



ISSUING DEPARTMENT: **GSM&TS**

EFFECTIVE DATE: **12-00**

UO SPONSOR: **VP-CGT**

REVIEW DATE: **12-05**

PAGE NO.: **1** OF **3**

TITLE: Odorization of Natural Gas

Purpose

This standard defines responsibilities and procedures for proper odorization of natural gas in Pacific Gas and Electric Company’s transmission and distribution system to ensure compliance with applicable federal and state laws and regulations. The standard covers the odorants approved for use by the Company and specifies the maintenance, operation and recordkeeping procedures for odorizers and odorant monitoring instruments. The standard replaces I.S. 465-1, “Odorization of Natural Gas.”

Safety

Improper odorization can expose employees, customers and the public to unsafe conditions, result in non-compliance with federal and state regulations and create negative publicity for the Company. Failure to comply with mandatory federal and state regulations may subject the Company to regulatory fines or disciplinary actions by the enforcing agencies.

Implementation Responsibilities

The vice president of California Gas Transmission (CGT) is responsible for reviewing, approving and distributing this standard.

The directors, managers, superintendents and supervisors of Operations, Maintenance and Construction (OM&C) and Gas System Maintenance and Technical Support (GSM&TS) department are responsible for ensuring that the provisions of this standard are followed.

Compliance

Implementation and effectiveness are measured by responsible managers and superintendents. In addition, periodic audits can be conducted by internal Company departments.

Procedure

The manager of Station Engineering, GSM&TS, is authorized to modify these detailed procedures and forms as needed or to approve variances from this procedure on an exception basis.

This standard is comprised of the following attachment, exhibits and supplement:

1. Attachment 1, "Procedures for Odorization of Natural Gas"
2. Exhibit 1, "Monthly Odorization Report," # 62-4650
3. Exhibit 2, "Monthly Odorization Report," # 62- 4650NJEX
4. Exhibit 3, "Odor Intensity Report," # 62-3480
5. Supplement 1, "Odometer Test Schedule for Transmission and Distribution Systems"

Definition of Terms

CGT Gas Quality On-Call Group: A technical resource which is available to GSO when corrective measures to gas quality system emergencies are needed. This group is composed of GSM&TS and GSO members who understand the Company's gas quality and odorization programs and have received training covering the gas quality incident reporting process, emergency notification, and contingency procedures.

Lower Explosive Limit (L.E.L.): The lowest concentration of gas in air that will support combustion. For the Company's natural gas, the L.E.L. is approximately 5 % gas-in-air.

Odor Intensity test instrument (commonly called "odorometer"): An instrument used to allow a person to determine the odor intensity at various gas-in-air concentrations.

Odorant: A chemical compound that is added to natural gas to give it its characteristic "smell" which warns of its presence.

Odorizer: The equipment used to add odorant to natural gas.

TBM: Tertiary Butyl Mercaptan.

THT: Tetrahydrothiophene.

Date Issued/Updated

Effective: December 2000

Review Date: December 2005

Signed,

Michael A. Katz
Vice President
California Gas Transmission

Contacts

[Redacted]

GSM&TS

Outside: [Redacted]

Internet: [Redacted]

(Engineering and maintenance practices)

[Redacted]

Gas Distribution Technical Services

Outside: [Redacted]

Internet: [Redacted]

(Gas distribution practices)

Reference Documents

49 Code of Federal Regulations, Part 192.625 and CPUC General Order 112E (and subsequent revisions)

UO Guideline 14350.1, "Odorant Blend Specifications"

UO Guideline 14351, "Purchase, Delivery and Management of Natural Gas Odorants" formerly CGT Recommended Practice 4351.1, "Bulk Deliveries, Maintenance and Operation Procedures" and I.S. 465-2, "Management of Natural Gas."

UO Guideline 14352, "Medor Odorant Gas Chromatograph-Maintenance and Calibration Procedures"

UO Guideline 14350.2, "Typical Odorant Injection System Specifications"

Attachment 1 – Procedures for Odorization of Natural Gas

I. General

- A. All gas in transmission and distribution lines and in gathering lines in Class 3 and 4 locations shall be odorized such that its odor is readily detectable at concentrations of one-fifth of the lower explosive limit.
- B. Proper levels of odorization shall be verified by conducting periodic analysis of the odorized gas and by performing odor intensity tests.

II. Odorant Blends

- A. Only the following gas odorant blends shall be used.

Odorants	Description	Recommended Application	Initial Recommended Nominal Rate (lb/MMscf)	Material Code
Odorant 1	50 % THT and 50 % TBM	Systemwide	0.15 to 0.60	M500020
Odorant 2	100 % THT	Farm tap odorizers and other specific applications	0.15 to 0.60	M500019

- B. Refer to CGT Guideline 14350.1, “Odorant Blend Specifications,” for detailed specifications of these approved odorants.
- C. Initial odorization rates shall be in accordance with the table above. If high or low odorant or odor levels in the downstream distribution system require that injection rates differ significantly from the recommended nominal rates in the table, a thorough field test shall be conducted to provide the basis for the deviation from the recommended nominal rates.
- D. All odorant purchases shall be coordinated through the Purchasing Department.
- E. Refer to UO Guideline 14351, “Purchase, Delivery and Management of Natural Gas Odorant,” for detailed procedures concerning the planning, purchase and coordination of any bulk delivery of odorant by a Company approved supplier.

III. Odorizers

- A. Odorizers shall be designed, installed, and maintained such that sufficient amounts of odorant can be introduced into the gas at all operating flows without wide variations in the concentration of odorant in the gas stream. Equipment adjustments may be required if odor intensity readings are outside the specified range.
- B. Odorizers shall not be taken out of service without the prior approval of the GSM&TS district superintendent or the OM&C distribution superintendent. For an extended shutdown period (over 24 hours), a clearance from Gas System Operations (GSO) shall be obtained.
- C. Odorizer inspection and maintenance intervals:
 - 1. Inspect all odorizers, except farm tap odorizers, at least once each month.
 - 2. Check, test and service farm tap odorizers at least annually.
 - 3. Perform maintenance and calibration of odorizer equipment in accordance with the equipment manufacturer's recommendations.
 - 4. Check liquid level in the odorant "run" tank and/or storage tank to ensure an adequate supply of odorant is available until the scheduled filling date, at least once a month.
 - 5. Use the GSM&TS maintenance management system to record calibration details and maintenance repairs performed on odorizers and related equipment maintained by GSM&TS. Calibration, maintenance and repair records for odorizers and related equipment maintained by divisions shall be kept by the local office for the operating life of the equipment. In the event the equipment is removed from service, the local office shall retain records for five years after the equipment is taken out of service.

IV. Odor Intensity Tests

- A. Odor intensity tests shall be performed using only these odor concentration test instruments:
 - 1. Heath Odorator,
 - 2. DTEX Odorant Detection System
 - 3. Bacharach Odorometer.
- B. Any new test instruments must be first approved by GSM&TS and Distribution.
- C. Properly trained operators and technicians with normal sense of smell shall perform the odor intensity tests.(See Section IX, Training.)
- D. Odor concentration test instruments shall be calibrated annually in accordance with manufacturers' instructions.

- E. Odor intensity tests shall be conducted at the designated distribution and GSM&TS sampling points and testing frequencies listed in Supplement 1.
- F. Gas odor shall be readily detectable at a concentration of 0.6 percent gas in air or less.
- G. If, for any reason, gas odor is not readily detectable at 0.6 percent gas in air, the person conducting the test shall immediately notify his/her supervisor. The supervisor may verify the reading, if appropriate, and shall immediately notify the GSM&TS district superintendent and/or the OM&C distribution superintendent, who shall ensure that immediate and continuing actions are taken to restore adequate odor concentration levels.

V. Odorant and Sulfur Analyzers

- A. Odorant/sulfur analyzers are used to monitor the concentration of odorant and/or sulfur compounds in the major sources of out-of-state gas, such as Canadian and southwest supplies, and in the gas from major underground gas storage fields.
- B. In conjunction with odor intensity tests, data from these odorant analyzers are used to verify proper levels of odorant concentration in the gas. These analyzers also determine when supplemental odorization shall be started at strategic locations in the system when needed.
- C. Refer to UO Guideline 14352, "Medor Odorant Gas Chromatograph Maintenance and Calibration Procedures," for detailed maintenance and calibration instructions.

VI. Response to High or Low Odorant Concentration

- A. Immediate action shall be initiated to investigate and take necessary corrective measures in response to reports of high or low odorant concentration levels.
- B. Upon receipt of a report of low odorant concentration, the district shall initiate immediate and continuing actions to restore adequate odorant concentration levels, so as to provide properly odorized gas. GSO and the affected distribution operating personnel shall be notified of the situation. GSO will coordinate communication between the CGT Gas Quality On-Call Group, GSM&TS districts and affected distribution locations.
- C. When high odorant levels are found, the district shall take corrective action and shall notify GSO and the affected distribution locations immediately.
- D. If the situation warrants, the California Public Utilities Commission (CPUC) shall be notified of any problems associated with low or high odor intensity levels in the gas system. Gas Distribution Technical Services (GD&TS) shall coordinate any CPUC notification relating to odorization.
- E. After taking action to correct low odorant concentration levels, an odorant intensity test shall be conducted to ensure adequate odorant levels. GSO and the OM&C distribution superintendents shall be notified after corrective actions are taken.

VII. Odorization Records and Reports

- A. Monthly odorization reports shall be completed for all odorizer stations:
 - 1. Monthly Odorization Form, 62-4650, Exhibit 1, to be used when usage readouts are not tracked electronically.
 - 2. Monthly Odorization Report-NJEX, Form 62-4650-NJEX, Exhibit 2, to be used when usage readouts are tracked electronically.
- B. These reports require that an accurate method of determining total odorant usage and total gas treated be used. The originals of these reports shall be retained in the local distribution office or GSM&TS district file for at least a five-year period. A copy of the report indicating the GSM&TS district superintendent's or OM&C distribution superintendent's review and approval shall be forwarded to the manager of Station Engineering, GSM&TS.
- C. Odor intensity test results for sample locations shown in Supplement 1 shall be recorded on an Odor Intensity Report, Form 62-3480, Exhibit 3. The original of this report shall be retained in the local distribution office or GSM&TS district file for at least a five-year period. A copy of the report indicating the GSM&TS district superintendent's or OM&C distribution superintendent's review and approval shall be forwarded to the manager of Station Engineering, GSM&TS.
- D. The "Remarks Section" of Form 62-3480 shall indicate any corrective actions taken to restore odorant concentration levels, or any other unusual conditions worth reporting.
- E. Calibration of odorant concentration test instruments and odorant chromatographs shall be performed annually and properly documented. Documentation shall be maintained on file in the district or division files for as long as individual instruments remain in service.

VIII. Responsibilities

- A. The responsibility for odorization of natural gas shall rest with the OM&C distribution superintendent and the GSM&TS district superintendent, who direct the maintenance and operation of facilities and equipment relating to odorization, such as odorizers, odor concentration test instruments and sulfur analyzers.
- B. GD&TS is responsible for communicating with the appropriate government agencies such as the Department of Transportation (D.O.T.) and the CPUC.

IX. Training

Training of GSM&TS district gas personnel and distribution gas personnel on the maintenance and operation of odorizers and odorant monitoring instruments can be arranged through the GSM&TS facility engineer assigned to manage odorant operations.

Monthly Odorization Report

	1	2	3	4	5	6	7	8	9	10	11	13
Day	Storage Tanks Last Report	Rec'd This Period	Total	Storage Tanks This Report	Difference	RUN TANK previous column 10	RUN TANK as found	Total Injected (6 - 7)	Added from Storage	RUN TANK as left (7 + 9)	MMCF	LBS/MMCF (8xW/11) **
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												

Quantities in column 9 to be measured on run tank

Monthly Statement											
0.00	0.00	0.00	0.00	0.00			0.00	0.00		0.00	0.00

Report Odorants in lbs./MMSCF

Odorant density (lb/gal): 7.45 ** (W) for 50/50 (TBM-THT) blend = 7.45 lb/gal

Date: _____ **Odor Intensity Reading:** _____ **% Gas In Air**

Line: _____ **Monthly Report Ending:** _____

Station: _____ **Approved** _____

Monthly Odorization Report - NJEX

	1	2	3	4	5	6	7	8	9	10	11	13
Day	Storage Tanks Last Report	Rec'd This Period	Total	Storage Tanks This Report	Difference	RUN TANK prev col 10 lbs injected	RUN TANK as found lbs injected	Total Injected (lbs) (6 - 7)	Added from Storage (lbs) (7 + 9)	RUN TANK as left (7 + 9)	MMCF	LBS/MMCF (8/11) **
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												
31												

Quantities in column 9 to be measured on run tank

Monthly Statement											
0.00	0.00	0.00	0.00	0.00			0.00	0.00		0.00	0.00

Report Odorants in lbs./MMSCF

Odorant density (lb/gal): **7.45** ** (W) for 50/50 (TBM-THT) blend = 7.45 lb/gal

Date: _____ Odor Intensity Reading: _____ % Gas In Air

Line: _____ Monthly Report Ending: _____

Station: Ryer Island

Conduct odorameter reading once a month. Approved _____

**ODOR INTENSITY REPORT
PERCENT GAS IN AIR**

DCS Area or CGT District _____ Month _____ Year _____

DAY	LOCATION				REMARKS	OPERATOR
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

If odor intensity reading is over 0.6% gas in air, or below 0.1% gas in air, a confirmation test with a different operator will be run and the gas distribution operating supervisor or the CGT district superintendent notified immediately.

Complete in duplicate, mail original to Gas System Maintenance & Technical Support, Manager, Station Engineering, 375 N. Wiget Lane, Walnut Creek

PACIFIC GAS AND ELECTRIC COMPANY
 ODOROMETER TEST SCHEDULE FOR
 TRANSMISSION AND DISTRIBUTION SYSTEMS

Periodic sampling with an odorometer will be required at the following pints in the system under paragraph 192.625 of 49 CFR Part 192:

Area	Headquarters	Local Office	Location	Frequency
3	Central Coast	Salinas	Carmel Valley	Weekly
6	Sierra	Marysville	Beale Air Force Base	Weekly
6	North Valley	Chico	Paradise	Weekly
6	Sierra	Auburn	Auburn	Weekly
			Nevada City	Weekly
2	Diablo	Concord	Danville	Weekly
7	North Coast	Eureka	McKinleyville	Weekly
7	North Coast	Santa Rosa	Willits	Weekly
			Ukiah	Weekly
6	Sacramento	Sacramento	Sacramento	Weekly
			Dixon	Weekly
			Woodland	Weekly
			Yolo	Weekly
1	San Francisco	San Francisco	San Francisco	Weekly
4	Fresno	Fresno	Fresno	Weekly
3	Central Coast	San Jose	Davenport	Weekly
6	North Valley	Redding	Redding	Weekly
5	Yosemite	Modesto	Oakdale	Weekly
			Martell-Stockton	Weekly
CGT	GSM&TS	Kettleman	Kettleman, Line 300	Weekly
		Kettleman	Kettleman, (Coalinga – withdrawal)	Weekly
		Los Medanos	Antioch Terminal, Line 400	3 X week
		Tracy	Brentwood Terminal	Weekly
		McDonald Is.	McDonald Isl – withdrawal	Withdrawal as needed
		Los Medanos	Los Medanos – withdrawal	Weekly
		Rio Vista	Rio Vista	Weekly
		Rio Vista	Isleton	Weekly