



## GS Recommended Practice

Page No.: 1 of 2

Issuing Department: GAS SYSTEM TECHNICAL SUPPORT

Effective Date: 6/1/97

Gas Supply Manager: GAS SYSTEM TECHNICAL SUPPORT

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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 O&MI shall be structured to contain only essential information. By keeping the O&MI condensed, the usability will be greatly enhanced and updating will be simplified. These instructions 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 document 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 required within the station.

For example and minimum content of O&MIs, see attached Supplement A.

### ORIGINATOR

GS Standard Technical Committee 21 on Station Equipment



# GS Recommended Practice

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

## RESPONSIBILITY OF O&MI

The Foreman/Operating Supervisor responsible for the maintenance and operations of the station shall approve new or revised O&MI. The Title Sheet should be initialed by the appropriate Foreman/Operating Supervisor.

## SUPPLEMENT

Supplement A - "Operation and Maintenance Instruction Preparation Guide"

## REFERENCES


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"

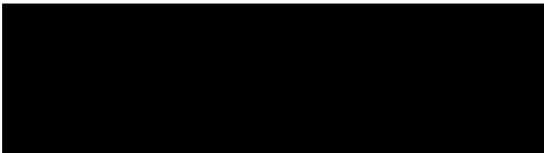
## CONTACT FOR FURTHER INFORMATION

 Senior Gas Engineer  
Gas System Technical Support  
Outside  Co. 8-223-3279 

## APPROVALS AND AUTHORIZATIONS



Manager - Gas System Technical Support



Manager - Gas System Maintenance

*OPERATION AND MAINTENANCE INSTRUCTIONS  
 PREPARATION GUIDE*

**Station Name**

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

**Operating and Maintenance Instructions**

<b>Appvd By</b>									
		Rev	Date	Description	GM	Dwn	Chkd	Supv	Appvd
GM				<b>OPERATING AND MAINTENANCE INSTRUCTIONS</b>  <b>STATION NAME</b>  PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA					
Supv					B/M				
Dsgn					Dwg List				
Dwn					Supds				
Chkd					Supsd By				
OK					Sheet No 1 of      Sheets				
Date	Scale				DRAWING NUMBER		REV		
					<b>080000</b>		<b>1</b>		
					Microfilm				

**TABLE OF CONTENTS**

**1.0 GENERAL ..... 1**

**2.0 STATION DATA ..... 1**

2.1 MOP, MAOP, FDP ..... 1

**3.0 STATION OPERATION (REFER TO OPERATING DIAGRAM \_\_\_\_\_)..... 2**

3.1 NORMAL OPERATING MODE..... 2

3.2 SETPOINTS..... 3

3.3 ABNORMAL OPERATING MODE ..... 3

3.4 REMOTE OPERATIONS ..... 3

    3.4.1 *Supervisory Control*..... 3

    3.4.2 *Data Acquisition*..... 4

3.5 EMERGENCY OPERATING PROCEDURES ..... 5

3.6 LOCAL STATION OPERATION ..... 5

    3.6.1 *Clearance Procedure* ..... 5

    3.6.2 *Logbook*..... 6

**4.0 MAJOR COMPONENTS..... 7**

4.1 REGULATORS..... 7

4.2 MONITORS..... 7

4.3 MAINLINE VALVES ..... 8

4.4 ISOLATION AND BYPASS VALVES ..... 8

4.5 BLOWOFF VALVES ..... 8

4.6 TAP & CROSSOVER VALVES FOR L400/401 ..... 8

4.7 ORIFICE METERS..... 8

4.8 STRAINER..... 8

**5.0 EXHIBITS ATTACHED ..... 9**

5.1 STATION DRAWING INDEX ..... 9

5.2 LOCATION MAP - DRAWING NO. \_\_\_\_\_ ..... 9

5.3 OPERATING MAP - DRAWING NO. \_\_\_\_\_, SHT. \_ OF \_ ..... 9

5.4 OPERATING DIAGRAM - DRAWING NO. \_\_\_\_\_ ..... 9

5.5 ELEMENTARY BLOCK DIAGRAM - DRAWING NO. \_\_\_\_\_ ..... 9

5.6 ELEMENTARY REQUIREMENTS - DRAWING NO. \_\_\_\_\_ ..... 9

5.7 STATION MAINTENANCE SCHEDULE ..... 9

**6.0 REFERENCES..... 9**

**1.0 GENERAL**

- Give a brief description of the primary purpose of the station. (Does it regulate, meter, blend, dehydrate, and/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-108S to Stockton, L-196A & 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 or city in which it is 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 L-401	975	975	975
36-inch L-400	975	975	975
32-inch L-210W	650	675	675
16-inch L-210W	650	650	720
10-inch L-210E	650	650	800
16-inch L-210E	800	800	800
16-inch L-403	800	800	800

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

This information can be found in Interim Standard IS 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 necessary to make a site visit to the station. Site visits should be arranged by contacting the station Operating Supervisor or Foreman 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 "L-108S 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 L-403 gas through meter M-2 and valve V-8. This gas is then mixed with L-400 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 210W 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 L-210E to 32-inch L-210W through valve V-17. Valve V-17 also provides forward pressure control to 32-inch L-210W.

L-401 gas can be combined with L-400 gas by opening crossover valves V-19, V-20, V21 and V-22. Monitor valves V-14 and V-16 provide overpressure protection for L-210W.

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 information regarding regulator setpoints refer to the latest Local Transmission System Operating Guide. For a list of setpoints for all monitors and relief valves in this station refer to Drawing 183018.

*GSO publishes Local Transmission System Operating Guide. Review the latest Operating Guide to ensure that the pressure requirements for the outgoing lines are listed. Drawing 183018 is a master list of all monitor and relief 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 Terminal is able to remotely control the following operations:

a) Flowrates

- M-1 (from L-400 to L-210W) flow rates
- M-3 (from L-400 to 10-inch L-210E) flow rates

b) Pressure Setpoints

- V-7 (forward pressure control)
- V-8 (forward and back pressure control)
- V-9 (forward pressure control)
- V-17 (forward and back pressure control)

### 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.*

Line Pressures:

- 32 & 16-inch L-210 (towards Napa "Y")
- 16-inch L-210 (from Rio Vista "Y")
- 10-inch L-210 (from Rio Vista "Y")
- 36-inch L-400
- 42-inch L-401
- 16-inch L-403

Flow rates:

- M-1 (from L-400 to L-210W)
- M-2 (from L-403 to L-210W)
- M-3 (from L-400 to 10-inch L-210E)

Valve positions:

- Valve V-7



- Valve V-8
- Valve V-9
- Valve 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 blow down in the reverse flow direction through control valves. Doing so may damage the valves.
- Do not blow down 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 blown down, 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 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 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 Limatorque Electric Actuator  Control Valve, 6", Fisher 657-AC, ANSI 600	V-7  V-8
4.2 Monitors  Plug Valve, 16", Rockwell #4749 1/2, ANSI 600, with Rotork Piston Actuator  Plug Valve, 12", Walworth #1647, ANSI 400, with Bettis Actuator	V-14  V-16

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

## 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. Elementary Block Diagram and Elementary Requirements, if they are available, may be included as an exhibit if they provide additional useful and current information.*

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 - Interim Standard IS 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 a Maintenance Management System. Currently, the Gas Facility Maintenance Schedule (FM) program is used by Divisions for stations they maintain and the Pipeline Maintenance Schedule (PLM) program 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.*

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 Interim Standard IS 457-2 through 457-6
- Check filters, dehydrator desiccant, and relief and regulator valve settings 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.

All station maintenance should be scheduled using the Pipeline Maintenance Schedule (PLM) for Zaneville Station.

<b>O&amp;MI Preparation Check List</b>					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 consist 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					