	DISTRIBUTION & CUSTOMER SERVICE (DCS) GENERATION, TRANSMISSION & SUPPLY (GTS)		
			DCS Standard D-S0350 ***GTS Standard S4110***
ISSUING DEPARTMENT:	**DE&P**	EFFECTIVE DATE:	**3-98**
DCS SPONSOR:	**VP - DE&P**	REVIEW DATE:	**3-03**
GTS SPONSOR	**VP - G&ET**	PAGE NO.:	**1** OF **12**

TITLE: Periodic Leak Surveys of Gas Transmission and Distribution Facilities

Purpose:

This standard establishes uniform minimum requirements for the performance of gas leak surveys of company pipelines, buried station piping, mains and services in order to detect, report and repair leaks; and establish a system of records.

Business Risks and Benefits:

Benefits: Improve public and employee safety; reduce company liability; ensure compliance with 49 CFR 192.605 (b), 192.706, 192.723; and ensure operational efficiency.

Risk: Failure to file or follow this standard could reduce public and employee safety; increase company liability; and could expose the company to possible government regulatory sanctions, increased inspections, warning letters, hearings, penalties, compliance orders, and civil and criminal fines as administered by the California Public Utilities Commission and Department of Transportation, Research and Special Programs Administration.

Implementation Responsibilities:

The vice president of Distribution Engineering and Planning and the vice president of Gas & Electric Transmission are responsible for approving, revising, and distributing this standard.

DCS and G&ET managers are responsible for implementing this standard within their respective organizations.

The responsibility for performance of gas leak surveys and records for the transmission and distribution facilities shall rest with the operating department supervisor who directs the maintenance and operation of the facilities.

Compliance:

Implementation and effectiveness are measured by responsible managers/superintendents. In addition, periodic audits can be conducted by internal company departments. The CPUC also conducts compliance reviews on the requirements in this standard. Leak survey reports revealing the need for corrective actions will be reviewed and acted upon by responsible supervisors.

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Policy: Leak surveys shall be conducted at regular intervals throughout the gas transmission and distribution systems. Company policy is to search for, evaluate and control gas leakage in the interests of safety and efficiency of operation.

Procedures: The procedural details of the gas leak survey program appear in Attachment 1.

Date Issued/Updated:

Effective: **March 1, 1998**

Review Date: **March 1, 2003**

Signed,

Shan Bhattacharya
Vice President,
Distribution Engineering & Planning

Signed,

William R. Mazotti
Vice President,
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Reference Documents:

49 CFR 192, Sections 605, 706, and 723.

CPUC General Order 112-E, section 143.1.

SP 460.21-2, "Clock Testing and Soap Testing for Leaks"

SP 460.21-3, "Investigating Gas leaks on Customer's Premises"

SP 463.8, "Maximum Operating Pressures of Pipelines and Mains Operating at or Over 20% SMYS"

SP 851-2, "Use of Multipurpose Customer Service Orders and Printer Generated Multipurpose Customer Service and Scheduled Meter Change Orders"

C-CS-S0003, "Establishing Gas Service"

D-S0213, "Work Procedures in Confined Spaces"

D-S0352/E-TSL-S4111, "Patrolling Pipelines and Mains"

D-S0353/E-TSL-S4112, "Physical Inspection of Pipelines, Mains, and Services"

GS&S A34.2, "Uprating Procedures - Low to High Pressure"

GS&S M-53, "Portable Combustible Gas Indicators Specification"

GS&S M-53.1, "Portable Combustible Gas Indicators Operation and Maintenance Specifications"

GS&S M-53.2, "Portable Hydrogen Flame Ionization Gas Detector"

D-G0500/RP4110.1, "Special Leak Surveys"

For Further Information:

For additional information or copies of this standard, please contact the Gas Distribution section of the Technical Services department.

Distribution:

DCS vice presidents

Gas Services and Operations superintendents

DCS managers

Gas and Electric Transmission managers

Division Capital Investment directors

Division Operation, Maintenance and Construction directors

Technical and Ecological Services manager

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Attachment 1

Definition of Terms:

Building: Any structure used for human occupancy in which gas could accumulate.

Business Districts: The principal business areas in an urban community. In determining business districts, the following areas should be considered.

A. The general public regularly congregates for economic, industrial, religious, educational, health, or recreational purposes.

B. The majority of the buildings on either side of the street are used for commercial, industrial, religious, educational, health or recreational purposes.

C. Gas facilities are under continuous paving that extends either from the center line of the thoroughfare to the building wall or from the main to the building wall.

D. any other location or site which in the judgment of the operator should be so designated.

Business districts do not include small commercial areas (e.g., a small store) in residential areas.

Class Locations: An area defined and classified by criteria set forth in 49 CFR 192.5.

Combustible Material: A flammable gaseous material consisting of organic compounds, such as methane, benzene, and so forth

Confined Space: Any structure of sufficient size that could accommodate a person and where gas could accumulate, such as vaults, manholes, and so forth, or where ventilation, entrance and exit is limited.

Distribution Main: A pipeline that serves as a common source of supply for more than two service lines operating at 60 psis or less.

Gas Detector: An instrument capable of detecting and measuring the percentage concentration of combustible gas in air.

Gas Facilities: All company operated gas lines and related appurtenances.

Gathering Line: A pipeline that transports gas from a current production facility to a transmission line or distribution main.

Leak: The unintentional escape of gas from containment.

Leak Grades:

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- ***Grade 1*:** A leak that represents an existing or probable hazard to persons or property, requiring immediate repair or continuous action until conditions are no longer hazardous.
- ***Grade 2*:** A leak that is not hazardous to life or property at the time of detection, but requires scheduled repair based on probable future hazard.
- ***Grade 3*:** A leak that is non-hazardous at the time of detection and can reasonable be expected to remain non-hazardous.

Leak survey: A search for possible gas leakage in any area where company gas facilities exist, or where a gas leak is reported or suspected.

LEL: The "Lower Explosive Limit," expressed as a percentage by volume of gas in air at standard conditions. For natural gas the LEL is 5%.

Reading: A repeated measurement of gas indicated on a gas detector. Where the reading is in a confined space, consideration should be given to the rate of dissipation when the space is opened or ventilated for the test and to the rate of accumulation when the space is closed.

Service: A distribution line that transports gas from a common source of supply to a customer meter.

Station Piping: For the purpose of leak surveying, this includes all underground gas pipes an appurtenances within the property lines of compressor stations, terminals, storage holder facilities, regulator stations and other gas operating installations.

Substructure: Any structure, tunnel, passageway, or other confined space below ground level where gas could accumulate.

Transmission Line: All pipelines operating over 60 psig that are not gathering lines.

Tunnel: A subsurface passageway in which a person could enter and gas could accumulate. For purposes of this standard, "tunnel" also includes sewers, storm drains, pipelines, conduits, etc.

Priorities: Surveillance and repair priority shall be based on such factors as:

1. The volume, gas-air concentration, and type of escaping gas (for handling unknown gas sources see Volatile Combustible Material in Soil, paragraph 7).
2. The size and occupancy of the area where leakage could occur, and the proximity to structures both above and below ground.
3. The presence of any type of channel or tunnel that could affect the migration or accumulation of gas underground.

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4. Soil and surface conditions that influence item 3) above.
5. The proximity to sources of ignition.
6. Public awareness, apprehension, and reaction to the leak situation.
7. Soil movement caused by landslides, earthquakes, and so forth, where external stresses on the pipeline may cause leakage.

After consideration of such factors, repair priority shall be in order of Grade 1, Grade 2, and Grade 3.

Leak Grades - Criteria, Response, Action:

Grade 1

1. Criteria
   A. Any reading greater than 10% LEL (.5% gas in air, 5,000 ppm) in or under a building or tunnel.
   B. Any reading of 80% LEL (4% gas in air, 40,000 ppm) or greater in a confined space.
   C. Any reading greater than 10% LEL (.5% gas in air, 5,000 ppm) at the outside wall of a building or where gas would likely migrate to the outside wall of a building.
   D. Any reading of 80% LEL or greater in a non-gas substructure where the gas would likely migrate to the outside wall of a building.
   E. Escaping gas that has ignited.
   F. Gas which can be seen, heard, or felt in a location where the presence of gas may endanger the general public or property.
   G. A gas leak reported by other than company or company-contracted personnel.
   H. A gas leak which in the judgment of the surveyor or supervisor is an immediate hazard.
2. Action
   A. Take immediate and continuous corrective action to eliminate the hazard. Such action may include (but is not limited to) one or more of the following:
      1) Evacuate premises.
      2) Vent the leakage.
      3) Remove sources of ignition.
      4) If gas is burning, prevent spread of fire but not necessarily extinguish burning gas.

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5) Eliminate source of gas.

6) Restrict public access to area.

B. Make continuous repair efforts until leak is eliminated or downgrade leak.

Grade 2

1. Criteria (by leak surveyor or other qualified personnel)

A. Any reading of 40% LEL (2% gas in air, 20,000 ppm) or greater under ***sidewalk*** in a wall-to-wall paved area which does not qualify as a Grade 1 leak.

B. Any reading of 100% LEL (5% gas in air, 50,000 ppm) or greater under ***street*** in a wall-to-wall paved area which does not qualify as a Grade 1 leak.

C. Any reading between 20% (1% gas in air, 10,000 ppm) and 80% LEL (4% in air, 40,000 ppm) in a non-gas substructure where gas would likely migrate, creating a probable future hazard..

D. Any reading between 20% LEL (1% gas in air, 10,000 ppm) and 80% LEL (4% gas in air, 40,000 ppm) in a confined space.

E. Any leak which, under frozen or other adverse soil conditions, would likely migrate to the outside wall of a building.

F. Any reading less than 10% LEL (.5% gas in air, 5,000 ppm) in or under a building or tunnel that does not qualify as a Grade 1.

G. Any reading less than 10% LEL (.5% gas in air, 5,000 ppm) in or under a building or where gas could migrate to the outside wall of a building that does not qualify as a Grade 1.

H. Any leak which in the judgment of the surveyor or supervisor is of sufficient magnitude to justify scheduled repair.

2. Action

A. Repair or clear no later than 18 months from the date reported; or ahead of ground freezing or other adverse changes in venting conditions. Maintain surveillance before repair every six months not exceeding the months following the anniversary month.

B. Downgrade to a Grade 3 if the leak is proved non-hazardous and can be expected to remain so.

Grade 3

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1. Criteria

   All other leaks which are non-hazardous at the time of detection and can reasonably be expected to remain non-hazardous.

2. Action

   Recheck during next scheduled survey.

Leak Survey, General:

The great variety of conditions encountered in the company's gas system precludes the establishment of a procedure subject to literal application in every situation. The procedures outlined are intended as guidelines to be used as minimum standards wherever applicable. Although these procedures will be found to be applicable in the majority of cases, particular situations wherein they would not be applicable will still require sound judgment in carrying out an effective leak survey program.

Odors or indications from foreign sources should be investigated using the procedures listed in the section on Volatile Combustible Material in Soil on page 11. When leak indications are found to originate from a foreign source or facility, such as gasoline vapors, sewer, or marsh gas, prompt action should be taken where necessary to protect life and property. Leaks that are potentially hazardous should be reported promptly to the operator of the facility and, where appropriate, to the police department, fire department, or other governmental agencies.

For leaks on customer's premises, refer to SP No. 460.21-3, "Investigating Gas Leaks on Customer's Premises," and to DCS Standard D-S0003, "Establishing Gas Service."

Frequency of Periodic Leak Surveys:

1. ***Annually*** (at least once each calendar year, not to exceed 15 months) where any of the following criteria apply.

   A. Gas facilities in Class 4 locations, in principal business districts, or in other comparable areas where wall-to-wall paving or other conditions prevent gas from venting to atmosphere.

   B. Gas facilities in Class 3 locations covered by 49 CFR 192.5(d), (i), and (ii), and G.O. 112-E, Section 143.1 where, in the opinion of the supervisor, conditions warrant annual survey. This may include certain public assembly buildings occupied by 20 or more persons, outdoor theaters, recreation areas, etc. In all cases, schools, hospitals, business districts, and churches must be surveyed annually.

   C. All transmission lines in Class 3 locations.

   D. All transmission lines operating at 20% SMYS or over.

   E. All gathering lines.

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F. Gas facilities transporting unodorized gas.

2. ***Every three years*** (within the month of the previous survey)
Gas distribution facilities not cathodically protected that are not evaluated through the use of electrical surveys.

3. ***Every five years*** (within the month of the previous survey)

The balance of all underground gas facilities.

4. ***After leak repairs***

The need for a follow-up after repair should be determined by a qualified employee, under the direction of the supervisor in charge of maintenance, based on such factors as residual gas, leak history, age, condition and type of system.

Leak Survey Methods:

Following are the acceptable methods of gas leak survey:

1. ***Mobile Type Survey***

Survey rights-of-way, alleys, easements, and streets where gas facilities are located, at a speed no faster than 400 feet per minute (4.5 mph).

2. ***Foot Survey***

A. Survey is normally to be conducted by using a portable hydrogen flame ionization instrument, or other combustible gas indicator of the filament-bridge type, either hand-bulb aspirated or motor-pumped. Exposed facilities may be tested with leak detection fluid (soap, etc.).

B. Foot survey method may be used to test mains in street or other vehicular areas where safe, effective coverage is possible and it is more practical and economical than mobile survey. In urban sections this can generally be accomplished by scanning the curb gutter area with flame ionization intake, and by surveying pavement cracks and substructures.

C. Survey procedures

1) Survey at exposed piping, at surface openings, pavement cracks and joints, unpaved areas, or other locations where gas may vent.

2) Survey over all services and meter sets.

3. ***Vegetation Survey***

A. Can be used as a leak survey method in conjunction with other methods and it may be used for Class 1 locations. It may be used as a principal method in Class 2 locations, provided gas detectors are available for verification of findings.

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B. May be performed by foot, vehicle, or aerial patrol.

C. May not be used on distribution facilities.

Records and Reports:

Following are the records and reports to be made in conjunction with leakage inspection procedures.

1. A suitable records system made up of the appropriate records indicating the established survey frequency shall be prepared and maintained in each division or headquarters.
2. A suitable records system shall be prepared for the surveys listed in this standard.
3. Leak numbers are to be assigned by Distribution Engineering & Planning department personnel in the DCS organization.
4. All leak indications shall be recorded on the appropriate forms and turned in daily to the operating headquarters. Indications requiring prompt action shall be transmitted to the designated operating supervisor as such indications are found or reported.
5. All leaks must be entered into the leak recording computer system, including all Grade 3 leaks.
6. Each leak indication must have a leak number assigned to it within one working day of the discovery of the leak.
7. Each leak indication must be entered into the leak recording computer system within ten working days of the discovery of the leak.
8. The established computer system shall be utilized to allow the automatic transfer of the local leak information to the system database.
9. Leak numbers should not normally be assigned to above-ground meter set leaks. The record of repair shall be kept on customer service tags or field service tags as specified in Standard Practice 851-2.
10. Leaks in gas-associated substructures shall be documented on field service tags and routed to the appropriate personnel.
11. Completed record copies shall be turned in to the operating headquarters with the following information:

    A. Dates surveyed, survey method, name of surveyor.

    B. Evidence that all main and services have been tested, by tracing over main and check-marking services or otherwise indicating on each record all facilities that have been tested.

    C. Plat sheet corrections required, as determined by inspection in the field.

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12. The Leak Survey, Inspection and Repair Report - Form #62-4060A (Form A) or equivalent, is to be used to record computer input data, and all information relative to survey findings, main condition, and repair. Pipeline, main, and service inspection records are to be maintained in accordance with DCS/GTS Standard D-S0353/S4112, "Physical Inspection of Pipelines, Mains, and Services."

13. Records of leaks discovered and routine leak surveys shall be retained as follows:

    A. For transmission units, the records shall be kept on file as long as that section of main involved remains in service.

    B. For all other lines, the records shall be kept for the current and immediately preceding survey plus one year. Form A is to be kept for the life of the facility.

14. Inspection records, in connection with leak repair or other pipe exposure shall be maintained for the life of the facility per DCS/GTS D-S0353/S4112, "Physical Inspection of Pipelines, Mains, and Services."

15. Distribution Engineering and Planning departments must perform periodic upload transactions to update the systemwide gas leak database.

16. Review.

    A. As the leak survey is in progress, results shall be reviewed on a daily basis by or at the discretion of the local supervisor. The supervisor can then ensure that periodic leak surveys are scheduled and completed in the field on time so that the necessary action can be taken.

    B. Upon completion of the survey, or as the survey progresses, the program shall be reviewed by the headquarters engineer or equivalent so that long-range plans, replacement studies, or other action can be formulated.

Volatile Combustible Material in Soil:

1. If the source of the gas leak cannot be found after a thorough field investigation by company leak surveyors or gas leak crews, one potential cause that must be considered is the presence of combustible material in the soil. When such conditions exist:

    A. The local headquarters must request that the material be further analyzed by an authorized lab or Technical and Ecological Services. TES analyzes gas samples using a gas chromatograph to ascertain the constituents.

    B. After the analyses are made, the ultimate decision concerning the source of the unknown gas should include the opinion of the local gas engineering representative and the local hazardous waste or

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environmental coordinator.

C. If the combustible gas is not PG&E's, the matter should be immediately referred to the public agency, property owner, etc., having the jurisdiction and a record made of the notification.

D. The situation must be monitored to keep informed about the eventual abatement of the hazard and to be cognizant of it when performing future leak surveys.

2. Local supervisors must ensure that their operating personnel are trained and that such training includes an awareness of sources of combustible gases other than PG&E's.

3. Upon detecting foreign combustible material it is PG&E's responsibility to identify and report it immediately. The probability of combustible gas indications not being from PG&E pipes is very low. Foreign combustible material is not to be blamed for every leak that is hard to find.

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