specifications F-11, "Valve Lubrication and Maintenance Requirements"

Gas Standards & Specifications H-14, "Typical District Regulator Sets"

Accident Prevention Rules Book

History File Requirements (HFR) Manual

GS Standard S-4431, "Operation & Maintenance Instruction Requirements"

General Order 112-E, "Rules Governing Design, Construction, Testing, Maintenance and Operation of Utility Gas Gathering, Transmission and Distribution Piping"

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OPERATION AND MAINTENANCE INSTRUCTIONS

PREPARATION GUIDE

Station Name

(Station name should be consistent with the name used on the Operating Diagram)

Operating and Maintenance Instructions

Appvd	By

Rev	Date	Description	GM	Dwn	Chkd	Supv	Appvd

GM	
Supv	
Dsgn	
Dwn	
Chkd	
OK	
Date	Scale

OPERATING AND MAINTENANCE INSTRUCTIONS

STATION NAME

PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

B/M	
Dwg List	
Supsds	
Supsd By	
Sheet No 1 of Sheets	
DRAWING NUMBER	REV
080000	1
Microfilm	

TABLE OF CONTENTS

1.0 GENERAL

- *Give a brief description of the primary purpose of the station. (Does it regulate, meter, blend, dehydrate, or odorize gas?)*

- *Identify the lines into and out of the station by giving their direction, population centers served and neighboring stations. (i.e. L-108 S to Stockton, L-196 A & B from Isleton Town Regulator Station)*

- *Describe the station location by identifying the closest cross streets, name of the road it can be accessed from, and the county in which its located.*

2.0 STATION DATA

2.1 MOP, MAOP, FDP

List all lines into and out of the station and give their Maximum Operating Pressure (MOP), Maximum Allowable Operating Pressure (MAOP), and Future Design Pressure (FDP). Listed below is an example.

Line Designation	MOP (psig)	MAOP (psig)	FDP (psig)
42-inch L401	975	975	975
36-inch L400	975	975	975
32-inch L210 W	650	675	675
16-inch L210 W	650	650	720
10-inch L210 E	650	650	800
16-inch L210 E	800	800	800
16-inch L403	800	800	800

The MAOP 's of the Station Piping are delineated on Operating Diagram 182416.

This information can be found in Standard Practice 463.8 entitled MAOP of Lines Operating At or Over 20% SMYS. The MAOP's can be verified by checking the Pipeline Survey Sheets located at the GSM office in Walnut Creek or at the GSTS office in the General Office.

Distribution Feeder Mains (DFM's) leaving a station should also be listed. The MOP, MAOP and FDP for DFM's can be confirmed with the Division.

Note that future revisions of the Operating Diagrams will contain MAOP information for the station piping. So it is only necessary to reference that drawing.

3.0 STATION OPERATION (Refer to Operating Diagram _____)

Describe, in general terms, the design criteria for the station. Is it automated to allow all functions to be performed unmanned? Describe how and where station data is transmitted. Then give a description of the normal and abnormal operating modes, and a discussion of the station operations.

This information can be obtained by interviewing the appropriate Operating Supervisor in CES (or Foreman in GS), or the responsible GSM Engineer for the station. It is also very worthwhile to make a site visit to the station. Site visits should be arranged by contacting the station Operating Supervisor to arrange a time and meeting location. The GSM Engineer should also be informed.

A check list of items to ask the field personnel during the site visit is attached to this template. (See Attachment 1.) This check list covers several items that are relevant to other parts of this template for creating complete Operation and Maintenance Instructions.

Below is an example describing a station's design criteria for the various functions performed at the station..

Zaneville Station is designed to be fully automated to allow the mixing, regulation and measurement of gas. A Remote Terminal Unit (RTU) transmits station data to the Blackwood Terminal. A description of the normal operating modes, abnormal operating modes, and station operations follows:

3.1 Normal Operating Mode

Describe the flow of gas during normal operation for each line entering and leaving the station. Normal operation is the way gas flows most of the time through the station. For complex stations, breakdown the gas flow by direction (i.e., "Flowing West to Napa 'Y'" or "L108 S to Stockton").

Below is an example of a typical "Normal Operating Mode" discussion:

Normal operation measures the flow and regulates the pressure of 16-inch L403 gas through meter M-2 and valve V-8. This gas is then mixed with L400 gas which is measured and regulated through M-1 and V-7. The setpoints of the two flow controllers are adjusted to provide an adequate heating value of the mixed gas. However, V-7 and V-8 also respond to downstream pressure controllers. Should the pressure in Lines 210 W exceed 650 psig, the pressure control will override the flow controls and start throttling the valves.

The station also provides backpressure control of 16-inch L210 E to 32-inch L210 W through V-17. V-17 also provides forward pressure control to 32-inch L210 W.

L401 gas can be combined with L400 gas by opening crossover valves V-19, V-20, V21 and V-22. Monitor valve V-14 and V-16 provide overpressure protection for Lines 210 W.

Valves that are closed during this mode are shown shaded on the operating diagram.

3.2 Setpoints

Include in this section the following statement:

For a list of setpoints for all the regulators, monitors and relief valves in this station refer to Drawing 183018.

This drawing is a master list of all setpoints for Gas Supply stations. Review the station setpoint on the list for accuracy. The list is currently being updated by GSM.

3.3 Abnormal Operating Mode

Describe here any operation that deviates from the "Normal Operating Mode". Please note that an abnormal operating mode is a planned, deliberate condition. It is not an emergency condition. Back-up supply sources from different pipeline taps, alternate methods to deliver gas to a pipeline leaving the station, and reversing flow to maintain supply pressure to a pipeline are all examples of an Abnormal Operating Mode. Also, give a general statement such as the following:

Operators that encounter an unusual or abnormal condition at the station will ascertain the situation and call for assistance if necessary.

3.4 Remote Operations

3.4.1 Supervisory Control

Indicate which control variables, if any, can be remotely controlled from the (Gas) Terminal or Load Center. Give the variable, such as flow or pressure, and the valve number that will be controlled.

This information can be obtained by getting a printout of the SCADA screen and a listing of the analog inputs, discrete inputs and control outputs from Gas Control in General Office or GSM in Walnut Creek.

An example of what to include in this section is given below.

Blackwood Gas Terminal is able to remotely control the flowrate by setting flow controllers on V-7 and V-9. In addition, pressure can be remotely controlled by setting pressure controllers on V-7, V-8, V-9 and V-17. The backpressure and forward pressure control setpoints of V-8 and V-17 are both remotely controlled.

3.4.2 Data Acquisition

List the major data acquisition parameters such as pressures, flows and valve position information that are transmitted to the (Gas) Terminal or Load Center.

This information can also be extracted from the printout of the SCADA screen and a listing of the analog inputs, discrete inputs and control outputs available from Gas Control in General Office or GSM in Walnut Creek.

An example of what to include in this section is given below.

- Station inlet and outlet pressures on all lines
- Flow rate in L403, L210 E and L210 W
- Valve positions for V-7, V-8, V-9 and V-17

3.5 Emergency Operating Procedures

The California Public Utilities Commission (CPUC) General Order 112E and Title 49 of the Code of Federal Regulations (49 CFR), Section 192.615 requires each operator to establish written procedures to minimize the hazard resulting from a gas pipeline emergency. The Emergency Plan Manual has been developed for this purpose for each area of the pipeline system and is referenced in this section. In addition, some stations may have an Emergency Operating Manual that gives additional emergency procedures. Verify the location of these manuals with the station Operating Supervisor and give the location in this section.

Given below is an example of what should be included in this section.

Emergency operating procedures in accordance with California Public Utilities Commission (CPUC) General Order 112E and Title 49 of the Code of Federal Regulations (49 CFR), Section 192.615 are outlined in detail in the Emergency Plan Manual. The Emergency Plan Manual is located at the River View Service Center. Additional emergency procedures are included in the Emergency Operating Manual. Copies of the Emergency Operating Manual are located at the River View Service

Center. Station operators must ascertain an abnormal or safety related condition and call for assistance if required.

Consideration should be given to the following during a station emergency:

- Do not shut down station remotely.
- Manual block valves should be used to isolate the station. Do not isolate the station by using only the control valves because leakage can occur through the valve seats even in the closed position.
- Do not blowdown in the reverse flow direction through control valves. Doing so may damage the valves.
- Do not blowdown in the reverse flow direction through meters, especially insertion and in-line turbine meters. Doing so may damage the meters.
- After the station has been blowndown, check equipment, especially filters and strainers, for any liquids that may have become dislodged during the blowdown.

3.6 Local Station Operation

3.6.1 Clearance Procedure

Verify which (Gas) Terminal or Load Center has the responsibility for granting clearance for maintenance or tasks that require a change in the mode of operation.

Suggested language is given below.

Any maintenance or tasks that require a change in the mode of operation for Zaneville Station shall comply with Gas System Maintenance (GSM) Clearance Manual. Prior approval of the subject work must be obtained from Blackwood (Gas) Terminal. No clearance is required for general maintenance that does not affect the normal operation of the station.

3.6.2 Logbook

The date and nature of all work performed at a station must be entered in the Operator's Daily Logbook. Verify the location of the Logbook.

Suggested language is given below.

The date and nature of all work performed at Zaneville Station must be entered in the Operator's Daily Logbook located at the River View Service Center.

4.0 MAJOR COMPONENTS

A simplified description of all components shown on the Operating Diagram, the Tag Numbers and the Manufacturers is given in this section. The descriptions are obtained from the Bill of Materials and the Main Gas Piping Drawings.

The Station Drawing List gives the drawing numbers to obtain the appropriate drawings from the drawing files. The Station Drawing List can be obtained by using the DocuTrack program which is maintained by the Records Section of Gas System Technical Services Department.

In addition, field verification of major components should be done during the site visits. It is important to document in the field whether regulators, monitors or relief valves, valve operators, etc., are the same as what the Bill of Materials describes. These items change frequently and, therefore, the Bill of Materials and Piping Drawings may not be up to date.

Given below is an example of what should be included in the Major Component List.

Description	Component Tag Number
4.1 Regulators	
Plug Valve, 16", Rockwell #4749 1/2, ANSI 600, with Limitorque Electric Actuator	V-7
Control Valve, 6", Fisher 657-AC, ANSI 600	V-8
4.2 Monitors	
Plug Valve, 16", Rockwell #4749 1/2, ANSI 600, with Rotork Piston Actuator	V-14
Plug Valve, 12", Walworth #1647, ANSI 400, with Bettis Actuator	V-16

4.3 Mainline Valves	
Ball Valve, 42", Grove #B-5, ANSI 600, with hydraulic actuator	V-281.59
Gate Valve, 36", Grove G-4, Fig. 10836, ANSI 400	V-281. 58
4.4 Isolation and Bypass Valves	
Plug Valve, 16", Rockwell Nordstrom #4749 1/2, ANSI Class 600	V-3
Plug Valve, 16", Walworth #1647, ANSI 400	V-13, V-1.37
Plug Valve, 8", Rockwell Nordstrom #4749 1/2, ANSI 600	V-4, V10
4.5 Blowoff Valves	
Ball Valve, 20", Grove #B-5, ANSI 600	Valve J
Plug Valve, 16", Rockwell Nordstrom #4749 1/2, ANSI 600	Valves A & B
4.6 Tap & Crossover Valves for L400/401	
Ball Valve, 24", Grove #B-5, ANSI 600	V-19, V20, V21 & V-22
Plug Valve, 16", Rockwell Nordstrom #4749 1/2, ANSI 600	V-1
Plug Valve, 12", Rockwell Nordstrom #4749 1/2, ANSI 600	V-2
4.7 Orifice Meters	
Orifice Meter Tubes, 16", with Daniel "Senior" Fitting, Max. G.W.P. 1000 psi	M-1
Orifice Meter Tubes, 10", with Daniel "Senior" Fitting, Max. G.W.P. 1200 psi	M-2
4.8 Strainer	
Basket Strainer, Vertical, 8", Aitken Model #840-12ECO, with Modco Vertical Hinged Closure, ANSI 400	S

5.0 EXHIBITS ATTACHED

List all the Exhibits that are attached to the station Operating and Maintenance Instructions. As a minimum, the following items are to be included.

Latest version of the documents listed below are available at the following address:

Department
Street
City, State, Zip
Telephone
Fax

5.1 Station Drawing Index

5.2 Location Map - Drawing No. _____

5.3 Operating Map - Drawing No. _____, Sht. _ of _

5.4 Operating Diagram - Drawing No. _____

5.5 Elementary Block Diagram - Drawing No. _____

5.6 Elementary Requirements - Drawing No. _____

5.7 Station Maintenance Schedule

6.0 REFERENCES

List all references that were given in the body of the Operating and Maintenance Instructions. As a minimum, include the following items.

- Piping Symbols - Drawing No. 182358
- Overpressure Protection Device Settings - Drawing No. 183018
- MAOP Of Lines Operating At Or Over 20% SMYS - Standard Practice 463.8
- Lubrication and Maintenance Requirements of Valves - Gas Std. F - 11
- District Regulator Station Maintenance - CES Standard C-T&CS-S3051

STATION MAINTENANCE SCHEDULE (Exhibit 5.7)

Verify that the station maintenance is performed per the Gas Facility Maintenance Schedule (FM) or the Pipeline Maintenance Schedule (PLM). The FM is used by Divisions for stations they maintain and the PLM is used by Gas System Maintenance for stations they maintain. If possible, obtain a copy of the FM, PLM or other maintenance records from the Operating Supervisor or Gas Mechanic during the site visit. List any major maintenance items that are not included on the FM or PLM in this section.

The following is an example of what to include in this section.

All station maintenance should be done per the Gas Facility Maintenance Schedule (FM) for Zaneville Station.

Inspection, testing, and maintenance of Zaneville Station shall be performed in accordance with CES Standard C-T&S-S3051, District Regulator Station Maintenance. All valves should be serviced and lubricated per Gas Standard F-11.

During the annual station maintenance the following items should be included:

- Calibrate all control loops including controllers (zero and tracking), transducers, valve positioners, switches and relays
- Clean, inspect and calibrate all RTU's
- Clean and inspect 8" basket strainer
- Recharge fire extinguisher
- Inspect orifice plates and meter tubes per Standard Practices 457-2 through 457-6
- Check filters, dehydrator desiccant and relief valves on gas supply racks

A discharge cycle should be performed on the UPS system and the HVAC filter should be replaced every three months. Check the oil level, starting batteries and gas pressure regulator of the emergency generator every month. A power failure should be simulated once a month and the generator should be run for one hour.

Inspection and calibration of all equipment must be documented on the appropriate forms. Station Maintenance Record (Form no. 11-171), ~~Relief Device Capacity~~ Review (75-492), Valve Maintenance Records (75-299), Vault Inspection Record (75-300), Calibration Form (75-324), and Orifice Meter Record of Periodic Inspection (62-3949) shall be completed when applicable maintenance is performed.

O&MI Preparation Check List

					Remarks
Station Name					
Station Address/Cross Street					
Station Location Map					
Operating/Maintenance Dept					
GSM Engineer/Phone					
Operating Supv/Phone					
Service Center Address					
Service Center Location Map					
Dwg Index/Station Name Shown					Review drawing title for consistency
Elementary Requirements					
Elementary Diagrams					
Operating Diagram					
Correct Version					
Inlet/Outlet Pressures					
Pressure Boundaries					
Closed Valves					
Fld piping consis't w/Op. Diag.					
Existing Operating Instructions					
Emergency Plan Manual Location					
Emergency Op. Manual Location					
Describe Normal Operations					
Describe Abnormal Operations					
Impacted Population Centers					
Line Nos.and DFM's					
Operating Maps					
Verify MAOP On Pipeline Survey					
Verify SP 463.8					Indicate if line is not listed in S.P.
MAOP					
MOP					
DP					
FDP					
Construction Drawings					
Main Gas / Bill of Materials					
Control Piping					
Setpoints (For Sta. Operation)					
Equip. Tag Numbers Checked					
Printout SCADA CRT Screen					
List of Inputs & Control Outputs					
Resp'ble Ld. Ctr. or Gas Term.					
Operator's Daily Log Location					
Comments: Mech/Supv					
Comments: GSM Engr					
Station Maintenance Schedule					
Facility (FM) or Pipeline (PLM) Maint.					
Field Trip Date					
Contact					
Items to bring					
Camera					
Files					
Maps					