

**Attachment 1
Procedures for Odorization of Natural Gas**

1. 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 analyses of the odorized gas and by performing odor intensity tests.

2. 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	500020
Odorant 2	100 % THT	Farm tap odorizers and other specific applications	0.15 to 0.60	500019

- B. 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 must be conducted to provide the basis for the deviation from the recommended nominal rates.
- C. All odorant purchases must be coordinated through the Purchasing department.
- D. Refer to Recommended Practice 4351.1, "Bulk Odorant Deliveries, Maintenance and Operating Procedures," for detailed procedures concerning the planning, purchase, and coordination of any bulk delivery of odorant by a Company-approved supplier.

3. Odorizers

- A. Odorizers must 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 CGT GSM&TS district superintendent or the T&D OM&C distribution superintendent. For an extended

shutdown period (over 24 hours), a clearance from Gas System Operations (GSO) must be obtained.

- C. At odorizer inspection and maintenance intervals, perform the following:
 - 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 the liquid level in the odorant "run" tank and/or storage tank at least once a month to ensure an adequate supply of odorant is available until the scheduled filling date.
 - 5. Use the GSM&TS maintenance management system to record calibration details and maintenance repairs performed on odorizers and related equipment maintained by CGT. 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 5 years after the equipment is taken out of service.

4. Odor Intensity Tests

- A. Odor intensity tests must 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 GD&TS.
- C. Properly trained operators and technicians with normal sense of smell shall perform the odor intensity tests (see Section 9, Training).
- D. Odor concentration test instruments shall be calibrated annually in accordance with the manufacturers' instructions.
- E. Odor intensity tests must be conducted at the designated distribution and CGT sampling points using the testing frequencies listed in Attachment 4.
- F. Gas odor shall be readily detectable at a concentration of 0.6% gas in air or less.
- G. If, for any reason, gas odor is not readily detectable at 0.6% gas in air, the person conducting the test must immediately notify his/her supervisor. The supervisor may verify the reading, if appropriate, and shall immediately notify the CGT district superintendent and/or the T&D distribution superintendent, who must ensure that immediate and continuing actions are taken to restore adequate odor concentration levels.

5. Sulfur Analyzers

- A. 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 U.S. southwest supplies, and in the gas from major underground gas storage fields.

- B. In conjunction with odor intensity tests, data from these sulfur analyzers is used to verify proper levels of odorant concentration in the gas. These analyzers also determine when or if supplemental odorization shall be started at strategic locations in the system.

6. Response to High or Low Odorant Concentration

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

7. Odorization Records and Reports

- A. The “Monthly Odorization Report,” Form 62-4650, Attachment 2, must be completed monthly for all odorizer stations, and is to be used at all odorizer locations.
- B. Form 62-4650 requires that an accurate method of determining total odorant usage and total gas treated be used. A copy of the completed report indicating the CGT district superintendent’s or T&D distribution superintendent’s review and approval must be forwarded to the manager of Station Engineering, GSM&TS. The originals of these reports shall be retained in the local distribution office or GSM&TS district file for at least a 5-year period.
- C. The odor intensity readings on the Monthly Odorization Report (Form 62-4650) can be taken either once at the end of each month (during the final monthly visit), or reported as an average of multiple reads during the month being reported. If a sulphur analyzer is located directly downstream with no other source of gas intermingling, and the analyzer continually monitors the concentration of odorant, then the odorant intensity reading is not required.
- D. Odor intensity test results, for the sample locations shown in Attachment 4, must be recorded using the “Odor Intensity Report,” Form 62-3480, Attachment 3 of this standard. For test sample locations, refer to Attachment 4, “Pacific Gas and Electric Company Odor Intensity Test Schedule for Gas Transmission and Distribution Systems.” The original copy of the completed report indicating the review and approval of the GSM&TS district superintendent or T&D distribution superintendent must be forwarded to the manager of Station Engineering, GSM&TS. A copy of this report shall be retained in the local distribution office or GSM&TS district file for a period of at least 5 years.

- E. The "Comments" section of Form 62-3480 should be used to indicate any corrective actions taken to restore odorant concentration levels, or any other unusual conditions worth reporting.
- F. 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.

8. Responsibilities

- A. The responsibility for odorization of natural gas shall rest with the T&D distribution superintendent and the CGT 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 DOT and the CPUC.

9. Training

Training of CGT district gas employees and T&D gas distribution employees 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.