

CES/GS STANDARD

CES STANDARD: C-T&CS-S0350
GS STD. PRACTICE: 460.21-4
ISSUING DEPARTMENT: T&CS, DISTRIBUTION PAGE NO.: 1 OF 2
CES OFFICER: V.P. T&CS EFFECTIVE DATE: 1-94
GS OFFICER: V.P. GS&O REVIEW DATE: 1-99

TITLE: Periodic Leak Surveys of Gas Transmission and Distribution Facilities

Purpose:

To establish a uniform requirement for the performance of gas leak surveys of Company pipelines, buried station piping, mains and services for the purpose of detecting and reporting leakage; and thereby establish a system of records.

Policy:

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

Responsibility:


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.

Effective Date: **January 1, 1994**

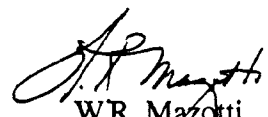
Review Date: **January 1, 1999**

Approved by:

Signed,


J.H. Pope
Vice President, T&CS

Signed,


W.R. Mazotti
Vice President, GS&O

Distribution:

- CES Vice Presidents
- Gas Services and Operations Managers
- Gas Services and Operations Superintendents
- Technical and Construction Services Managers
- Division Managers
- Division Capital Investment Directors
- Division Construction, Maintenance and Operations Directors
- Technical & Ecological Services Manager

TITLE: Periodic Leak Surveys of Gas Transmission and Distribution Facilities.**Reference Documents:**

- S.P. 460.2-1, "Patrolling Pipelines and Mains"
- S.P. 460.2-2, "Physical Inspection: Pipelines, Mains and Services"
- S.P. 460.21-2, "Clock Testing and Soap Testing for Leaks"
- S.P. 460.21-3, "Investigating Gas Leaks on Customer's Premises"
- S.P. 460.21-5, "Work Procedures for Gas Department Employees in Confined Spaces"
- S.P. 460.21-8, "Fumigation"
- S.P. 463.8, "Maximum Operating Pressures of Pipelines & Mains operating At Or Over 20% SMYS"
- S.P. 851-2, "Use of Multipurpose Customer Service Orders and Printer Generated Multipurpose Customer Service and Scheduled Meter Change Orders"
- GS&S A34.2, "Upgrading 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"
- C.P.U.C. General Order 112-D.

Supplement:

The procedural details of the gas leak survey program appear in the Supplement to this Standard.

For Further Information:

For additional information or copies of this Standard please contact the Distribution Department.

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REVIEW DATE: 1-99

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GS OFFICER: V.P. GS&O

TITLE: Periodic Leak Surveys of Gas Transmission and Distribution Facilities

1. Definition of Terms:

The following definitions shall apply to this Standard Practice:

- A. **Building:** Any structure used for human occupancy in which gas could accumulate.
- B. **Class Locations:** An area defined and classified by set criteria. See Section 192.5 of the C.P.U.C. General Order 112-D.
- C. **Combustible Material:** A flammable gaseous material consisting of organic compounds, such as methane, benzene, and so forth.
- D. **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.
- E. **Distribution Main:** A distribution line that serves as a common source of supply for more than one service line.
- F. **Gas Detector:** An instrument capable of detecting and measuring the percentage concentration of combustible gas in air.
- G. **Gas Facilities:** All company operated gas lines and related appurtenances.
- H. **Gathering Line:** A pipeline that transports gas from a current production facility to a transmission line or main.
- I. **Leak:** The unintentional escape of gas from containment.
- J. **Leak Grades:**
 - 1. **A Grade 1** leak represents an existing or probable hazard to persons or property requiring immediate repair or continuous action until conditions are no longer hazardous.
 - 2. **A Grade 2** leak is one that is not hazardous to life and property at the time of detection, but requires scheduled repair based on probable future hazard.
 - 3. **A Grade 3** leak is one that is non-hazardous at the time of detection and can reasonably be expected to remain non-hazardous.
- K. **Leak Survey:** A search for possible gas leakage in any area where gas facilities exist, or where a gas leak is reported or suspected.
- L. **LEL:** The lower explosive limit, expressed as a percentage by volume of gas in air at standard conditions.
- M. **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 the rate of accumulation when the space is closed.
- N. **Service:** A distribution line that transports gas from a common source of supply to a customer meter.

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- O. Station Piping:** For the purpose of leak surveying, this includes all underground gas pipes and appurtenances within the property lines of compressor stations, terminals, storage holder facilities, regulator stations and other gas operating installations.
- P. Substructure:** Any structure, tunnel, passageway, or other confined space below ground level where gas could accumulate.
- Q. Transmission Line:** All lines operating over 60 psig.
- R. 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, and so forth.

2. Priorities

- A. 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 8).
 - 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.
 - 4. Soil and surface conditions that influence #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.
- B. After consideration of such factors, repair priority shall be in the order of Grade 1, Grade 2 and Grade 3.**

3. Leak Grades: Initial Report, Response, Action**A. Grade 1**

- 1. Initial Report (by Leak Surveyor or other qualified personnel)
 - (a) Any reading greater than 10% LEL 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 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.

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(h) A gas leak which in the judgment of the surveyor or supervisor is an immediate hazard.

2. Action

(a) Take immediate and continuous action to eliminate the hazard. Such action may include (but is not limited to) one or more of the following:

(i) Evacuate premises.

(ii) Vent the leakage.

(iii) Remove sources of ignition.

(iv) If burning, prevent spread of fire but not necessarily extinguish burning gas.

(v) Eliminate source of gas.

(vi) Restrict public access to area.

(b) Make continuous repair efforts until leak is eliminated or downgrade leak.

B. Grade 2**1. Initial Report (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% LEL and 80% LEL in a non-gas substructure where gas would likely migrate, creating a probable future hazard.

(d) Any reading between 20% LEL and 80% LEL 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 in or under a building or tunnel that does not qualify as a Grade 1.

(g) Any reading less than 10% LEL at the outside wall of a building or where gas could migrate to the outside wall of a building than 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 prior to repair every six months not exceeding the month following the anniversary month.

(b) Downgrade to No. 3 if non-hazardous and can reasonably be expected to remain so.

C. Grade 3**1. Initial Report (by Leak Surveyor or other qualified personnel)**

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

TITLE: Periodic Leak Surveys of Gas Transmission and Distribution Facilities**2. Action**

Recheck during next scheduled survey.

4. Leak Survey, General

- A. 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 the exercise of sound judgment in carrying out an effective leak survey program.
- B. Odors or indications from foreign sources (see Paragraph 8, Volatile Combustible Material In Soil.) 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.
- C. For leaks on customer's premises, refer to S.P. No. 460.21-3, "Investigating Gas Leaks on Customer's Premises", and S.P. No. 460.21-8, "Fumigation."

5. Frequency Of Periodic Leak Surveys

- A. **Annually** (in the period from the month preceding to the month following the anniversary date) where any one of the following criteria apply:
1. 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.
 2. Gas facilities in Class 3 locations covered by Paragraph 192.5(d)(i) and (ii), General Order No. 112-D, 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, and so forth. In all cases, schools, hospitals, business districts and churches must be surveyed annually.
 3. All transmission lines in class 3 locations.
 4. All transmission lines operating at 20% SMYS or over.
 5. All gathering lines.
 6. Gas facilities transporting unodorized gas.
- B. **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.
- C. **Every five Years** (within the month of the previous survey)
The balance of all underground gas facilities.
- D. **After leak repairs**
- The need for a follow-up survey 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.

TITLE: Periodic Leak Surveys of Gas Transmission and Distribution Facilities**6. Leak Survey Methods**

Following are the acceptable methods of gas leak survey:

A. 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).

B. Foot Survey:

1. 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.).
2. 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 the flame ionization intake, and by surveying pavement cracks and substructures.
3. Survey Procedures:
 - (a) Survey at exposed piping, at surface openings, pavement cracks and joints, unpaved areas, or at other locations where gas may vent.
 - (b) Survey over all services and meter sets.

C. Vegetation Survey (Visual surveillance of vegetation along the route of buried gas facilities):

1. 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.
2. May be performed by foot, vehicle, or aerial patrol.
3. May not be used on distribution facilities.

7. Records And Reports

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

- A. 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.
- B. For the surveys contemplated under Paragraph 5.A.2 a suitable records system shall be prepared.
- C. Leak numbers are to be assigned by operating department personnel .
- D. 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.
- E. The established computer system shall be utilized to allow the automatic transfer of the local leak information to the system database.
- F. 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.

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- G. Leaks in gas associated substructures shall be documented on field service tags and routed to the appropriate personnel.
- H. Completed record copies shall be turned in to the operating headquarters with the following information:
1. Dates surveyed, survey method, name of surveyor.
 2. 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.
 3. Location of all leak indications found.
 4. Plat sheet corrections required, as determined by inspection in the field.
- I. 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 Standard Practice 460.2-2.
- J. Records of leaks discovered and routine leak surveys shall be retained as follows:
1. For transmission mains, the records shall be kept on file as long as that section of main involved remains in service.
 2. For all other lines, the records shall be kept for the current and immediately preceding survey. Form A is to be kept for the life of the facility.
- K. Inspection records, in connection with leak repair or other pipe exposure shall be maintained for the life of the facility per Standard Practice 460.2-2.
- L. Operating Departments must perform periodic upload transactions to update the systemwide gas leak database.
- M. **Review:**
1. 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.
 2. Upon completion of the survey, or as the survey progresses, the program shall be reviewed by the division engineer or equivalent so that long-range plans, replacement studies, or other action can be formulated.

TITLE: Periodic Leak Surveys of Gas Transmission and Distribution Facilities**8. Volatile Combustible Material In Soil**

- A. If the source of the gas leak can not be found after a thorough field investigation by our 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:
1. 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.
 2. 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 Environmental Coordinator.
 3. If the combustible gas is not ours, the matter should be immediately referred to the public agency, property owner, and so forth, having the jurisdiction and a record made of the notification.
 4. 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.
- B. Local supervisors must ensure that their operating personnel are trained and that such training includes an awareness of sources of combustibles gas other than our own.
- C. Upon detecting foreign combustible material it is our responsibility to identify and report it immediately. The probability of combustible gas indications not being from our pipes is very low. Foreign combustible material is not to be blamed for every leak that is hard to find.