

Objective	The purpose of this Standard is to establish the requirements for preparing and updating Operation and Maintenance Instructions (O&MI) necessary for performing the inspection, operation, and maintenance of CGT major gas facilities.
Scope	This Standard applies to the O&MI requirements of CGT major gas facilities. This Standard does not apply to other CGT gas facilities or DCS facilities.
Applies To	GSM&TS maintenance and operations employees, and DCS employees delegated to maintain CGT major gas facilities under the MOU agreement.
Rescission	This Standard supersedes the GS Standard S4431, "Operation and Maintenance Instructions Requirements for Major Gas Facilities", Revision 1, dated June 1, 1997 and GS Recommended Practice RP 4431.1, "Guide for the Preparation of Operation and Maintenance Instructions for Major Gas Facilities", Revision 1, dated June 1, 1997.
Related Standard	CGT Standard 4430, "CGT Gas Facilities Requirements". CGT Standard 4432, "Station Inspection, Testing, and Maintenance Procedures"
Originator	Technical Committee 21, Station Equipment.
Business Risk	Improper inspection, operation, and maintenance of any CGT major gas facility could jeopardize the safe and efficient operation of that facility or result in non-compliance with Federal or State regulations. Non-compliance with applicable Federal and State regulations may subject PG&E to fines and negative publicity. Furthermore, major gas facilities without O&MIs may be taken out of service until the O&MIs are issued.
Responsibility for Implementation	GSM&TS Area Superintendent

Subject: OPERATION AND MAINTENANCE INSTRUCTIONS
REQUIREMENTS FOR MAJOR GAS FACILITIES

Effective Date: 01 Oct 1999
Review Date: 01 Oct 2001

Contact for Further Information

██████████ Senior Gas Engineer
System Integrity, Gas System Maintenance & Technical Support
Outside ██████████ Co. ██████████

Exhibits or Appendices

- Exhibit 1 - Review/Change Log
- Exhibit 2A - O&MI Process Flowchart for New or Major Facility Changes
- Exhibit 2B - O&MI Process Flowchart for Minor Facility Changes
- Exhibit 3 - Operation and Maintenance Instruction Preparation Guide

References

- CES Standard C-T&CS-S0351, "District Regulator Station Maintenance"
- CPUC General Order 112-E, "Rules Governing Design, Construction, Testing, Maintenance and Operation of Utility Gas Gathering, Transmission and Distribution Piping"

Deviations

Approval to deviate from the requirements of this Standard must be obtained in writing from the Director, Station Engineering, or Director, System Integrity, GSM&TS.

Approvals and Authorizations

Kirk Johnson **10/14/99**

Kirk Johnson Date
Manager, Gas System Maintenance & Technical Support

Definition

Major Gas Facilities: Facilities that modulate gas pressure and flow, or process the gas, within the gas transmission system. These facilities may be unmanned, manned part or full-time, or remotely operated. Facilities shall include:

- System control points, such as Terminals and Gas Load Centers.
- Compressor stations.
- Pipeline pressure limiting stations.
- Gas processing facilities.
- Line rupture control valves (LRCVs).
- Gas metering and regulating facilities serving electric generating plants.
- Underground gas storage field facilities.

Other facilities handling large volumes of gas and containing one or more of the following equipment: controller-operated equipment, 10-inch or larger control valves, or ultrasonic metering.

Requirements**General**

As required by CPUC General Order 112 (latest version), Operation & Maintenance Instruction (O&MI) containing or referencing other existing written procedures for conducting operation and maintenance activities, and for emergency response to all pipeline facility incidents, shall be prepared and followed.

All major gas facilities and any renovations within these facilities shall have an O&MI issued **prior** to the facility or any upgrades being placed in operation.

Note: For stations not considered major gas facilities, inspections and maintenance shall comply with CGT Standard S-4432, "Station Inspection, Testing, and Maintenance Procedures."

Each O&MI shall be reviewed and updated at intervals not exceeding 15 months, but at least once each calendar year, or whenever a major station modification is to be placed in operation.

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REQUIREMENTS FOR MAJOR GAS FACILITIES**Effective Date: 01 Oct 1999
Review Date: 01 Oct 2001**O&MI Content**

Copies of the O&MIs shall be readily available to any person responsible for inspecting, maintaining, and operating any major control facilities. One copy of the O&MI shall be kept at the major gas facility.

Copies of the O&MIs shall be stored in the GSM&TS Records Section file room in Walnut Creek.

The O&MI shall be structured to contain only essential information about the gas facility. For an example of the format and minimum content requirements, see attached Exhibit 3. By keeping the O&MI condensed, the usability will be greatly enhanced and updating will be simplified.

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 GSM&TS DocuTrak program. (If requested, Records Section of GSM&TS can prepare listing.) This list will help inventory station drawings and assist the field in requesting station drawings from the Records Section.

The O&MI shall contain an Operating Diagram which shows the maximum allowable operating pressure (MAOP) limits within the station and identifies any valves that are required to be closed based on code requirements. This Operating Diagram provides a valuable tool for personnel to operate the station safely. The Operating Diagram eliminates much of the uncertainty of overpressuring the station piping when gas routing changes are required within the station.

The O&MI shall be assigned a CGT drawing number. The drawing number must be obtained from GSM&TS Records Section in Walnut Creek.

Responsibilities**Preparation**

The person assigned the overall project responsibility for installing or modifying a major gas facility is responsible for preparing or revising the O&MI for the facility.

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REQUIREMENTS FOR MAJOR GAS FACILITIES**Effective Date: 01 Oct 1999
Review Date: 01 Oct 2001

Approval	The District Superintendent or DCS Operating Supervisor responsible for the maintenance and operations of the station shall approve new or revised O&MIs. The District Superintendent or DCS Operating Supervisor may delegate the responsibility of approving O&MIs with only minor revisions to the responsible Facility/Pipeline Engineer.
Annual Review	The District Superintendent or DCS Operating Supervisor responsible for the maintenance and operation of a major gas facility is responsible for the annual review and, if necessary, updating of that facility's O&MI. The District Superintendent / DCS Operating Supervisor is responsible for filling out and initialing the Review/Change Log of the facility O&MI when the annual review of the document is complete. See Exhibit 1 for the Review/Change Log form. The Review/Change Log shall be retained in the Station Maintenance Folder located in the District/Division office assigned responsibility for maintaining the facility.
Records	The Records Section of GSM&TS shall maintain electronic files containing the latest version of each O&MI. These files must be accessible to all operating and maintenance departments.
Field Copies	The District Superintendent or DCS Operating Supervisor delegated to perform the M&O function at the facility shall be responsible that most recent version of the O&MI with its updated exhibits is kept at the major gas facility and another copy is kept in the district office where the work crew is based.
Procedure for Creating and Updating	Two flowcharts indicating the process making and issuing major and minor revisions to the O&MI are shown in the attached Exhibits 2A and 2B, respectively.

REVIEW/CHANGE LOG

OPERATION & MAINTENANCE INSTRUCTIONS

STATION: _____

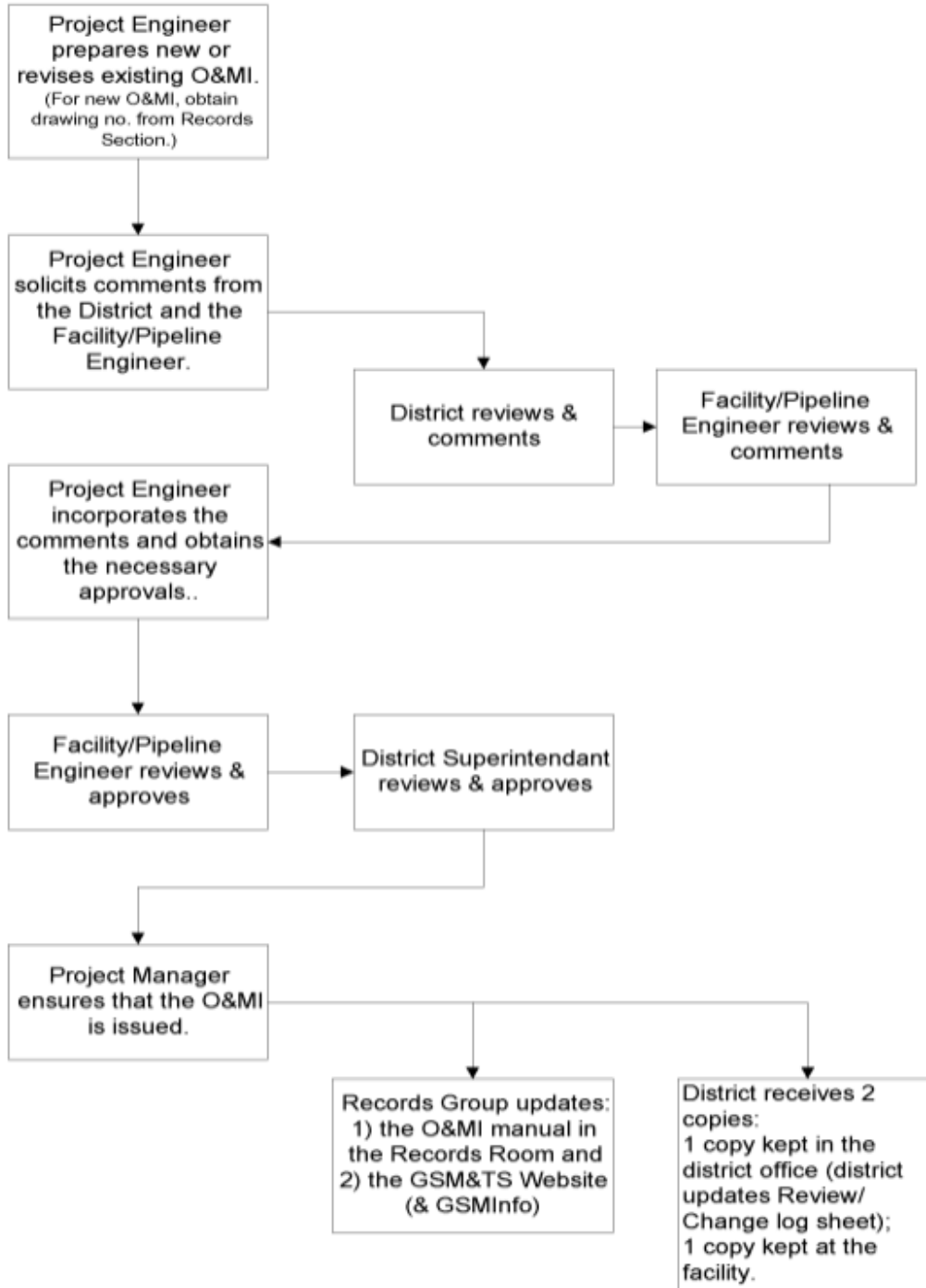
Requirements: (Refer to CGT Standard 4431) The District Superintendent/Operating Supervisor shall be responsible for filling out and initialing this Review Log when the annual review of the document is complete.

This Review/Change log shall be retained in the District/Division's office copy of the Operation and Maintenance Instructions (O&MI).

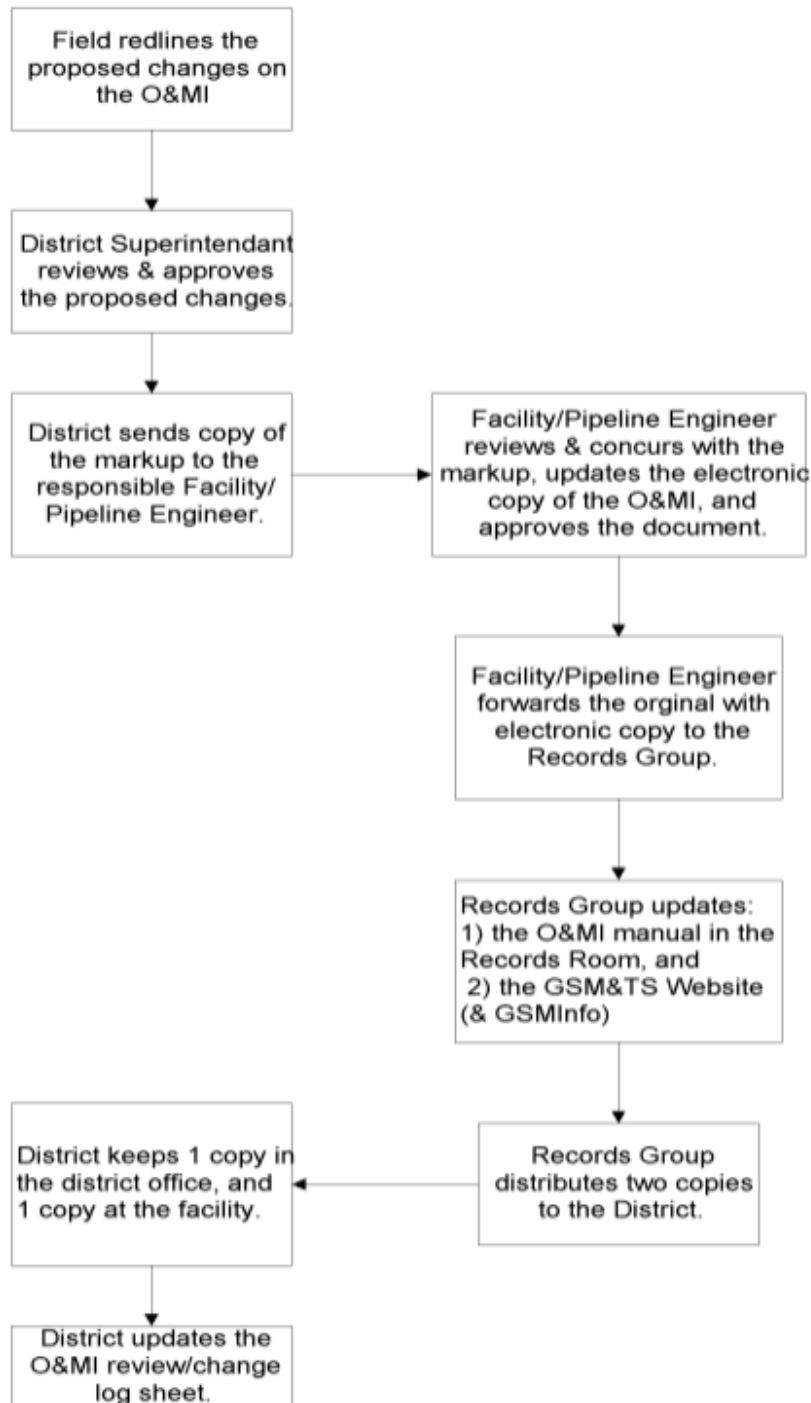
The O&MI shall be review and updated at intervals not exceeding 15 months, but at least once each calendar year.

Review Number	Date of review	Reviewer's initials	Comments (No Change / Update Description)
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9.	_____	_____	_____
10.	_____	_____	_____
11.	_____	_____	_____
12.	_____	_____	_____
13.	_____	_____	_____
14.	_____	_____	_____
15.	_____	_____	_____
16.	_____	_____	_____
17.	_____	_____	_____
18.	_____	_____	_____
19.	_____	_____	_____
20.	_____	_____	_____

O&MI PROCESS FLOWCHART FOR NEW OR MAJOR FACILITY CHANGES



O&MI PROCESS FLOWCHART FOR MINOR CHANGES



OPERATION AND MAINTENANCE INSTRUCTIONS

PREPARATION GUIDE

Zaneville Station

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

Operation and Maintenance Instructions

Appvd	By								
		1	9/1/99	Issue for use.					
		Rev	Date	Description	GM	Dwn	Chkd	Supv	Appvd
GM		<p style="text-align: center;">OPERATING - INSTRUCTION</p> <p style="text-align: center;">OPERATION & MAINTENANCE INSTRUCTIONS</p> <p style="text-align: center;">ZANEVILLE STATION</p> <p style="text-align: center;">PACIFIC GAS AND ELECTRIC COMPANY SAN FRANCISCO, CALIFORNIA</p>				R/M			
Supv						Dwg List			
Dsgn						Supds			
Dwn						Supsd By			
Chkd						Sheet No 1 of Sheets			
OK						DRAWING NUMBER		REV	
Date	Scale					080000		1	
						Microfilm			

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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 MAOPs of the Station Piping are delineated on Operating Diagram 081234.

This information can be found in CGT Drawing 086868, entitled "MAOP of Lines Operating At or Over 20% SMYS." The MAOPs can be verified by checking the Pipeline Survey Sheets located at the GSM&TS office in Walnut Creek.

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

Note: Operating Diagrams are being updated to include MAOP information for the station piping.

3.0 **STATION OPERATION (Refer to Operating Diagram 081234)**

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 District Superintendent (or DCS Operating Supervisor), or the responsible GSM&TS 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's District Superintendent or Operating Supervisor to arrange a time and meeting location.

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, V-21 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&TS.

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 Gas Control 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&TS 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 Gas Control 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&TS 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.

The following 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 Gas Control 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	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

<p>4.4 Isolation and Bypass Valves</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>4.5 Blowoff Valves</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 & B</p>
<p>4.6 Tap & Crossover Valves for L400/401</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 & V-22</p> <p>V-1</p> <p>V-2</p>
<p>4.7 Orifice Meters</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>4.8 Strainer</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: Gas System Maintenance & Technical Support, Records Section
Street 375 N. Wiget Lane
City, State, Zip Walnut Creek, CA 94598
Telephone 925-974-4195
Fax 925-974-4214

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 - Drawing 086868
- Lubrication and Maintenance Requirements of Valves - Gas Std. F - 11
- Station Inspection, Testing, and Maintenance Procedures - CGT Standard 4432

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 CGT Standard 4432, "Station Inspection, Testing, and Maintenance Procedures." 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. F4432), Relief Device Capacity Review (75-492), Valve Maintenance Records (Form no. FF11), 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.