

# PACIFIC GAS AND ELECTRIC COMPANY

GAS TRANSMISSION AND DISTRIBUTION  
GAS ENGINEERING  
GAS SYSTEM INTEGRITY



## Risk Management Instruction

Instruction No. RMI-09

*System review for cross bored sewers, laterals and storm drains*

Prepared By: Redacted Date: 08/21/08 \_\_\_\_\_

Approved By: Redacted Date: 08/21/08 \_\_\_\_\_

Integrity Management Program Manager

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0	08/21/08	Initial Issue	<span style="border: 1px solid black; padding: 2px;">Redact</span>	<span style="border: 1px solid black; padding: 2px;">Redacte</span>
1	05/28/09	Added sections 5.3 through 5.8	<span style="border: 1px solid black; padding: 2px;">Redacte</span>	<span style="border: 1px solid black; padding: 2px;">Redacte</span>
2	<i>Master</i>			
3				

## *System review for cross bored sewers, laterals and storm drains*

### **1.0 PURPOSE**

- 1.0 The purpose of this procedure is to evaluate the gas system for locations where plastic gas facilities may be installed (cross bored) within unpressurized sewers, sewer laterals and storm drains.

### **2.0 DEFINITIONS**

- 2.1 Sewers – Unpressurized collection systems that gather customer effluent by gravity.
- 2.2 Laterals – Sewer laterals are the unpressurized customer lines from a business or residence to the sewer main or trunk line.
- 2.3 Storm Drains – Unpressurized collection systems that gather water runoff from streets. This includes the main as well as the vertical drop inlets.
- 2.4 Piercing tools - widely used for service installations. The tool is unguided and there are limited means of tracking its location. The tools work by displacing the soil around the bore.
- 2.5 Horizontal Directional Drills (HDD) - allows for the drill head to be steered as the bore is cut. The cuttings or spoil is removed from the bore along with drill mud which is injected to lubricate the head. This method allows for constant monitoring of the drill head position and tell-tale indications of trouble by a sudden drop in drill mud pressure or surge in the drill head when passing through a sewer or storm drain.
- 2.6 Priority sites – Sites where a release of gas within a sewer, lateral or storm drain would have greater consequence than other locations – hospitals, schools, condo and apartment complexes.
- 2.7 Cleared sites – Sites which have been evaluated by this procedure and are found to be a low risk for being cross bored with other infrastructure

### **3.0 INTRODUCTION**

- 3.1 Rooting or auguring of sewers, laterals and storm drains is a threat to portions of the gas distribution system that are inadvertently installed within third party infrastructure. Gas may be released within the third party infrastructure when sewer cleaning tools come in contact with plastic gas pipe. The speed of release and spread of gas within the host structure can affect multiple buildings simultaneously.
- 3.2 Gas pipes come to be installed within sewers, laterals and storm drains when trench less technologies are used for installation. Trenches technologies fall into two categories – piercing tools and horizontal directional drills. Both tools result in a horizontal hole through the soil that accommodates the installation of a gas

pipe. Prior knowledge of the location of other underground infrastructure is essential to avoid penetrating them with piercing tools or boring machines.

- 3.3 PG&E has used piercing tools since the 1950's. Their use is wide spread for short runs of 500 ft or less. Typically this would be a service installation where other methods such as inserting, splitting are not feasible. Most construction crews have them.
- 3.4 The first use of horizontal directional drilling (HDD) in PG&E was in 1971, when approximately 600' of 4" steel line was installed across a river bed. It became a common tool in the 1980's for the installation on new plastic distribution piping. HDD can be used to cut bores greater than 500'.

## 4.0 SCOPE

- 4.1 This procedure targets priority sites within the service area where a release of gas within a sewer, lateral or storm drain would have a greater consequence than other locations. These sites generally coincide with places where people gather over extended periods such as hospitals or schools and also include high density housing such as condo and apartment complexes.
- 4.2 This procedure addresses the cross bore configurations that are most likely to occur. This is where the gas pipe runs perpendicular to the threat. They include:
  - 4.2.1 2.3.1 Sewers and storm drains as a threat to:
    - 4.2.1.1 Long side services
    - 4.2.1.2 Gas mains at street intersections.
  - 4.2.2 Sewer laterals as a threat to:
    - 4.2.2.1 Gas mains between intersections.
  - 4.2.3 There are several configurations that are judged lower in risk and are not considered within the scope of this procedure. They correspond to locations where the gas pipes do not cross the threat or by material considerations. They include:
    - 4.2.3.1 Sewers and storm drains as a threat to:
      - 4.2.3.1.1 Short side services. Assumption: Sewers and Storm drains are thought to be in the center of the street. Short side services would not cross over them.
      - 4.2.3.1.2 Gas main installations within blocks bounded by intersections. Assumption: Gas mains run parallel to the threat.
      - 4.2.3.1.3 Non plastic materials. Assumption: metallic infrastructure (primarily cast iron and steel) would not fail in a sewer cleaning event.
    - 4.2.3.2 Sewer laterals as a threat to:

- 4.2.3.2.1 Short and long side services. Assumption: Sewer laterals are thought to run parallel to short and long side services.
- 4.2.3.2.2 Non plastic materials. Assumption: metallic infrastructure (primarily cast iron and steel) would not fail in a sewer cleaning event.

## 5.0 PROCESS

- 5.1 General - This procedure uses a three step process for identifying cross bored sewers laterals and storm drains at priority sites. The three steps are – Plat sheet review, Sewer Operator Records Review and Field inspection.
- 5.2 Plat Sheet Review –
  - 5.2.1 Identify priority sites - On a county by county basis, parcel map information is reviewed to identify the location of priority sites. This information is recorded as in a map layer in GIS. Each parcel record includes information on address, owner and land use as well as additional empty fields for investigation results. These sites fall into the following land use categories:
    - 5.2.1.1 Apartment
    - 5.2.1.2 Apartment & Commercial Store
    - 5.2.1.3 Condominium
    - 5.2.1.4 Convalescent/Nursing Home
    - 5.2.1.5 Dwelling/Apartments
    - 5.2.1.6 Hospitals
    - 5.2.1.7 Hotels
    - 5.2.1.8 Motels
    - 5.2.1.9 Office & Apts
    - 5.2.1.10 Schools
    - 5.2.1.11 and where USEDESC IS NULL, USECODE = COS, DBM, LZB, MIX, TH, ZBM assumed to be Condos/Townhomes per aerial photography.
  - 5.2.2 Match parcel map layer to Gas plat tif files – The gas plat tif files are images of the gas plat sheets showing the configuration of gas services and mains. These images are not interactive in GIS but can be scaled to the same scale as the parcel map layer. When the parcel map and tif file are geographically aligned, the specifics of the gas facilities can be seen with respect to the priority sites.
  - 5.2.3 A reviewer views each site and answers questions concerning the configuration of the site. The answers will either clear the site as not being at risk for threats in scope or not clear it. All not cleared sites move to the next step - Job Package review. The answers to the questions are record in the empty fields on the parcel map layer in GIS. The parcel questions are as follows:

- 5.2.3.1 JT is Y/N: Is the service is indicated as “Joint Trench” or “JT”? All joint trench construction is assumed to mean open trench for main and service.
- 5.2.3.2 Plastic is Y/N XX: Is the service is plastic? What is the year of installation? The year installed is input as XX. Non plastic services are assumed cleared.
- 5.2.3.3 Short Side is Y/N Z: Is the service a “short side” service yes/no or Z.
- 5.2.3.4 A service is “short side” if the main feeding it is on the same side of the street, parallel to the right of way boundary, and within 33% of the width of the street from the right of way boundary.
  - 5.2.3.4.1 The Z code is used when the service is neither short side nor long side. This occurs when it is not the service that crosses the street but the main itself. This is often the case in new developments when a main branches off another main to supply a large development. Use of the Z code requires additional comments in the comments field as follows:
    - 5.2.3.4.1.1 Is the main feeding the service a long side main as it cuts the street? If so enter “long side threat” in comments column.
    - 5.2.3.4.1.2 Is the main feeding the service a short side main as it cuts the street? If so leave the comments column blank.
    - 5.2.3.4.1.3 Is the main feeding the service neither long nor short? If so enter “Z” in the comments followed by “long”, “short” or “long&short” to indicate the condition of the main or mains feeding the parcel at the street.
- 5.2.3.5 SVC before 1971 is Y/N: Was the service installed before 1971? HDD was first introduced in 1971 and began widespread use after 1980. (May want to consider dropping this to capture more of the piercing tool effects.)
- 5.2.3.6 SVC Precedes Main is Y/N: Does the service installation date precede that of the main? This suggests the main was replaced and the service was “cut, test and transfer”.
- 5.2.3.7 Main JT Y/N: Is the main is indicated as “Joint Trench” or “JT”? All joint trench construction is assumed to mean open trench for main and service.
- 5.2.3.8 Main before 1971 Y/N: Was the main installed before 1971?
- 5.2.3.9 Main Plastic is Y/N: Is the main is plastic?

- 5.2.3.10 Inserted Service Y/N: Is the service inserted?
- 5.2.3.11 MainJobNum XXXXXXXX YY? What is the main job number and year of installation? Enter job number as XXXXXXXX. Enter year as YY. Job number need not be preceded by alpha characters.
- 5.2.3.12 Comments
- 5.2.3.13 Reviewer: Enter PG&E ID of reviewer.
- 5.2.3.14 Date: Enter the date which the parcel was reviewed.
- 5.2.4 When the plat sheet review is complete ad algorithm is applied to the answers stored in the parcel record. The results of the algorithm either clear or don't clear the parcel from further consideration.
- 5.2.5 Quality control and assurance – The plat sheet review is a repetitive process. To insure accurate results the process included reviewer training and auditing results.
  - 5.2.5.1 Reviewer training – Before beginning the work each reviewer receives training on the operation of the GIS data base and the steps required to review a parcel and record findings. The reviewer is provided a copy of the process in written form. Use the following link to view the training documents: [Protocol and Training Materials\GIS\\_instructions.doc](#)
  - 5.2.5.2 Auditing results – each week a sample of 25 parcels records are selected from each reviewers work. An auditor reviews these records and produces a report of the % agreement with each auditor. The results are discussed in a weekly team meeting. Click on the following link to view audit results: [Audit Results](#)
  - 5.2.5.3 Ongoing training – The weekly team meetings include a review of the audit findings for the previous week. Samples of findings are shared with the team to continuously improve skills.
  - 5.2.5.4 Audit results and weekly training updates are recorded in the minutes of each team meeting. A link to the minutes is as follows: [MeetingMinutes](#)
- 5.2.6 Order of parcel review – The order of progress generally follows a listing of problem areas by county. Other issues such as parcel map availability may cause the work schedule to deviate from the plan. The link to this plan is [Protocol and Training Materials\Protocol\DIGGIN\\_boring091307.xls](#)
- 5.2.7 The progress whiteboard is a tool to check progress of county reviews on a weekly basis. The link to the progress whiteboard postings is [ProgressWhiteBoard](#)
- 5.3 Use of other PG&E data bases to determine threats -
  - 5.3.1 The Plat sheet review in section 5.2 results in a list of parcels where PG&E's gas facilities may be threatened and the consequence of damage is elevated.

- 5.3.2 Limited historical data indicate threats may also exist where the consequence is not elevated. These threats may be numerically superior to the results in section 5.2.
- 5.3.3 Company activities which may have produced threats outside the results in section 5.2 are as follows:
  - 5.3.3.1 Gas Pipeline Replacement Project (GPRP)
  - 5.3.3.2 Copper Service Replacement Project
  - 5.3.3.3 New Capacity
  - 5.3.3.4 Work Required by Others
  - 5.3.3.5 Reliability Project that are not GPRP
- 5.3.4 As geographic information from these projects is made available it will be entered into GIS data base and evaluated in the Sewer Operators Records Review (section 5.4)
  - 5.3.4.1 Service installations may be added as point data to the associated parcel.
  - 5.3.4.2 Main installations may be added as line data from digitized plat sheets.
- 5.4 Sewer Operators Records Review – The Plat sheet review in section 5.2 results in a list of parcels where PG&E’s gas facilities may be threatened and the consequence of damage is elevated. At this point it is not known if there is a conflict exists with other infrastructure. The first step in determining conflict is the review of the Sewer Operators records.
  - 5.4.1 Obtain records of sewer and storm drain location. The order of preference of data format is as follows:
    - 5.4.1.1 Electronic map layer suitable for use in PG&E’s Geographic Information System (GIS).
    - 5.4.1.2 Digitized versions of paper map records
    - 5.4.1.3 Digitized versions of paper map records
  - 5.4.2 Obtain records of any pervious sewer and storm drain video inspections. The preference of data format is as follows:
    - 5.4.2.1 Electronic map layer suitable for use in PG&E’s Geographic Information System (GIS).
    - 5.4.2.2 Digitized versions of paper map records
    - 5.4.2.3 Digitized versions of paper map records
    - 5.4.2.4 Tabular lists
  - 5.4.3 Generate map layers in PG&E’s GIS with the information obtained in 5.3.1 and 5.3.2.
  - 5.4.4 Review each parcel from section 5.2 (Parcels with a possible threat and elevated consequence) and section 5.3 (other PG&E data bases) for sewer or storm drain infrastructure conflicts.
    - 5.4.4.1 A conflict will be assumed if a sewer or storm drain is shown within the same street as the parcel’s gas service or main.
    - 5.4.4.2 The parcel will be cleared of threats if no sewers or storm drains are present in the same vicinity as the parcel’s gas service and main.
    - 5.4.4.3 The parcel will be cleared of threats if the sewer operator has record of a video inspection showing no conflict conducted after the installation of the service & main.

- 5.4.5 The sewer operators source documents of video inspections should be sampled to insure the quality of findings.
- 5.5 Field Inspections – The results from section 5.4 (Sewer Operators Records review) will demonstrate no conflict for some parcels, addresses and line installations. For the remaining parcels, addresses and main installations and field inspection is required.
  - 5.5.1 Review PG&E field installation data to determine if the site was installed by directional drilling or piercing tools.
    - 5.5.1.1 Older project files may not be conclusive as to the installation methods used.
    - 5.5.1.2 GPRP files for the last several years has documented the as built installation methods. The information is in tabular form for main installations.
    - 5.5.1.3 Generally service installation methods are only available in the service order records at the local PG&E offices.
    - 5.5.1.4 The location is cleared if field installation data is conclusive of the method used and it was not directional drilling or piercing tools.
- 5.6 For parcels not cleared in the plat review (5.2), Sewer operators review (5.3) or the PG&E field installation data review(5.5.1) field inspection shall follow this guidance:
  - 5.6.1 Site is cleared by field inspection if the wall to wall distance of the gas facilities and sewer or storm drain infrastructure is greater than 12 inches.
    - 5.6.1.1 Gas infrastructure depth can be determined by PCM measurements.
    - 5.6.1.2 Sewer and storm drain depth can be determined by linear interpolation of actual depth measurements at manholes located on opposite ends of a city block.
    - 5.6.1.3 Sewer and storm drain depth can not be extrapolated.
    - 5.6.1.4 Lateral depth can not be interpolated or extrapolated.
  - 5.6.2 For sites not cleared by 5.6.1 a video inspection is required.
    - 5.6.2.1 Video inspection of the sewer or storm drain from one intersection to the next adjacent intersection shall clear all the services on that block from threats due to the sewer or storm drain.
    - 5.6.2.2 Video inspection of sewer laterals will clear the gas main from threats associated with a perpendicular lateral.
- 5.7 Reporting – Reporting to management will include the following information:
  - 5.7.1 A list of selected sites to be reviewed on a county to county basis.
  - 5.7.2 The number of selected sites cleared by a review of the Sewer Operators information and Field Inspections
  - 5.7.3 The number of additional sites cleared by a review of the Sewer Operators information and Field Inspections. These would be sites adjacent to the selected sites that are cleared as a result of the work on the selected site.
  - 5.7.4 The number and location of sites where cross bored infrastructure has been found.



- 5.7.5 The status of work to repair cross bored sites. It is anticipated that repairs will be done on an expedited basis.
- 5.8 Schedule – the 2009 schedule will follow the proposed schedule in latest cross bore spending plan and schedule.

\*\*\* End of Procedure \*\*\*