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Cross Bore Best Practices – Best Practices Guide

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Table of Contents

OTD	1
Legal Notice.....	ii
Table of Contents.....	iii
FOREWORD.....	1
EXECUTIVE SUMMARY	2
INTRODUCTION	7
BACKGROUND	8
SUMMARY OF BEST PRACTICES	10
LEGACY CROSS BORE GUIDELINES	12
INVESTIGATIVE TECHNIQUES – OFFICE.....	12
INVESTIGATIVE TECHNIQUES – FIELD	13
COMMUNICATIONS and EDUCATION.....	17
INTERNAL	17
EXTERNAL.....	20
NEW INSTALLATIONS GUIDELINES.....	28
COMMUNICATIONS and EDUCATION.....	31
INTERNAL	31
EXTERNAL.....	33
ORGANIZATIONS	37
Appendix A – NTSB Incident Summary and Recommendations 1976.....	39
Appendix B – GPR Soil Suitability Map	42
Appendix C – Communications and Education.....	42
C-1: Frequently Asked Questions/Responses	43
C-2: Brochures	46
C-3: Door Hangers.....	50
C-4: Sewer Tags	54
C-5: Press Releases	55
C-6: Direct Mailing Examples.....	57
C-7: Items for Training	59
Job Site Briefing – Investigating Potential Cross Bores in Existing Installations.....	61
Job Site Briefing – Preventing Cross Bores in New or Replacement Installations.....	62

C-8: Examples of Procedures – Source Duke Energy 63

Appendix D – Cross Bore Related Proposed Legislation and Regulations72

Proposed Legislation – One-Call Notification Programs..... 72

Regulations..... 72

Minnesota Alert Notice to Underground Gas Pipeline Operators 72

Alert Notice to Underground Gas Pipeline Operators 72

Code of Virginia, Title 56, Chapter 10.3 – Underground Utility Damage Prevention Act..... 74

FOREWORD

This Cross Bore Best Practices Guide (Guide) is the result of the identification of a need for a single source of information that could be used by natural gas distribution system operators to investigate and remediate existing cross bores as well as prevent future cross bores. Our sponsoring organization recognizes that the use of trenchless technology to install natural gas mains and services may inadvertently transect another underground utility, specifically a sewer line or septic system, resulting in a potentially unsafe situation.

The development of this Guide included the review of information from a wide variety of sources across North American (excluding Mexico) including numerous natural gas distribution companies that were either individual companies or multiple companies as part of a larger holding company referred to here as Local Distribution Companies (LDCs), installation contractors, remediation contractors, equipment providers, industry associations and industry literature. The combined customer base of the 23 LDCs interviewed represent 80% of the 75 million natural gas customers in the United States and Canada. The information included in this Guide summarizes the best practices to investigate and remediate existing cross bores and to avoid future cross bores during the process of installing new mains and services. Specific conversations and company specific documents have been kept confidential unless the information is in the public domain or a release has been provided by the company.

EXECUTIVE SUMMARY

This Guide provides a set of best practices for the natural gas industry for the investigation and remediation of existing cross bores as well as the prevention of future cross bores. A cross bore could be any one of several types of utilities intersecting another utility, this set of best practices is focused on natural gas lines intersecting with a sewer or septic system as a result of the use of trenchless technology.

For simplicity, the terms sewer or sewer system are used exclusively throughout this Guide to represent both the sanitary and storm sewer systems, as well as private septic systems. This Guide provides best practices, methodologies, technology recommendations, and procedures for identifying and detecting existing cross bores, clearing potential cross bores and preventing new cross bores.

The first recorded incident involving a cross bore occurred in Kenosha, Wisconsin on August 29, 1976 at a home that was not served by natural gas. The National Transportation Safety Board (NTSB) investigated the incident and issued the following set of recommendations in November of that year.

NTSB Recommendations

- Complete inspection of those locations along the construction route where gas mains and sewer laterals may be in proximity to one another and correct any deficiencies.
- Examine records to determine other locations where gas lines were installed near existing sewer facilities (including a review of sewer blockage complaints), then inspect these locations and take corrective action where necessary.
- Revise construction standards to require the underground facilities be located accurately before construction and to provide protection for these facilities near boring operations.
- Inform inspectors and supervisory personnel of the circumstances of this accident, train them to be alert for similar conditions, and advise them of preventive actions.

The NTSB's recommendations from 1976 capture the core of the best practices included in this Guide.

The intersection of a sewer with a natural gas line has the potential to create a safety concern if the intersection results in a blockage of flow through the sewer system. Typical cleaning operations to clear a sewer blockage use a device that can pierce the natural gas line resulting in the rapid release of natural gas. This rapid release may result in the natural gas traveling back through the sewer system into the premise with the potential to create an unsafe situation.

During the development of this Guide it was noted that the status of cross bore program development ranged from thorough and active with a full dedicated staff to those just getting underway to none at all. Consequently, the benefits from this Guide will range from an opportunity to fine tune a program and improve the accuracy and efficiency of procedures to providing a foundation for the development of a new program. Out of the 23 companies interviewed, 83% had included or were planning to include cross bores in their Distribution Integrity Management Programs. The reasoning provided for not including cross bores ranged from "no way of assessing the risk" to "they don't track install type" to "no reason". In all cases, it is recommended that the inclusion of cross bores be included in the Distribution

Integrity Management Program of every company that used or uses trenchless technology as an installation method.

The DIMP regulations (PHMSA, DOT Section 192.1005 – 192.1013) require operators of natural gas distribution systems to develop and implement an integrity management program that includes the establishment of a distribution pipeline safety program where operators track and trend the performance of materials in their system, monitor performance, and conduct leak surveys. Included in this plan are the identification of threats and a risk based assessment process. This risk based assessment process makes an evaluation and ranking of risks. It also determines and implements measures designed to reduce risks followed by a performance based monitoring program resulting in a determination of “fit for service.” The regulations are striving for increased safety using a combination of smart modernization and enhanced operating, maintenance, and communications processes and procedures.

To determine if regional issues played a role in the approach to cross bores, the 23 local distribution companies (LDCs) interviewed were divided into five regions – Mid-South (6), Mid-West (6), Northwest (3), Northeast (5) and Southwest (3). The majority of the differences in the approach used to assess the potential for a cross bore were obvious such as the likelihood of a full basement or the need to construct the sewer at a depth to be below the level of frost penetration in the north. Soil conditions, the influence of existing or proposed legislation, the use of the One-Call System or the Call Before You Clear programs, the use of bi-lingual outreach materials and other factors varied between companies sometimes within the same region. As regional differences were noted they are identified in the Guide.

The first section of the Guide provides best practices and general guidelines for LDCs on the cross bore topic. A quick guide is provided that captures the primary items that should be used to focus the development of each LDCs best practices:

Quick Guide

- Comply with all regulations
- Dedicate resources
- Do not assume a lack of a natural gas service precludes a location from having a cross bore
- Use a record keeping system that is fully auditable
- Use a GIS
- Use a risk based approach
- Include cross bores within the DIMP Plan
- Develop operating procedures and training programs specific to cross bores
- Coordinate information exchange with One-Call Systems

The second section of the Guide provides best practices for addressing cross bore events that currently exist due to previous installations, referred to in the Guide as *legacy installations* or *legacy cross bores*. The approach used to conduct the investigations varied and in most instances was evolving. Of the

companies interviewed, 39% have a legacy program in place, 17% are developing a legacy program, 13% do not have a legacy program but are exploring the option, and 30% do not have a legacy program. Several companies indicated that a "found" cross bore was the best indicator that there may be others in the immediate area.

To-date, only 17% of the companies indicated that they have made a process change that facilitates inspection or discovery of legacy cross bores. Among the process changes made, the best practices noted was the initiation of a collaborative effort with the sewer operators. If worked properly, advantages can accrue to the utility as well as the sewer operator. Other process changes included the creation of a separate department to maintain focus and awareness or an integrated team with staff from various departments all with a common goal, focus, and awareness.

The most cost effective approach to the investigative efforts for legacy cross bores uses a risk-based approach that progresses from an office review of records to a focused field investigation and remediation. The following table provides an overview of the approaches discussed during the interviews regarding legacy investigations.

PRACTICE	INVESTIGATIVE APPROACH
Customer Type	Similar to public building inspections in a typical leak survey program. The type of customer can impact the magnitude of the potential outcome if an issue occurs.
Previous Claim Experience and/or Incident Reports	When a cross bore is reported it is probable that others may have occurred in the same area due to similar utility installation practices or field conditions.
Data Range	A determination of the date when trenchless technology was first used and/or the period when changes or improvements were made in the technique influenced the time period when a change in risk occurred.
Survey Completed Projects	Surveying completed trenchless technology projects on a random basis to identify patterns.
Service Path	Establishing the horizontal location of the sewer line and the crossing gas line through mapping and/or field locates to exclude the potential for the two facilities to intersect.
Risk-based with Attributes	<p>Develop a list of attributes, which may be weighted, where each attribute would increase the probability of a cross bore occurrence. Risk attributes can be used in a matrix or added to prioritize investigations.</p> <p>The attributes would relate to the installation "environment" and would include but not be limited to:</p> <ul style="list-style-type: none"> • Natural gas service depth • Sewer system depth • Service material type • Service installation type • Basement floor depth below surrounding grade • Building on slabs or with crawl spaces • Trailer parks • Sloped building lot • Water table elevation

- | | |
|--|--|
| | <ul style="list-style-type: none">• Previous claims and/or incident reports in a specific locale |
|--|--|

The development and deployment of a communications and educational outreach program was among the first steps taken by those companies interviewed that were addressing legacy installation with 70% having an outreach program and another 13% in the process of developing a program. Sewer tags were commonly used to alert plumbers or do-it-yourselfers of the potential issue along with websites, bill inserts, advertising, etc. to raise awareness within the general public. Of the 70% with an outreach program 56% have active training programs with plumbers and sewer cleanout companies.

Companies or their contractors commonly use a job site briefing at the beginning of each work day to ensure the crew is focused on safety and everyone is aligned on the tasks of investigating potential cross bores. A job site briefing is provided to focus the field investigations of existing installations:

Job Site Briefing – Investigating Potential Cross Bores in Existing Installations

- Establish a tolerance/safety zone with a minimum clearance of 2 foot/0.6 meters horizontal and 1 foot/0.3 meters vertical based on sewer and natural gas mark-outs
- Do not assume the depth or location of any facility, use locating tools to pinpoint the sewer and natural gas lines
- Use a camera to verify no crossing bores occurred, or
- Hand dig/pothole at each cross point or parallel construction within the tolerance zone to verify location of natural gas and sewer lines
- Repair all cross bores prior to leaving the site
- Schedule repair of intersected facilities and property restoration

The third section of the Guide is focused on preventing cross bores during new installations. Over 87% of the companies noted that they have taken actions to improve the trenchless technology approach being used, with over 50% indicating that those actions were taken since 2008. The most common method used to reduce risk of a cross bore during new installations was to expose the sewer at the potential point of intersection and observe the bore as it passes each intersection as well as when the reamer is pulled back. The next most common approach was the use of a camera inspection prior to and following the installation which may be done in combination with exposing the sewer at the potential point of intersection.

New technologies have the potential to assist in the prevention or discovery of a cross bore during new installation. Of those interviewed 70% of the companies indicated that they were not exploring new technologies with 17% indicating they were involved with technology development efforts at GTI.

As with the summary of methods to focus the field investigation of existing installations, a job site briefing is also provided to ensure that the installation crew is focused on safety and the tasks required for new installations:

Job Site Briefing – Preventing Cross Bores in New or Replacement Installations

- Establish a tolerance/safety zone with a minimum clearance of 2 foot/0.6 meters horizontal and 1 foot/0.3 meters vertical based on sewer mark-outs.
- Do not “blind bore” or assume the depth or location of any facility. Pothole to expose all parallel or crossing utilities and observe the bore as it passes each intersecting utility as well as when the reamer is pulled back.
- Use a camera for pre and post installation inspection to establish the condition of the sewer prior to installation and to verify no cross bores occurred during the installation, or
- Hand dig/pothole at each potential cross point or parallel construction within the tolerance zone
 - Observe/verify location of crossing natural gas and sewer lines
- Repair all cross bores identified during post installation inspection prior to leaving the site.
- Schedule repair of intersected facilities and property restoration.

The Guide also provides contact information for organizations with additional information and a series of appendices that provide the full text of the NTSB summary of the first incident investigation in 1976, examples of a wide variety of communications and education materials, a summary of cross bore related legislation and regulations and a summary of technologies under evaluation for further development to detect if a transaction of a sewer line has taken place as part of a new installation.

INTRODUCTION

This Guide provides a set of best practices for the natural gas industry for the investigation and remediation of existing cross bores as well as the prevention of future cross bores. ***A cross bore is defined as an intersection of an existing underground utility or underground structure by a second utility installed using trenchless technology resulting in direct contact between the transactions of the utilities compromising the integrity of either utility or underground structure***¹. As implied by this definition, a cross bore could be any one of several types of utilities



intersecting another utility. In most cases, if the intersection was with an electric, communications, water, or natural gas line, the incident would be apparent at that moment or shortly thereafter. However, if the intersection is with a sewer line, the event may go unnoticed until a blockage takes place and a corrective action is initiated. Specifically, this set of best practices is focused on remediating existing intersections and preventing future intersections of a natural gas line with a sewer or septic system.

The first recorded incident involving a cross bore of a sewer line by a natural gas line occurred at a home that was not served by natural gas in Kenosha, Wisconsin on August 29, 1976². Based on the results of the investigation into this incident, the National Transportation Safety Board (NTSB) issued the following set of recommendations on November 12, 1976. The NTSB recommendations have been generalized here for purposes of this Guide. (The full text is included in Appendix A).

- Complete inspection of those locations along the construction route where gas mains and sewer laterals may be in proximity to one another and correct any deficiencies.
- Examine records to determine other locations where gas lines were installed near existing sewer facilities (including a review of sewer blockage complaints), then inspect these locations and take corrective action where necessary.
- Revise construction standards to require the underground facilities be located accurately before construction and to provide protection for these facilities near boring operations.
- Inform inspectors and supervisory personnel of the circumstances of this accident, train them to be alert for similar conditions, and advise them of preventive actions.

This set of recommendations from 1976 captures the guidelines of the cross bore best practices for legacy installations provided in this Guide.

¹ Cross Bore Safety Association, <http://www.crossboresafety.org/>

² National Transportation Safety Board, Safety Recommendation(s), Pg. 76-83 through 76-86, Issued November 12, 1976. http://www.nts.gov/recs/letters/1976/P76_83_86.pdf

BACKGROUND

Cross bores have become an industry concern because of several recent incidents involving natural gas mains and services that were installed using trenchless technology and inadvertently transected a sewer line or private septic system. When a gas pipe blocks the flow through a sewer or septic service, a plumber may be called or the owner may attempt to remove the blockage. Typical cleaning operations use a device that can pierce the plastic gas line, resulting in the rapid release of natural gas.

Whereas some companies have begun thorough programs to inspect past trenchless gas pipe installations to ensure cross bores have not occurred, other operators have not started such a program or are in the early stages of development and would benefit from a set of best practices to serve as a foundation for the development of their own program. Even for those operators with programs in place, additional information is desired to assist in identifying potential cross bores and improving the accuracy and efficiency of their procedures.

In the fall of 2010, Operations Technology Development³ (OTD) conducted a workshop to develop a research and development roadmap for addressing cross bores. The result of the workshop was a matrix of industry needs which included tools to prevent and detect cross bores, best practices, information, and processes. This Guide addresses one of the needs identified in the workshop. Efforts continue on the other high priority needs.

To develop this Guide, information was gathered from a wide variety of sources across North American (excluding Mexico) including numerous Local Distribution Companies (LDCs), installation contractors, remediation contractors, equipment providers, industry associations and industry literature. A listing of organizations with information and training materials on cross bore is provided to compliment the information summarized in this Guide. Information has been combined to create a single cohesive Guide. Specific conversations and company specific documents have been kept confidential unless the information is in the public domain or a release has been provided by the company.

This document represents the results of this research and provides a Guide for use by operators to reduce their risk and exposure to the threat of cross bores. For simplicity, the terms sewer or sewer system are used exclusively throughout this Guide to represent both the sanitary and storm sewer systems, as well as private septic systems. This Guide provides best practices, methodologies, technology recommendations, and procedures for identifying and detecting existing cross bores, clearing potential cross bores and preventing new cross bores.

The first section of the Guide provides best practices and general guidelines for LDCs on the cross bore topic. The second section of the Guide provides best practices for addressing cross bore events that currently exist due to previous installations, referred to here as legacy installations or legacy cross bores. The third section of the Guide is focused on preventing cross bores during new installations.

³ OTD was established in May 2003 as an Illinois not-for-profit company to facilitate voluntarily funded, collaborative research on issues related to gas operations and infrastructure, with a focus on reducing operating costs, enhancing safety, and increasing the operating efficiency of natural gas distribution systems. OTD's membership has grown to 23 members, representing utilities throughout North America. www.otd-co.org

Distribution Integrity Management Programs (DIMP)

The DIMP regulations (PHMSA, DOT Section 192.1005 – 192.1013) require operators of natural gas distribution systems to develop and implement an integrity management program that includes the establishment a distribution pipeline safety program where operators track and trend the performance of materials in their system, monitor performance, and conduct leak surveys. Included in this plan are the identification of threats and a risk based assessment process. This risk based assessment process provides an evaluation and ranking of risks. It also determines and implements measures designed to reduce risks followed by a performance based monitoring program resulting in a determination of “fit for service.” The regulations are striving for increased safety using a combination of smart modernization and enhanced operating, maintenance, and communications processes and procedures.

Out of the 23 companies interviewed, 83% had included or were planning to include cross bores in their Distribution Integrity Management Programs. The reasoning provided for not including cross bores ranged from “no way of assessing the risk” to “they don’t track install type” to “no reason”. In all cases, it is recommended that cross bores be included in the Distribution Integrity Management Programs of every company that used or uses trenchless technology as an installation method.

SUMMARY OF BEST PRACTICES

The use of trenchless technology to install natural gas mains and services has been an industry practice since the 1970s. Any natural gas LDC using trenchless technology has the potential to have a cross bore event within their delivery system. Each LDC should:

- Comply with all regulatory guidelines within the state/provincial or local jurisdictions served.
- Evaluate whether the potential for a cross bore event exists within the natural gas delivery system and dedicate resources to complete the investigation of legacy installations and establish procedures, training, education and communications to prevent future events.
- Be able to answer – “Was any form of trenchless technology used to install mains or services?”
 - By the company?
 - By a contractor?
 - By a company acquired or part of a merger?
 - As a result of a propane system converted to natural gas?
- Do not assume that the lack of a natural gas service installation excludes the location from having a cross bore.
- Provide support from the highest level of the organization and dedicate the necessary resources to develop a program to evaluate the potential for cross bores throughout the delivery system and remediate what is found.
- Create a separate department to maintain focus and awareness or an integrated team with staff from various departments all with a common goal, focus and awareness.
- Use a coordinated and consistent methodology across the company to investigate and remediate existing cross bores and to prevent future cross bore events.
- Use a record keeping system to ensure all procedures, records, and techniques are fully auditable or third-party verifiable and is in compliance with federal and state/provincial requirements. The review of every potential cross bore should be documented with date/time stamps and signed by a representative of the company.
- Use a Geographic Information System (GIS) to collect and organize data, systematically manage the evaluation process, assess the risks and prioritize the approach for remediation.
- Use a risk based approach such as leak classification, high consequence area (HCA) criteria or one that recognizes physical attributes that increase the potential for a cross bore (ex. shallow sewer system, shallow basement, sloped lots, trailer park installations etc.) to prioritize the investigative efforts.
- Develop operating procedures and training programs specifically to investigate legacy cross bores and processes to prevent future cross bores.

Quick Guide

- Comply with all regulations
- Dedicate resources
- Do not assume a lack of a natural gas service precludes a location from having a cross bore
- Use a record keeping system that is fully auditable
- Use a GIS
- Use a risk based approach
- Include cross bores within the DIMP Plan
- Develop operating procedures and training programs specific to cross bores
- Coordinate information exchange with One-Call Systems

- Coordinate information exchanges with One-Call Systems.
- Advocate for the inclusion of sewer location information in the One-Call System databases
- Develop processes and facility installation techniques to prevent future cross bore events.
- Include cross bores as a potential risk factor within the company DIMP.

LEGACY CROSS BORE GUIDELINES

INVESTIGATIVE TECHNIQUES – OFFICE

Starting the investigation of legacy cross bores in the office using a risk-based approach provides a cost effective means to focus subsequent field inspections. There are a number of techniques, described below, that can be used to gather the data required to perform a risk-based assessment of the probability of a cross bore.

- Determine the date when trenchless technology was first used for the installation of either mains or services, consider excluding installations prior to that date
- Review natural gas system installation records and as-built drawings to establish the time and date of the installation, installation method, names of the installers, depth of the installation, horizontal location relative to the structure and/or road center line as well as any notations or observations
- Do not assume the lack of a natural gas service installation excludes the location from having a cross bore. A cross bore could have occurred as a result of the natural gas main having pierced the sewer lateral, even though no natural gas service was installed
- Determine the date when the sewer system was installed compared to when the natural gas system was installed. In some locales the natural gas system pre-dates the installation of the sewer system. In these instances, the premise was being served by a septic system rather than a sewer system. Field verification would be required to determine if the previously used septic system was in the front of the premise and, if so, was it completely abandoned eliminating it as a pathway into the premise
- Interview the installers of both the natural gas and sewer systems, where available, for information to assist in focusing the investigation and corroborating the finding with other sources
 - Attempt to determine if there are any known areas where the sewer installation may have resulted in burial depths that would be shallow and in the range of typical natural gas lines
 - Conversely, attempt to determine if there are locations where the natural gas lines may have been installed in conditions where the burial depth would be deeper than normal
 - Determine if there were instances when a cross bore event was noted and repaired that may not have been recorded, as it was considered to be part of normal procedures at the time
- Review property taxation records and databases to determine the depth of the exit point of a sewer from a premise. In some locales, the government agency responsible for taxation maintains records to indicate whether the structure has a basement, a crawl space, or is on a slab. This information can be used to establish a relative depth of the exit point for the sewer from the structure. The depth of the exit point coupled with records indicating the depth of the junction point of the sewer lateral with the main could be used to assess the potential for a cross point with the natural gas system, assuming the sewer system is gravity based.
- In addition to the relative depth information that may be established by knowing the exit point of the sewer from the structure, a topographic review of the land surface between the structure and the sewer main might provide valuable information. Again, assuming a gravity based system, the relative depth of the service lateral can be estimated and compared to the installation depth of the natural gas system
 - Also consider the relative depth of the sewer lateral could be a regional issue of frost penetration. Sewer and water installation may be at a depth of 40+ inches/100+ centimeters

or more to protect against freezing. Knowing the installation depth of the sewer system compared to the known depth of the natural gas system may allow the assessment of the potential for a conflict

- Review damage claim records for terms related to this topic – sewer, septic, sewer main, sewer lateral, sewage, blocked sewer, etc. Note any trends such as claims being more prevalent during a certain time period or in a particular geographic area or when using a specific contractor or installation technique
- Review county health department records as a potential source for sewer/septic system records
- Review road construction records, some locales record the location of facilities, including sewer systems, during a road project
- Review construction records to determine if the current structure, with the accompanying sewer system, is the original structure or if a previous structure had been occupied. It is possible to have more than one lateral on a parcel, with one being from a previous structure and it is no longer used. It is also possible the branched system may exist due to more than one structure being connected to the sewer system, prior to being connected to the main
- Use a GIS to collect the data needed for the investigation resulting in the creation of a relational database available throughout the company. The GIS can be used to assign locations for field investigations, track results, report progress, and trend the findings allowing future work to be directed at higher probability locations
- Ensure available procedures, record keeping, and techniques are fully auditable or third-party verifiable and in compliance with federal and state/provincial requirements

INVESTIGATIVE TECHNIQUES – FIELD

Following the completion of the office investigation of the legacy installations further investigations are required by field personnel to complete the process of clearing the system of potential cross bores.

Technologies and techniques that provide useful information during a field investigation include:

- A visual inspection of the area coupled with a working knowledge of typical construction techniques. Items that may assist in locating the sewer lateral as well as determining the relative depth and location include:
 - Sewer manholes.
 - Exterior cleanouts.
 - In those locales where the natural gas system pre-dates the installation of the sewer system, field verification is required to determine if a septic system is in the front of the premise and in the path of the natural gas installation or if a previously used septic system was completely abandoned eliminating it as a pathway into the premise. The first requirement is to determine if the septic system is still in use or if the premise has transitioned to the use of the sewer system. If the septic system is still in use, locate the septic system and the relative position of the septic lateral to the natural gas service. If the septic system is no longer in use, determine if the transition to the sewer system included a full abandonment of the septic system eliminating the septic system as a pathway for natural gas into the premise
 - Sewer construction materials – cast iron, plastic or non-metallic. If the sewer system was constructed using metal, it may be locatable with standard pipe locating equipment
 - Typical sewer installations may vary based on local geography or past usage. In most instances, unless the premise is constructed on a level lot with a full basement and the

- sewer exits through the floor, the sewer could be constructed at an elevation that could have been intersected by a natural gas installation and would need to be investigated
 - The proximity of the sewer line and blockage to the natural gas line can also be used for those instances where a field investigation is required due to a blocked sewer that may be the result of a cross bore
- One-Call System ticket mark-outs can be effective for locating potential cross point between the natural gas and sewer systems depending on the availability of records for the sewer system. The effectiveness of using the One-Call system varies by region. For those locales where the sewer operator participates in the One-Call system, the mains are typically mapped. In others, the location of the junction of the lateral on the main may also be available. The mapping of the lateral from the main to the structure is typically not known; however, this is changing on a state-by-state basis with states such as Minnesota requiring that all new sewer installations be locatable.



Figure 1 Example of Ground Penetrating Radar Equipment and Illustration of Results. Source USDA



Figure 2 Sewer Inspection Camera System. Source XCEL Energy

- Ground Penetrating Radar (GPR) can be an effective technology for locating underground utilities (Figure 1) depending on the site specific soil type. For areas with a high percentage of clay, the use of GPR may be marginally effective. Soils with more than 35% clay may restrict the penetration of the signal to no more than four feet while sand or gravel based soils may provide for signal penetration up to 16 feet/5 meters. The U. S. Department of Agriculture (USDA) provides a Soil Suitability Map for the entire country (see Appendix B) as well as specific maps for many states. A similar resource could not be located for Canada
- Truck mounted camera systems (Figure 2) or cameras on a cart with a reel and viewing monitor, or hand-held cameras inserted in sewer mains and laterals that include pan and tilt capabilities for increased maneuverability and software capable of simultaneously recording the image associated with a spatial reference is recognized as the most effective, although not the lowest cost tool, to detect cross bores. The majority of users of this technique chose the truck mounted version with the sewer main as the preferred entry point. Entry via the sewer main is considered to be the least intrusive to the customer. Depending on the technology used, guided cameras cannot be used in sewer mains that are larger than 40 inches in diameter or smaller than 8

inches in diameter. In instances where the mains are larger than 40 inches contractors opt to place an employee in the main with camera equipment, whereas in mains smaller than 8 inches a push camera is used. Surveying of the sewer progresses along the main to each lateral and then down each lateral to inspect for the presence of a cross bore. The effectiveness of a camera survey is dependent on the cleanliness of the sewer main or lateral. On average 30% of the mains and 15% of the laterals require cleaning. Sewer owners are under regulatory obligation to clean and inspect their system, a coordinated program between the sewer owner and the utility has the potential for mutually beneficial results. To ensure data integrity the data during a camera survey is to undergo a quality assurance review followed by plotting in a GIS. Where branch lines or multiple laterals are encountered dye tablets can be used to determine which line is in use or providing flow to the sewer system.

If access to the sewer main or lateral is not available from outside the structure, access may be gained through an existing external clean out in the sewer lateral or a new access point may be created.



Figure 3 Lateral and Mainline Probe for Lateral Launch. Source Video Industrial Services

Camera systems are also used for pre survey inspections and post installation verifications to ensure no cross bore events took place during new installations of gas facilities

- A probe, either tethered or un-tethered, can be launched into either a sewer main or service lateral. Probe configurations vary and may contain a camera with a light, a sonde, or a cleanout tool. An example of a lateral and mainline launch probe is shown in Figure 3.



Figure 4 Sewer Sonde. Source Radiodetection

- A sonde (Figure 4) provides a lower cost alternative to a camera with similar insertion and launch capabilities. If a sonde is to be used, a regular calibration regime should be established and may be required by some jurisdictions (ex. Minnesota Office of Pipeline Safety.) Sondes have multiple operating frequencies; different frequencies work better for different types of pipe. Effectiveness is also influenced by soil type and depth.

- Metal fish tape and a pipe locator (Figures 5 and 6) offer another low cost alternative to locate non-metallic sewer laterals where a cleanout is available and soil conditions are such that a pipe locator is effective. The metal fish tape is inserted along the length of the lateral and an estimate can be made of the location and depth to the sewer system with the pipe locator. A variation on the use of a metal fish tape is the use of the metallic cable that is part of the mechanical sewer cleanout equipment used to remove an obstruction. The cable can be detected by the same locator that is capable of detecting the metal fish tape.



Figure 5 Metal Fish Tape



Figure 6 Pipe Locator

- Potholing (also referred to as hand exposed or day-lighting) via hand or vacuum excavation or other methods that will not affect the integrity of the underground facility at the potential cross points is recommended if the use of a camera, camera with sonde or sonde is inconclusive. Potholing is also recognized as offering the lowest risk and lowest cost alternative to verifying that a single location is free of conflicts. Potholing requirements vary by company. It is recommended a minimum of 12 inches and preferably 24 inches be exposed on each side and below the sewer main or lateral to allow adequate viewing of the crossing point. In such cases, the location of the installed natural gas line needs to be visually verified to ensure that the pothole location is correct and that no cross bore has occurred.

The preferred method for conducting field investigations involves the use of a truck mounted camera system when the effort is to clear the sewer main as well as multiple service laterals at the same time. When a single service location is to be investigated, potholing which may also include the use of a metal fish tape and locator is the preferred approach providing a lower cost approach with less scheduling required for crews and equipment, with positive visual evidence at the cross points. All data collected during field investigations shall be maintained for future reference and entered into a GIS system or a permanent storage system that provides tracking and trend analysis as required by DIMP.

Interviews with LDCs and service providers confirm that the majority of the legacy field investigations are being conducted by contractors. Reasons for using contractors include but are not limited to: 1) the need for specialized and costly equipment, 2) training requirements for the use of specialized equipment, 3) unfamiliarity with the techniques required, 4) an interest in having a dedicated focused investigative effort in order to not share resources to accomplish the daily Operations and Maintenance (O&M) work, 5) availability of workforce and finally, 6) the recognition that the investigation of legacy installation will occur within a limited time period and is better suited to the use of specialists that can be used for a specified time period and then released.

In some locales such as Maryland, the entire sewer system is owned by one company. However, in most locations, the mains are owned by the municipality and the laterals are owned by the individual property owner. All field investigations should be coordinated with the sewer owner. Each sewer owner operates under requirements to clean and inspect their system. A cost effective and mutually beneficial exchange of information would result if the timing of the sewer system being cleaned for purposes of inspection was coordinated between the sewer operator and the utility/remediation contractor with legal access to the sewer being obtained prior to the start of field investigations. Among the best practices noted was the initiation of a collaborative effort with the sewer operators. If worked properly, advantages can accrue to the utility as well as the sewer operator.

COMMUNICATIONS and EDUCATION

A wide variety of audiences will be part of a cross bore program. These audiences will be comprised of personnel within the company, external contractors, government employees, and the public. Company personnel will range from those having regular contact with customers to field personnel to engineering. The external contacts will include, but may not be limited to, the customer or premise owner, plumbers, rental equipment business owners, the media, governmental agencies, and may include incident first responders. Examples of training material graphics and public relations items such as a set of responses to frequently asked questions, brochures, and press releases are included in Appendix C which is made up of 8 sub-sections for each of the various items used for communications and education. Communications and educational techniques are discussed for each potential audience below.

INTERNAL

Customer Service/Call Center Representative

The first point of contact for a natural gas utility related issue is often a Customer Service Representative (CSR) who may be located in a Call Center. CSR's need training on the topic of cross bores including what they are, how they may become a customer issue, and what types of communications should be provided to the customer. The training materials to explain what a cross bore is and the approach being taken to address cross bores should be company specific. Suggested training materials may include screen shots to illustrate how a particular software package may be used to document a call, as well as, several graphics showing what a cross bore is and how it could occur. Appendix C-7 provides information that may be useful to compliment the training and to help visualize how a cross bore could occur and techniques used for investigation.

Procedures for handling a cross bore related call should be clear and concise. It is recommended a procedure include a flowchart with a series of questions, allowing the CSR to quickly determine if further investigation is warranted and the level of urgency to be applied. Depending on the population being served, it may be appropriate to have the flowchart and the accompanying questions prepared in more than one language.

The call may originate from the customer or from a plumber at a customer's premise hired to clear a blockage in a sewer that is suspected to be caused by a natural gas line. The call could also come from a premise owner in the natural gas utilities service territory that does not have a natural gas service. Upon

receiving the call, the recommended questions and associated responses used by the CSR should include but may not be limited to:

- Q1. Is there any sign of a natural gas leak – odor, hissing sound, bubbles rising through standing water (ex. Toilet)?
 - A1a. If the answer is YES or Unknown (This could be due to a diminished sense of smell, odor fade in the system, or a hearing impairment), the recommended response should provide instructions to the caller that include:
 - Do not turn on or off anything electrical
 - Do not light a match, candle, cigarette or turn on or off any electrical appliances, lights or use any device that could cause a spark
 - Exit the building and stay (distance to be specified by the utility, recommended to be 150 feet/50 yards/50 meters) away from the area until a Field representative arrives and indicates that the area is clear.
 - The issuance of orders to Field personnel to investigate should follow the normal process of a Class 1 leak being reported.
 - A1b. If the answer is NO move on to Q2.
- Q2. Is the clog or blockage inside or outside the building?
 - A2a. If the answer is - the blockage is inside the building - indicate to the customer/premise owner the blockage is not a natural gas system issue and is the responsibility of the owner of the premise. Also indicate if it is later determined that there is a blockage outside the premise they should call back with updated information.
 - A2b. If the answer is that the blockage is outside the building state that the premise owner or plumber is to stop work until a utility representative arrives. Record the response and issue an order to investigate, the level of response should follow the normal process of a Class 1 leak being reported.

Data to be collected and information to be verified during the call would include:

- Address of the premise to be investigated
- Home phone number
- Callers name
- Access arrangements
- A phone number where the caller can be reached

Depending on the status of legacy cross bore investigations within the company it may be possible for the CSR to “clear” (determine there is no conflict) the affected address through a search of the company’s GIS cross bore database. If it is possible to clear the affected address, the customer or plumber representing the customer’s/premise owner’s location should be notified. The CSR should verify the address and advise the customer/plumber the location is clear. A phrase stating “According to

our records, there appears to be no conflict with your sewer lateral and our natural gas lines” could be used.

If the address cannot be verified as clear of any conflict it may be determined that a field technician should be dispatched, the level of response should follow the normal process of a leak being reported.

Dispatch Operator

A second point of receipt of customer calls by a utility may be an emergency response operator or systems dispatch operator. The training, procedures, flowchart, and questions outlined above for CSR’s or Call Center Representatives are anticipated to be the same for dispatch personnel.

Engineering

The investigative process to clear or correct potential cross bores results in the creation of useful data on existing facilities that may not have been captured initially. Data such as depth and GPS location of the gas system at every pothole, inspection information of the condition of the pipe or fittings, verification of the materials used during construction and other similar records for completeness, tracking and traceability may have value to the company. These assist in compliance with the DIMP (see DIMP FAQ’s in call out box) requirements regarding system records.

Another valuable outcome is the ability to use the investigative records obtained on the sewer mains and laterals. These can be used to create maps of those facilities for future design and engineering work.

Gas First Responders and Field Operations

Field personnel are a common point of contact with the public either due to curiosity, media investigations, or to normal field work where the activity includes the need to obtain access outside the public right-of-way or inside a premise. Depending on the approach taken to accomplish the work, company personnel may be directly involved or they may be on-site directing the activities of a contractor. They may also be called to the site as part of a response to a call received by Customer Service or Dispatch. All field personnel, either utility or contractor employees, should be trained and familiar with the programs goals and procedures (Appendix C-8). Appendix C-7 contains examples of training materials for use with field personnel as well as materials to be used to ensure personnel are familiar with the

DIMP FAQ’s

Question - C.4.b.3 The DIMP requirements include knowing the condition of facilities at risk for potential damage from external sources. Cross bores of gas lines in sewers have been reported at 2-3 per mile in high risk areas – predominately where trenchless installation methods were used for gas line installs and where sewers and gas lines are in the proximity of each other.

Does the potential for cross bore of sewers resulting in gas lines intersecting with sewers need to be determined?

Response - Yes, the threat of excavation damage includes consideration of potential or existing cross bore of sewers which have resulted in gas lines intersecting with sewers. Pursuant to § 192.1007(a)(2), the operator must consider information gained from past design, operations, and maintenance. If operators used trenchless technologies without taking measures to locate sewer laterals and other unmarked facilities during construction, there may be a risk their facilities were installed through the foreign facility. If this excavation damage threat applies to the operator, they must evaluate its risk to their system. Depending on the results of the risk evaluation, they may need to identify and implement measures to reduce this risk to existing and future facilities.

training being provided to others so they can properly respond to questions.

The training items for Gas First Responders and Field Operations personnel should include job site briefing information that would be used at the beginning of every cross bore legacy investigation. The job site briefing materials should be concise and emphasize the key points to be remembered during the daily work activities (see Appendix C-7).

General Utility Personnel

Communications may occur by word of mouth as employees are often also customers and it is fairly common for a non-employee to discuss utility related items with an employee. These discussions may be casual during off-hours or they may be while field work is taking place at the customer's premise or in the vicinity. Having educated employees on cross bore and an understanding of the safety benefits behind the program provide one of several communications tools.

EXTERNAL

Customers and Premise Owners

Communications with employees, customers, or premise owners in the service territory that are non-customers can also be made through the public media. Media items, discussed below, may include the use of a press release, news articles and newspaper, radio, or television advertisements. The company's website or utility outreach programs may also be used and designed to educate the public on safety. A training video may provide a simple and inexpensive method of informing a wide variety of audiences that could include plumbers, rental equipment providers, sewer operators, the media or customers if posted on the company website.

Bill inserts, direct mailings, door hangers, sewer tags, informational phone calls and social media are direct communications techniques with customers that can be used to effectively explain the cross bore program. Each of these direct communication techniques are discussed in more detail below.

Bill Inserts

A bill insert is one of many techniques used by the utility industry to inform their customers on a variety of topics. The challenge is in delivering the message in a form that is brief yet understandable. See Appendix C for examples of language used such as in Appendix C-1 for frequently asked questions/responses, C-2 for brochures or C-5 for press releases. The content should include:

- An emphasis on safety
- A bi-lingual message, if appropriate, for your service territory
- A statement with information on how rare the issue is for a sewer blockage to be the result of a natural gas line penetrating the sewer line in the past
- The customer does not have to be a natural gas customer for this to have happened as others around them have natural gas lines
- The steps they need to take if they suspect a blockage is in a sewer line outside the structure and related to a natural gas line
 - Do not attempt to clear the blockage with mechanical equipment

- Immediately stop what you are doing
- Do not light a match, candle, cigarette or turn on or off any electrical appliances, lights or use any device that could cause a spark
- Move at least 50 yards/50 meters away from the structure
- Call the natural gas company – the company should provide a phone number that is answered 24/7
- Call 911 if no such number is in use by the utility
- Provide a simplified graphic of what a cross bore is as many people benefit from a picture with a written explanation
- And finally, explain how the company will respond promptly to investigate at no charge

Direct Mailings

Direct mailings should contain information identical to the information described for the bill inserts (above) along with a letter of introduction from the company. An example of a direct mailing to a business owner is provided in Appendix C-6. A direct mailing compliments and re-enforces the other forms of communications to customers or premise owners. It should also be designed to reach those premise owners that are not natural gas customers but are within an area served by natural gas and may have a sewer blockage.

Direct mailings can take the traditional form of using the Postal Service. Direct mailings can also be accomplished through an email campaign with those customers using the company's electronic billing option or have voluntarily provided their electronic contact information. In addition, social media avenues such as Facebook, Twitter, etc. can also be effective.

For those mailings using the Postal Service, an added measure of safety can be provided by including a sewer tag (Appendix C-4 and discussed in more detail below) with an explanation of the purpose of the tag and instruction on where the tag should be placed.

Door Hangers

The purpose of door hangers (examples shown in Appendix C-3) is similar to, but more focused than, the bill inserts. A door hanger is used while a field investigation is underway in areas where cross bores could have occurred. As the inspections take place, it may be necessary to notify a customer or a premise owner that inspections are underway. It also informs the premise owner that a Field representative from the company or a contractor will be in the area. The only time a door hanger should be used is if the premise owner will be having their sewer inspected or located as part of a company sponsored program. The recommended contents of the door hanger include:

- A bi-lingual message if appropriate for your service territory
- An emphasis on safety
- A brief explanation of why the inspection is taking place
- A statement that access through the customer's or premise owner's sewer cleanout or roof vent may be required – NOTE: Several companies have stated they would not enter a premise to

gain access to the sewer due to liability concerns, if access could not be gained from outside they chose to create an access point/clean out outside the building.

- A statement of the day/dates when the inspection would take place
- The name and contact phone number of the inspector, it is not recommended the customer be encouraged to call the Call Center or System Dispatch.

Outgoing Calls and Other Forms of Customer Communication

Call Centers, either company based or contracted, have been used when specific utility related information needs to be conveyed on a timely basis. The method can be either an automated calling system or live calls directed at customers involved in the investigation. This approach can be used as a compliment to door hangers to inform the customer of an upcoming investigation in their area or at their premise. The script for the outgoing call in this instance would be similar to the information found on the door hanger. Outgoing calls can also be used to respond to customer inquiries for more information, if a phone number or website is used to indicate where additional information can be obtained or to respond to a recorded call or complaint.

Various forms of social media are becoming more common for everyday usage. Email is displacing the use of first class mail, Twitter, Facebook and text messaging are tools that can provide an effective mode of communications along with the use of a company website with links to sites containing additional information.

Equipment Rental Business Owners

The customer or plumber, in their attempt to deal with the sewer blockage outside the structure, may determine they need equipment that is commonly available for rent (i.e., sewer cleaning equipment). The equipment rental business owners can be a valuable source of information to the customer, premise owner or plumber. They can assist the utility by promoting a safe approach when clearing an exterior sewer line.

Educational techniques used with equipment rental business owners include direct mailings (Appendix C-6), posters and/or brochures (Appendix C-2) similar to, but with more detail, than the bill inserts explaining the topic of cross bore to the do-it-yourselfer or plumber. The request to the equipment rental business owner would be to place the poster or brochures in well-trafficked areas. When renting a mechanical device such as an auger or “snake” a brochure can be provided to the customer along with a brief explanation of the topic of cross bore. They can review the other safety and operational items normally provided prior to renting a piece of equipment. The level of cooperation of the equipment rental business owner may vary, in some locales it may be necessary to contract with a third party to restock the brochure racks.

Another informational item that has been developed for use with equipment rental owners is decals affixed to the equipment as a reminder to the user of the need to proceed with caution.

First Responders (external)

Some building occupants and/or plumbers may not call the utility company, but rather contact local emergency personnel. A 911 call may be the result of a customer, premise owner, or plumber

encountering a blocked sewer. The use of the 911 system may be at the recommendation of the utility or it may be the default response when the person dealing with the blockage is not sure who to call. The second reason a first responder may be called is that a natural gas related accident has occurred and emergency assistance is required.

In the case of a 911 call where a natural gas line is suspected of creating a blockage in a sewer line, the training, procedures, flowchart and questions outline above for Customer Service/Call Center Representative should be used. The additional item for the first responder is a phone number that can be reached on a 24/7 basis if a utility response is determined to be appropriate.

In the unfortunate situation where an accident has taken place, the first responder would respond in the same manner used during a leaking natural gas situation, a natural gas fire, or explosion. In each of these instances, training and procedures should be followed that are for a natural gas incident.

Media

The focus of establishing and conducting a cross bore best practices program is to enhance public safety. Every description in the text of this Guide as well as every example of an educational or communication item in Appendix C are designed to be used to emphasize the proactive improvement to safety as a result of this program. Cross bore programs should include some form of media communications to assist in reaching out to everyone within the utilities service territory. A set of frequently asked questions with responses and an example of a press release are provided in Appendices C-1 and C-5, respectively, to assist in the development of this type of communications.

Municipal Government and Sewer/Septic System Owners/Operators

Establishing and maintaining open lines of communications and a good working relationship throughout the investigative and remediation program will provide operational and public relations benefits to the company as well as to the sewer system owner/operator. In the majority of the instances, the municipality is the owner/operator of the sewer mains which will serve as a primary access point for inspection.

Items beneficial to the sewer system owner/operator include the offer to:

- Provide:
 - A copy of the video footage obtained during the inspection allowing the identification of:
 - Illegal sewer hookups
 - Condition of the main
 - Confirmation of sewer main and lateral material type and size
 - Evidence of disconnected laterals
 - Spatial location data for sewer mains and laterals
 - A copy of any written logs
 - Notification of potential tree root issues
 - Notification of other conflicts
- Request a single permit rather than applying for numerous individual permits

In return for the beneficial items of interest, the utility may receive:

- A single permit for the entire project
- No permit fees
- Flexible operating hours
- Flexible notification requirements
- Access to records of sewer lines preferably in electronic form
- Traffic control requirements that are the same as routine maintenance work
- Company employed contractors viewed as Company employees
- Normal restoration procedures
- No additional restrictions for working on private property
- A cooperative agreement that identifies:
 - Cleaning schedules
 - Cleaning of blocked sewers by the sewer operators prior to inspection
 - Access to the sewer owners cleaning and inspection contractors for a fee

One Call System

One Call systems are in operation in every state in the U.S. and in five provinces in Canada. The only systems with underground facilities in the public right of way that do not consistently participate in the One Call process are sewer systems. When requested, the locations of sewer mains are often provided by the municipality. The information provided by the municipality may extend to the junction point between the main and the lateral. However, the use of either a One Call system or information from the municipality for purposes of locating sewer systems is further complicated when the natural gas service is installed to the premise using trenchless technology. The lateral portion of the sewer system is often considered to be privately owned and typically there are no requirements for privately owned systems to be mapped or recorded in publically available documents. In some locales the portion of the lateral in the public right-of-way has been located by the municipality; however, this is the exception rather than the rule. The result is a call to a One Call system for mark out or locating sewer service laterals may not provide any information. Legislation has been proposed that may result in One-Call programs within the U.S. being modified with language to prohibit the exemption of municipal and state agencies from participating in the One-Call programs (see Appendix D).

Other Utilities

The use of trenchless technology has had a wide usage by other utilities. It is entirely possible during the course of the investigation another utility may be found to have penetrated the sewer system. It is recommended the occurrence of the intersection be documented. It is also recommended that if the utility creating the intersection with the sewer system can be determined that the utility be notified so corrective action can take place. Finally, it is recommended the operator of the sewer system and/or the owner of the lateral be notified.

Plumbers

Plumbers are typically contacted by a customer or premise owner to clear a blockage in a sewer line. Utility best practices should include the use of mass mailings, training programs, or other forms of correspondence to inform plumbers on the topic of cross bores. Several utilities stated that their primary contact is with licensed plumbers. However, it should be recognized the premise owner's first contact with a plumber may not be with a licensed plumber. The requirements for a plumber to be licensed vary by locale. Any correspondence with plumbers should take this into consideration as a

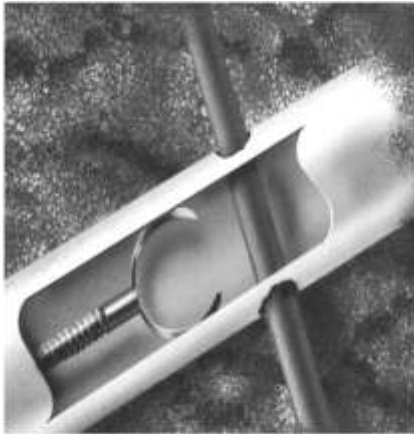


Figure 7 Pipe Locator

wider audience than licensed plumbers may be warranted.

Among the audiences of plumbers that should receive information from the utility would be those that are involved in a training program at a trade or technology school, union training centers and apprentice programs as well as the use of posters and brochures at plumbing supply locations.

One of the first items a plumber may observe or be made aware of would be a sewer tag (discussed in more detail below) that would be placed on the location(s) where the plumber would be most likely to attempt to gain access to the sewer system. The tag serves as a notification that a blockage that is determined to be outside the premise may be the result of a natural gas line being installed through the sewer line. The tag also advises the

plumber on the appropriate actions they should take.

When the blockage is determined to be outside the structure, it is important for the plumber to consider that the blockage may be the result of a natural gas line having been inadvertently installed through the sewer line. Prior to attempting to clear the blockage with any form of mechanical equipment, the plumber should call the utility for assistance. The utility should use a bi-lingual set of instructions, if appropriate for the service territory, to state they will respond promptly and perform an investigation at no charge. Appendix C-2 contains an example of a brochure used with plumbers.

Depending on the status of legacy cross bore investigations within the company, it may be possible for the CSR to perform the investigation over the phone to "clear" (determine that the sewer line has been previously inspected and there is no conflict) the affected address through a database search. If it is possible to clear the affected address, the plumber can be notified that the address in question has been cleared of any possible cross bore potential. At that point, the CSR should verify the address and advise the customer/plumber that the location is clear. Such a statement can be: "According to our records, there appears to be no conflict with your sewer lateral and our natural gas lines".

If the address cannot be cleared using a database search, a response should be provided in accordance with normal practices used for leaks. In the interim, as the utility is responding to the event as if it were

a Class 1 leak, the plumber should be advised to take the following safety precautions when clearing a blockage in any exterior sewer line.

- Always use an exterior cleanout to ream the sewer line, if one is available. In the unlikely event a gas line is penetrated while clearing a blockage, using an exterior cleanout will lessen the chance of natural gas entering the structure.
- If a power-driven tool is used to clear the blockage, please be aware any spark-producing device may cause ignition should there be a presence of natural gas.
- Know the signs of a natural gas leak:
 - The distinctive odor* or hissing sound of natural gas at the cleanout, vent, or inside the building served by the sewer line.
*Some persons may not be able to smell the odor because they have a diminished sense of smell or they have smelled the same odor for too long, or because the odor is being masked by other odors in the area. In addition, certain conditions in pipes and soil may cause the loss of odorant (known as “odor fade”) so that it is not detectable.
 - Bubbles rising through standing water or in the toilet bowl.
- If any signs of a gas leak are present, immediately stop what you are doing and:
 - Have everyone immediately evacuate the structure and move away from any area where gas is venting.
 - DO NOT turn electrical appliances or lights on or off.
 - Retreat to a safe distance, considering that a structure filled with natural gas can explode outward to distances of 150 feet/50 meters or more if there is an ignition source.
 - From a safe location, call **Insert Utility name** at 1-800-XXX-XXXX, 24 hours a day, seven days a week
 - Call 911.
 - Do not go back into the building for any reason until a qualified person has verified it is safe to do so.

Regulatory Agencies

Regulatory involvement with cross bore initiatives varies widely. To-date, 40+ states require some level of locating by sewer owner/operators. In some states, Minnesota and Virginia for example, there has been direct involvement that has resulted in prescriptive rules for gas utilities when using trenchless technology. (Appendix D)

In other states there is the beginning of regulatory initiatives (i.e., Missouri); however, in many states the topic has not been raised in any formal manner. Approaches taken by utilities depend on several factors – the actions of other utilities under the same jurisdiction, the relationship the utility has with the regulators, the overall regulatory climate in the region, and corporate philosophy, to name a few.

In many instances the utilities are addressing the sewer locating requirement through their state One Call System. Discussions are directed at requiring that the sewer systems be incorporated into the One

Call systems, the sewers and laterals be located, and all new sewer installations are locatable from the surface or through detailed installation records.

Sewer Tags

Sewer tags (examples shown in Appendix C-4) provide a simple reminder of the actions a plumber or anyone else should take in determining the cause of a sewer blockage outside the premise, in an area where the utility may have used trenchless technology in the past but has not affirmatively determined that no cross bores exist . A sewer tag would be placed at one or more of the locations in the home where access would be gained to sewer system, such as a basement clean out, or under the kitchen sink. The tag provides contact information and serves as a notification that the utility will respond to analyze the situation. If a blockage is determined to be outside the premise, the blockage may be the result of a natural gas line being installed through the sewer line. Sewer tags should be placed by company employees or contractors at the time of re-lights (discussed in more detail in the section on new installations) as an added measure of safety until such time as the location can be cleared of any potential cross bore.

The use of sewer tags is recommended as part of the overall program to clear each sewer main and lateral within the area where trenchless technology was used as an installation technique. The inclusion of a tag within the direct mailing described above provides an additional level of safety until such time as the individual location can be cleared.

NEW INSTALLATIONS GUIDELINES

There are many parallels between the guidelines for legacy and new trenchless gas installations. The guidelines provided here do not repeat the full wording that can be found earlier in the Guide, but rather refer the reader to the appropriate sections for more detail.

The technologies described in the section “Investigative Techniques – Field” found in the legacy portion of this guide are also valuable tools that can be used to locate underground facilities prior to performing new installations. In addition, the use of camera inspections, sondes, metal fish tapes, combined with potholing are all recognized as useful to verify that no conflicts took place during the installation. If due diligence performed in locating the sewer facility is inconclusive and investigative techniques are not able to provide a sufficient level of confidence, or if regulatory requirements are prohibitive for the use of trenchless technology, then utilities may have to use conventional direct burial techniques such as open cutting or trenching.

As noted in the background section, the need for new tools and techniques that can be used to prevent a cross bore event or detect the event at the time of the occurrence have been recognized as valuable. GTI is considering several projects to develop those tools.

A variety of trenchless construction methods can be used for gas piping installation depending on local soil conditions. Options include: horizontal directional drilling (HDD), conventional auger boring, pipe pushing, pipe ramming/jacking, hole hogging and moling. This manual assumes the user is familiar with and has procedures for trenchless construction techniques. The procedures outlined below and the example procedures included in Appendix C-8 provide construction steps that should be taken related to the prevention of cross bores in sewer systems.

- Prior to any trenchless construction the local One-Call system should be contacted to have the area where the new installation is to occur marked for all existing utilities. The mark-out should include all sewer facilities to be crossed which should then be located and verified, in those locales where the One-Call system does not include sewer information the sewer operator should be contacted to provide or assist in providing the mark-out. In no case should an installation be conducted via a “blind bore”.
- A trenchless construction tolerance/safety zone should be established. Any construction crossing or parallel to and within the tolerance zone of other underground facilities should include visual verification of the drilling head, back reamer, and the other underground facility at the crossing point or at regular intervals for parallel construction. The majority of the utilities defined a trenchless construction tolerance zone as 2 feet/0.5 meters plus one-half times the width or diameter of the facility. Where the width or diameter of the facility is unknown the tolerance zone is 2 feet/0.5 meters.
- The depth or location of any facility along the proposed installation path should not be assumed, a “blind bore” should never occur. The location, depth, and clearance of facilities to be crossed should be determined at the point where the proposed installation path crosses the existing facility. Where visual verification of the sewer is not possible, the location can be measured or calculated using measurements at known locations. The depth and location of the top of the

sewer lateral can be accurately calculated or measured using the building exit and sewer clean-out locations. The location, depth of the drilling head, and back reamer can be accurately determined by electronic or visual means during trenchless construction. Accuracy of electronic depth readings should be periodically confirmed during drilling operations. The gas main or service line installed by trenchless construction is to be installed above the sewer lateral. The minimum clearance to be maintained between the back reamer and the calculated or measured location of the top of the sewer lateral is to be determined on a company by company basis.

- Where the depth of a sewer lateral is measured or calculated a pre-installation camera inspection is recommended for all sewer laterals crossed. Any existing damage or irregular finding identified during the inspection documented and reported to the property owner. A post-installation camera inspection of the sewer is also recommended with focus on new or additional damage to the sewer facility. Any new or additional damage should be addressed immediately.
- One or more of the following methods are recommended for verifying and documenting the location of facilities, prior to drilling operations:
 - Measured - determining the depth or location of a facility using a nearby reliable source such as a valve box, vent, clean-out, manhole, etc.
 - Calculated - determining the depth or location of a facility using two or more references located on either side of the trenchless installation path (e.g. examination of the sewer outlet from the basement and the depth of the sewer main based on a measured depth at a manhole). A gravity sewer lateral starts at the building exit and slopes downward toward the main. The potential for vertical directional changes must be considered when using the calculated method. For example, a sewer lateral may exit a basement at 4 feet/1.2 meters below grade level, and slope gradually from the structure out to the vicinity of the main line sewer, where it then becomes steeper as it connects to the main line sewer. By inference, a gas facility installed at less than 4 feet/1.2 meters below grade level would not intersect with the sewer, assuming level ground
 - Verified Burial Depth – exposing (pot holing, day-lighting) the shallower of an existing facility or the proposed path of the drilling equipment 2 feet/0.5 meters beyond its depth during trenchless construction to visually confirm that a conflict between the two facilities does not exist at the crossing location
 - Camera - utilizing a camera to identify the condition of a sewer lateral prior to trenchless construction (pre inspection) and to confirm a sewer lateral has not been damaged during trenchless construction (post inspection). Cameras equipped with sondes can also be used to determine the location of a sewer lateral for visual verification (potholing) during trenchless construction. In some soil conditions the use of a camera drawn back through the bore prior to the installation of the natural gas line has provided verification that no damage occurred during trenchless construction
 - Horizontal Separation-use of sewer locating techniques, sewer location maps, or knowledge of the area may show that the sewer facility is clearly on one side of the property, while the

proposed gas line is located at the other. Another possibility is the sewer facilities are in the rear of the structure, while the gas facilities are in the front

- Overhead - identifies overhead facilities not involved in trenchless construction
- Does Not Exist - identifies the type of facility has been confirmed to not exist in the area of trenchless construction
- Audio listening equipment placed in the sewer main closest to the boring head or in a lateral's clean out has been used as a supplemental technique during all phases of trenchless technology installation as a technique to detect a potential cross bore. Listening devices are not considered acceptable by most utilities for use alone. The technique may detect a cross bore event has occurred or a drilling head has come into contact with the sewer facility as it passed, but it does not allow for a positive documentation that a cross bore was prevented. The microphone and headset should be checked periodically throughout the day to verify they are operating properly. Any questionable change in sound should result in the stoppage of work and an investigation for the source of the contact. Listening equipment has also been used along with a sound generating device such as an air horn upon completion of the trenchless excavation but prior to the pipe being pulled to check for a cross bore event. If the sound is detected in any manhole the installation should be checked for a cross bore event.
- When using trenchless technology parallel to existing underground facilities, potholes should be excavated along the bore path to ensure the bore is on track as planned, depending on clearance distance from the existing facility. At a minimum, potholes should be excavated at the entrance and exit points of the proposed bore path. Depending on the clearance between the facilities, additional potholes may be required by the company installation specifications. For example, when the clearance can be maintained at 10 feet/3 meters or more no additional potholes would be required. If the clearance is less than 10 feet/3 meters but greater than 5 feet/1.5 meters, additional potholes could be excavated along the bore path at reasonable intervals. If the clearance were less than 5 feet/1.5 meters, the on-site supervisor or company representative should assess the risk. Risk is based on the type of soil conditions and the size and controllability of the proposed bore. A determination is made on the appropriate clearance, if a closer pothole interval is needed, and/or to verify the location and clearance of the existing facility.

After the natural gas facilities have been installed using trenchless technologies, one or more of the following methods are recommended to be used for verifying and documenting potential cross bores:

- Exposing the sewer at each potential intersection and observing the bore as it passes each point as well as the reamer as it is pulled back through the bore. This technique can be used alone or in combination with a camera inspection
- Pre and Post Camera Inspection/Comparison - utilizing a camera to identify the condition of the sewer prior to trenchless construction (pre inspection) and to confirm the sewer has not been damaged during trenchless construction (post inspection)
- Cameras equipped with sondes can also be used to determine the location of a sewer for visual verification (potholing) during trenchless construction.

- In some soil conditions the use of a camera drawn back through the bore prior to the installation of the natural gas line provides verification that no damage occurred during trenchless construction

COMMUNICATIONS and EDUCATION

INTERNAL

Customer Service/Call Center Representative

The first point of contact for a natural gas utility related issue is often a CSR who may be located in a Call Center. As noted under the section on legacy investigations, CSR's should receive training on the topic of cross bores, what they are, how they may become a customer issue, and what types of communications have been provided to the customer. The purpose of the training related to new installations is based on the possibility that calls may be received from a customer or premise owner due to: 1) A customer/premise owner with a sewer blockage that occurred soon after a new installation 2) utility construction personnel in the area, 3) company mailings related to legacy investigations if the new installation is part of a system upgrade or 4) an awareness of the potential for a cross bore event from conversations with others that had been part of a legacy investigation. Appendix C-7 provides useful information to compliment CSR training.

Procedures for handling a cross bore related call should be clear and concise and refer the CSR to the same protocol used for normal non cross bore construction activities. An emphasis on safety and a recognition on the part of the company that the construction procedures and processes being used to avoid a cross bore situation are key.

Engineering

Data such as depth and GPS location of the sewer system and laterals, if available from the owner of the sewer system, may have value to the utility company to assist in design, construction, or operations and maintenance activities.

Construction Specifications/Guidelines

Trenchless construction technology is a valuable, cost effective technique for the installation of plastic mains and services. Training and the use of well define procedures are key to the success of the use of trenchless technology. Examples of training materials related to cross bore can be found in Appendix C-7 and trenchless technology installation procedures are outline above and in Appendix C-8. The methods used during construction to prevent cross bore should be formalized in a reference document available to company crews, contractors, and supervisory personnel with the repeated reference to the policy that states that no "blind bore" should ever occur. The reference document can take the form of a specification, procedures manual, best practices manual, or guidelines that describe the methods to be followed throughout every stage of construction to prevent cross bores. The reference document can also serve as the basis for training material such as job site briefings or "tailgate meetings", and formal lesson plans addressing the topic.

Reference material related to cross bore prevention should be included as part of a company’s construction specifications. Suggested wording to ensure no cross bores occur during gas main and service installation can include:

- General requirements to exercise due diligence to ensure no cross boring of a sewer line occurs. For example, “At no time is there to be an installation of a natural gas main or service line using a “blind” bore technique”.
- Requirements for Pre Installation Camera Inspections to locate the sewer system and assess condition, Post Installation Camera Inspections to verify no cross bore or damage to the sewer has occurred, or both.
- Requirements for locating the sewer facility with camera/sonde, sonde, or metallic fish tape, then potholing the crossing point prior to running the natural gas line.

Language with specific requirements for locating:

All sewer laterals must be located, marked, and those found closely paralleling or crossing the horizontal bore path are exposed or excavated to the depth of the trenchless construction method to verify adequate separation. “Excavated to depth of trenchless construction method” means excavating a minimum of 12 inches and preferably 24 inches on both sides of the sewer lateral mark out and 12 inches below the planned bore depth and observing the installation of the gas line to verify no conflict.

~OR~

The sewer main or lateral is to be inspected with a camera following the gas line installation with a trenchless construction method before pressurizing/energizing with natural gas.

- Requirements that if the sewer facility can’t be located or if there is unacceptable risk conventional installation (backhoe, trenching) methods should be used or the new facility should be inserted in the older steel service that is being replaced

If trenchless construction methods are used for new main and/or service installation, records should be kept to document the decisions made by the crew or local supervisor. The responsible crew member or construction supervisor would be required to indicate the number of sewer laterals cleared of conflict by completing a sewer crossing verification summary on the Construction/“As Built” sketch or electronic job record, and sign and date the document (electronic or paper) .

The sewer crossing verification block shown on the “as built” would include the following fields:

- Does the project involve crossing a sewer main or lateral? YES__ NO__
- If YES, how many sewer mains or laterals were cleared? Mains____ Laterals____
- What method(s) was used to verify the crossing did not result in a conflict? Document what type of method was used (as approved by each utility):

_____ Open Trench

- _____ Post Installation Camera Inspection
- _____ Locate and Expose by Excavation (Pothole)
- _____ Location and depth marked and verified prior to construction by _____ method
- _____ Estimated Vertical Separation
- _____ Estimated Horizontal Separation
- _____ Inserted into older steel facilities
- _____ Sewer in rear, gas in front

Were there any locations where a positive location could not be determined? If YES, indicated the address, highlight the location on the “as built” and state the reason why. Indicate what method was used to perform due diligence and exclude the possibility of a cross bore if this were the case.

Construction Personnel

The use of trenchless technology and the prevention of cross bores during construction is an important subset of the activities of construction personnel that requires specialized training. Appendix C-7 includes training materials that can be used in either a formal class room setting or computer based training. In addition to the materials used for the initial training experience the training items for construction personnel should include job site briefing information that would be used at the beginning of every new installation where the potential for a cross bore exists. The job site briefing materials should be concise and emphasize the key points to be remembered during the daily work activities (see Appendix C-7).

EXTERNAL

Customers and Premise Owners

Communications between utilities and their prospective customers occurs in a variety of ways with a variety of results. Communications may occur by word of mouth as employees are often also customers and it is fairly common for a non-employee who is a prospective customer to discuss utility related items with an employee. These discussions may be casual during off-hours or they may be while field work is taking place at the customer’s premise or in the vicinity. Having employees that are kept up-to-date on new installation activities, have received education on cross bore, and understand the safety benefits behind the investigative program and preventative processes may be one of a utilities most effective communications tools.

In addition to the indirect method of word-of-mouth with employees, prospective customers or premise owners can also be made aware of new installations or system upgrades and the potential for a cross bore event through the public media. Media items, discussed below, may include the use of a press release, news articles, newspaper, radio or television advertisements, the company website or utility programs. These are designed to educate the public on the cross bore preventative process and the company’s emphasis on safety.

Direct mailings, door hangers and outgoing calls are direct communications techniques for use with prospective customer that can be used to explain the new installation and the accompanying cross bore preventative process. Each of these direct communication techniques are discussed in more detail below.

Direct Mailings

A direct mailing compliments and re-enforces the other forms of communications a company uses to establish a relationship with a new or prospective customer where new installations would take place as well as to re-enforce the positive relationship the company strives for with existing customers where a system upgrade would be taking place. The mailing should be signed by a representative of the company, explain the construction activities that will take place and provide contact information for additional information.

An added measure of safety can be provided by including a sewer tag (discussed previously and shown in Appendix C-4) with an explanation of the purpose of the tag and instruction on where the tag should be placed.

Door Hangers

A door hanger which may be either part of an information packet or a provided separately (Appendix C-3) would be used just prior to new construction activity. It may be preferred to have a before construction as well as an after construction door hanger that can be used selectively used depending on the locale and timing of when direct communications is determined to be most effective. If used before construction, the door hanger would provide notification to the premise owner where a new service would be installed or a re-light may be required as a result of a system upgrade. In the case where the door hanger is used following construction, the door hanger can be used to make the premise owner aware of the new installation. It can also alert the owner if they experience a blockage in their sewer system that a cross bore may have occurred and they should contact the company prior to attempting to clear the blockage or have the blockage cleared by others.

The recommended contents of the door hanger include:

- A bi-lingual message if appropriate for your service territory
- An emphasis on safety
- A brief explanation of why the installation or system upgrade is taking place or if the door hanger follows the installation an explanation of what took place
- A statement of the day/dates when the installation will or did take place
- If the door hanger is to be used following the installation, an explanation there is the potential a sewer blockage may occur which has the potential to be the result of a cross bore along with the actions to be taken to ensure safety
- The name and contact phone number of the inspector, it is not recommended that the customer be encouraged to call the Call Center or System Dispatch.

Outgoing Calls and Other Forms of Customer Communications

Call Centers, either company based or contracted, have been used when specific utility related information needs to be conveyed on a timely basis. The method can be either an automated calling system or live calls directed at prospective customers that will be involved in the new installation. This approach can be used as a compliment to door hangers to inform the customer of upcoming construction activities in their area or at their premise. The script for the outgoing call in this instance would be similar to the information found on the door hanger. Outgoing calls can also be used to respond to customer inquiries for more information when a phone number or website is used to indicate where additional information can be obtained or to respond to a recorded call or complaint.

As noted in the section on legacy investigations other forms of communications are becoming more common place including various types of social media. Email is displacing the use of first class mail, Twitter, Facebook and text messaging are tools that can provide an effective mode of communications along with the use of a company website with links to sites containing additional information.

Media

The media can be made aware of new construction activities and the general issue of educating the public on the need for an increased awareness of cross bore in part to maintain good relations, ease traffic congestion, promote the company and the efforts to construct and maintain a reliable and safe distribution system. Any contact with the media related to new installation should follow normal company protocol. Educational or communication items in Appendix C that were primarily focused on legacy investigations can be revised for use during new installations to emphasize the proactive improvement to safety that will result from infrastructure installations and/or upgrades.

Municipal Government and Sewer/Septic System Owners/Operators

The location of an existing sewer system(s) typically owned and/or operated by municipalities or possibly by a private corporation is an important first step in the due diligence phase of the design and pre-construction phases of a new installation or system replacement. Establishing and maintaining open lines of communications and a good working relationship throughout the design and construction phases of the installation will provide benefits to the company as well as to the sewer system owner/operator. Items beneficial to the sewer system owner/operator include the offer to:

- Provide:
 - A copy of the video footage obtained during the inspection allowing the identification of:
 - Illegal sewer hookups
 - Condition of the main
 - Confirmation of sewer main and lateral material type and size
 - Evidence of disconnected laterals
 - Spatial location data for sewer mains and laterals
 - A copy of any written logs
 - Notification of potential tree root issues
 - Notification of other conflicts
- Request a single permit rather than applying for numerous individual permits

In return for the beneficial items of interest, the utility may receive:

- A single permit for the entire project
- No permit fees
- Flexible operating hours
- Flexible notification requirements
- Access to records of sewer lines preferably in electronic form
- Traffic control requirements that are the same as routine maintenance work
- Company employed contractors viewed as Company employees
- Normal restoration procedures
- No additional restrictions for working on private property
- A cooperative agreement that identifies:
 - Cleaning schedules
 - Cleaning of blocked sewers prior to inspection
 - Access to the sewer owners cleaning and inspection contractors for a fee

One Call System

Contact with the One Call system to mark out the location of utilities in the area designated for the new installation or system upgrade should be completed prior to any installation activities. However, as noted earlier, the only systems with underground facilities in the public right of way that do not consistently participate in the One Call process are sewer systems. The location of sewer mains are often locatable by the municipality, this locating capability may extend to the junction point between the main and the lateral. However, the use of a One Call system for purposes of locating sewer systems is further complicated when the natural gas service is to be installed to the premise using trenchless technology. The lateral portion of the sewer system is often considered to be privately owned and currently there are no requirements for privately owned systems to be mapped or recorded in publically available documents in most states. The result is a call to a One Call system for mark-out or locating services may not provide useful information for locating sewer systems.

Proposed changes to the language of One-Call programs within the U.S. requiring municipalities and their contractors to participate in One-Call Programs were discussed earlier. Please refer to the earlier discussions for details as well as Appendix D. The proposed changes will not become effective until two years after enactment.

Other Utilities

The use of trenchless technology has had a wide usage by other utilities and it is possible, during the course of due diligence efforts, to verify the location of the sewer system that another utility may be found to have penetrated the sewer system. It is recommended the occurrence of the intersection be documented. It is also recommended if the utility creating the intersection with the sewer system can be determined that the utility be notified so corrective action can take place. Finally, it is recommended the operator of the sewer system and/or the owner of the lateral be notified.

Plumbers

If sufficient measures were taken during the gas piping installation then the likelihood of a plumber having the need to contact the utility or determine if a blockage outside the premise is related to a natural gas line intersecting a sewer line following a new installation is significantly lower than for premises where a higher chance of a cross bore situation may exist. However, it is still possible a cross bore may have occurred. Training programs for plumbers should include reference to new installations as well as legacy installations along with a reminder to look for a sewer tag, assuming their use is part of utility company policy following a new installation or system upgrade.

In the unlikely event a plumber contacts the utility regarding a blockage in the sewer system outside a premise that is in the location of a new installation, the procedures that should be followed are similar to those found in the legacy investigation section.

Regulatory Agencies

Regulatory involvement with new installations may include a review or audit of installation procedures and practices in both the office and the field.

To improve the safety and cost effectiveness of natural gas system installations, discussion with regulators should include the advocacy of the requirements that the sewer systems be incorporated into the One Call systems and the sewers be located and/or locatable (refer to Appendix D for additional information).

ORGANIZATIONS

The following provides contact information for organizations that have information related to cross bores. This listing is not meant to be comprehensive but rather complimentary to this Guide and to serve as a starting point to obtain additional information:

American Gas Association (AGA)

400 North Capital Street, NW
Washington, DC 20001
Website: www.aga.org
Phone: 202.824.7000

Call Before You Clear

Sponsored by Several Utilities
Website: www.callbeforeyouclear.com

Common Ground Alliance (CGA)

1421 Prince Street, Suite 410
Alexandria, VA 22314
Website: www.commongroundalliance.com
Phone: 703.836.1709

Cross Bore Safety Association (CBSA)

7424 Creekton Drive

Louisville, KY 40241

Email: info@crossboresafety.org

Website: www.crossboresafety.org

Phone: 812.719.4800

Distribution Contractors Association (DCA)

101 W. Renner Rd., Suite 460

Richardson, TX 75082-2024

Email: dca@dca-online.org

Website: www.dca-online.org

Phone: 972.680.0261

Gas Technology Institute (GTI)

1700 South Mount Prospect Road

Des Plaines, IL 60018

Website: www.gastechnology.org/

Phone: 847.768.0500

Midwest ENERGY Association (MEA)

2119 Cliff Drive

Eagan, MN 55122

651-289-9600

Website: www.midwestenergy.org

National Underground Contractors Association (NUCA)

3925 Chain Bridge Road

Suite 300

Fairfax, VA 22030

Website: www.nuca.com

Phone: 703.358.9300

North American Society for Trenchless Technology (NASTT)

7445 Morgan Road

Liverpool, NY 13090

Website: www.nastt.org

Phone: 703.351.5252

Appendix A - NTSB Incident Summary and Recommendations 1976

Log P-69 Oct 1976 Page 1-76 - 15 Nov 76

NATIONAL TRANSPORTATION SAFETY BOARD WASHINGTON, D.C.

FOR RELEASE: 6:30 A.M., E.S.T., NOVEMBER 12, 1976

(202) 426-8787

ISSUED: November 12, 1976

Forwarded to:
Mr. C. S. McNeer
President
Wisconsin Natural Gas Company
233 Lake Avenue
Racine, Wisconsin 53401

SAFETY RECOMMENDATION(S)

P-76-83 through P-76-86

At 8:53 a.m., on August 29, 1976, an explosion and fire destroyed a house at 6521 20th Avenue in Kenosha, Wisconsin. Two persons were killed, four persons were injured, and two adjacent houses were damaged. The destroyed house was not served by natural gas. However, natural gas, which was escaping at 58 psig pressure from a punctured 2-inch plastic main located 39 feet away, had entered the house through a 6-inch sewer lateral. The gas was ignited by an unknown source. After the accident, the National Transportation Safety Board's investigation disclosed that the gas main had been installed by boring through the bottom of the sewer tile; the gas main was perpendicular to the sewer tile. 1/

In July 1975 the Wisconsin Natural Gas Company (Wisconsin) employed a contractor to construct the gas main parallel to the curb on 20th Avenue. The contractor used a combination of open trenching and pneumatic boring techniques to install the main. Pneumatic boring was done in front of the house at 6521 20th Avenue and at other locations along the avenue. An experienced Wisconsin employee inspected the construction. The inspector's daily log, which was turned in to his supervisor each evening, recorded that a sewer lateral had been broken at 6604 20th Avenue during the construction. Supervisory personnel reviewed the logs to determine the status of construction and to identify any unusual circumstances related to the construction. Construction procedures were not changed, however, as a result of this recorded break.

1/ The National Transportation Safety Board will not issue a report on this accident.

1921

P-76-83 through P-76-86

Shortly after construction was completed, the residents at 6521 20th Avenue experienced some blockage in their sewer lateral. They employed a contractor to clean out the lateral. He inserted an auger with a cutter head into the lateral to clean it. The blockage was not rectified, however, and at 8:30 a.m., on August 29, 1976, a sewer cleaning company employee arrived at the house to clean the sewer lateral again. At 8:50 a.m. the cleaner inserted an auger into the 6-inch sewer lateral; the auger struck and ruptured the 2-inch plastic gas main. When the gas main was excavated after the accident, investigators discovered that the auger from the first cleaning attempt had also struck the gas main, but had not punctured it at that time.

The day after the accident Wisconsin excavated four sewer laterals near the ruptured gas main. Two of these laterals had been damaged during the gas main construction when the gas main was installed partially inside the sewer laterals. Wisconsin is continuing to excavate and inspect sewer laterals along 20th Avenue. Wisconsin purchased an electronic transmitting device which, when inserted into a sewer lateral, determines the depth of the lateral. This device is planned for use at all other locations where boring was performed to determine if other sewer laterals were damaged. Suspect laterals will be excavated and repaired if necessary.

Therefore, the National Transportation Safety Board recommends that Wisconsin Natural Gas Company:

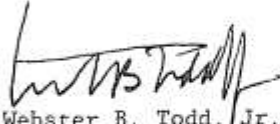
Complete inspection of those locations along the construction route (Drawing No. F-3386-2) where gas mains and sewer laterals may be in proximity to one another and correct any deficiencies. (Class I, Urgent Followup) (P-76-83)

Examine its records to determine other locations where gas lines were installed near existing sewer facilities (including a review of sewer blockage complaints), then inspect these locations and take corrective action where necessary. (Class I, Urgent Followup) (P-76-84)

Revise its construction standards to require that underground facilities be located accurately before construction and to provide protection for these facilities near boring operations. (Class I, Urgent Followup) (P-76-85)

Inform its inspectors and supervisory personnel of the circumstances of this accident, train them to be alert for similar conditions, and advise them of preventive actions. (Class I, Urgent Followup) (P-76-86)

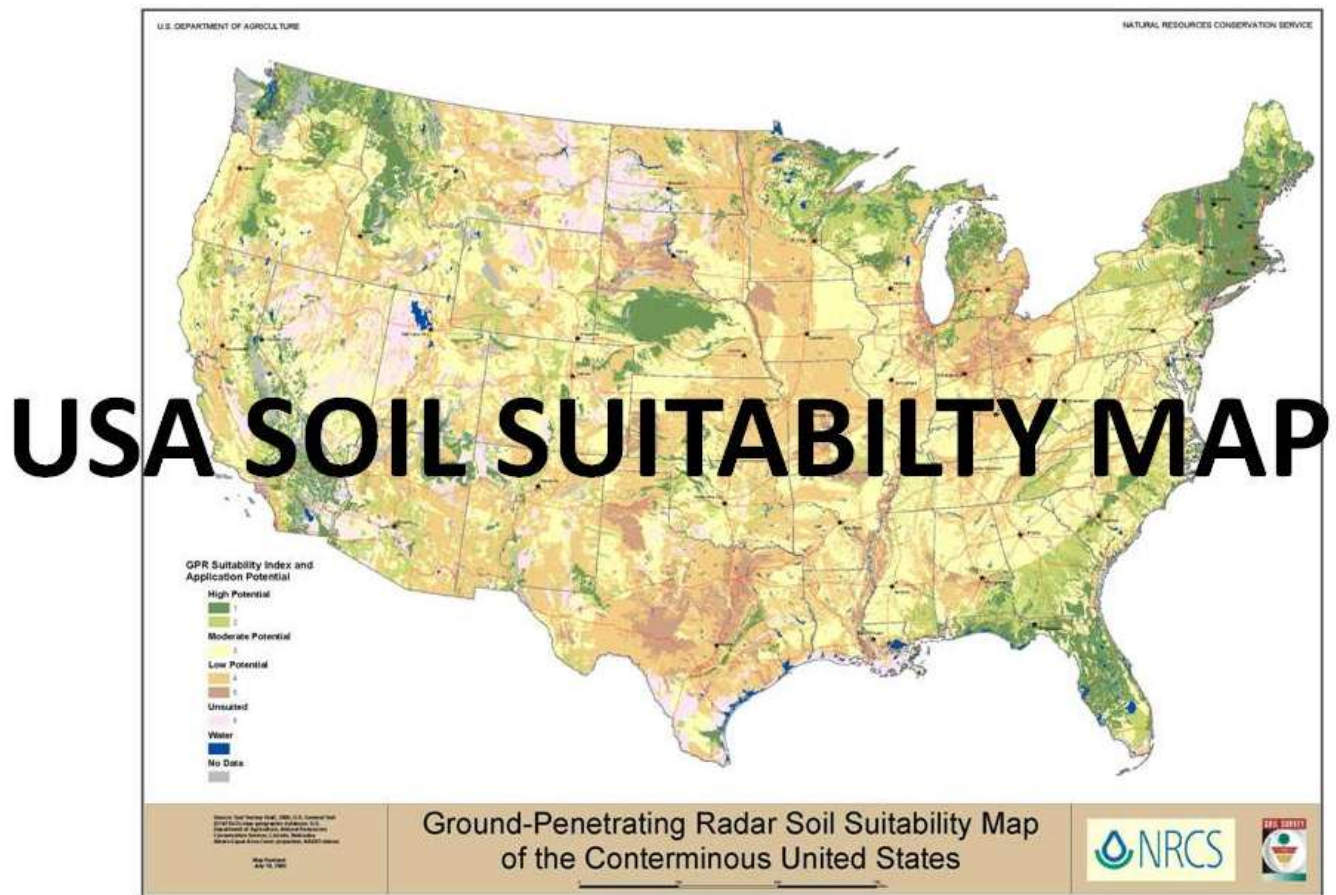
TODD, Chairman, BAILEY, Vice Chairman, McADAMS, HOGUE, and HALEY, Members, concurred in the above recommendations.



By: Webster B. Todd, Jr.
Chairman

THIS RECOMMENDATION WILL BE RELEASED TO THE PUBLIC ON THE ISSUE DATE SHOWN ABOVE. NO PUBLIC DISSEMINATION OF THIS DOCUMENT SHOULD BE MADE PRIOR TO THAT DATE.

Appendix B – GPR Soil Suitability Map



Appendix C – Communications and Education

C-1: Frequently Asked Questions/Responses

Below are examples of the types of questions that may be asked and the associated responses that may be useful. These may be changed or added to in order to fit the individual LDCs legal and procedural requirements.

What is a sewer line intersection?

A sewer line intersection is a term used to describe an instance where a gas pipeline that was installed by a horizontal, trenchless installation method crossed through into a sewer line.

Are sewer line intersections a safety hazard?

As long as a gas line that crosses through a sewer line remains intact, it does not pose an immediate safety concern. However, sewer line intersections can become a safety issue if, for example, a plumber cleans out a clogged sewer line with a plastic gas line crossing through it. The sewer auger will damage the gas line causing gas to migrate back into the customer premises.

What should I do if I hear or smell escaping gas?

If you smell a natural gas odor, hear the hissing sound of gas escaping, or see other signs of a leak, take the following precautions:

- Have everyone immediately evacuate the premises.
- DO NOT light a match, candle or cigarette.
- DO NOT turn electrical appliances or lights on or off or use any device to cause a spark.
- Move a safe distance away from the structure, considering the structure may be filled with natural gas and can explode outward to distances of 150 feet/50 meters or more, if there is an ignition source.
- From a safe location, call **Insert Utility name** at 1-800-XXX-XXXX, 24 hours a day, seven days a week (or depending on company procedures
- Call 911.

What are you doing to address/resolve this issue?

Insert Utility name is launching a comprehensive inspection and communications program to locate and eliminate sewer line intersections which includes:

- Identifying the sewer line intersections throughout our service territory, conducting inspections, relocating gas lines where intersections are identified, and repairing the damaged sewer line.
- Alerting sewer and plumbing professionals about the issue and explaining steps they should take if they are working a job involving the same potential sewer line intersection.
- Distributing information to major retailers that rent plumbing equipment so they can share the information with their customers.
- Communicating with impacted customers about the inspection process and next steps.
- Meeting with officials in cities where sewer line intersections exist to explain the issue and next steps.

Why did you use this trenchless installation method?

The trenchless pipe installation method is used to minimize surface disruption to paving, landscaping, and hardscaping which can be caused by digging open trenches. This method is required by most franchise agreements under which **Insert Utility name** operates. Trenchless installation is less expensive than open digging trenches, which helps **Insert Utility name** contain facility installation costs that are then passed along to our customers through rates.

How could these intersections occur without your knowing about them?

While cities actively map the location and depth of sewer mains, they generally do not map the sewer lines running from private property to the sewer main line, as cities do not claim ownership of these sewer lines. In addition, sewer lines

are typically made of non-conductive materials, so they are not easily detected from above ground using conventional locating equipment available to excavators.

About how many sewer intersections exist?

We are in the process of reviewing construction records and other documented resources to determine the scope of the issue.

Once you've estimated the number of intersections, how will you proceed?

We will begin inspections with high-priority locations, such as areas where historical intersections have occurred. Possible intersection locations corresponding with locations such as schools, hospitals, apartment buildings, and other structures with high density occupancy will also be given priority.

When did you become aware that this was an issue?

Past incidents in our service territory have resulted in minor property damage (usually limited to the broken/damaged sewer line). However, it was not until recently that **Insert Utility name** became aware of more serious incidents occurring in other parts of the country.

How many sewer intersection incidents have there been in **Insert Utility name's service territory?**

Insert Utility name provides service to **XX** million consumers through **XX** million meters in more than **XXX** communities. Our records indicate over the past **XX** years, there were **XXX** reported instances where gas lines were damaged when sewer lines were being cleaned out.

What is the nature of these incidents?

These incidents have primarily resulted in minor property damage to the sewer line.

If there have been **XXX claims, why didn't you start the inspections sooner?**

Recently **Insert Utility name** became aware of more serious incidents in other parts of the country.

How will you conduct the inspections?

First, we will conduct a review of gas pipeline construction records. Company and sewer records will be examined to determine if trenchless installation methods were used and if the gas pipeline and the sewer line crossed within 10 feet. If this is the case, we will conduct a physical on-site inspection to determine the sewer line's location and to inspect the inside of the sewer line.

Areas where previous intersections have occurred will be inspected. High-priority locations, such as schools, hospitals, apartment buildings, and other structures with high density will also have an inspection priority. In some instances, a videoscope may be used to inspect the inside of the sewer line. If the gas pipeline is found to cross through the sewer line, the gas pipeline will be relocated and the sewer line repaired. In the event a videoscope is used and cannot provide confirmation that the sewer line is clear, we may excavate the sewer line to make a final determination, and relocate the gas pipeline if necessary.

How will your inspections impact customers?

The customer may be temporarily inconvenienced if we need to access the sewer line, but it should not be for more than an hour. Impacted customers will be given advance notice of inspections. We will need to have access to the customer's sewer line and preferably through a cleanout or vent outside the premises. If no outside access can be found, we may have to access the sewer line from inside the premises.

Who will perform the inspections?

Either **Insert Utility name** employees and/or **Insert Utility name** contractor crews will perform the inspections. All contractor crews will be licensed and covered by existing franchise agreements, including indemnification and insurance provisions.

Why are you doing these inspections now?

Providing safe and reliable service to our customers is our top priority. We have initiated these inspections at a time when many utilities are looking at what can be done to mitigate risks by proactively addressing this issue. In addition, federal regulations have been implemented requiring gas utilities (local distribution companies) to create management plans for distribution pipeline integrity.

How many on-site inspections do you anticipate conducting?

We are in the process of reviewing construction records and other documented resources to determine the scope of the issue.

Who will pay for these inspections?

Insert Utility name will pay for the inspections.

How long will it take you to make all sewer intersections safe?

This depends upon the number of inspections we will need to conduct. Presently, we are in the process of reviewing construction records and other documented resources to determine the scope of the issue.

What should customers/plumbers do if they have concerns about their natural gas service?

They should call **Insert Utility name** at 1-800-XXX-XXXX.

What should customers/plumbers do if they smell a gas odor?

If customers/plumbers smell a natural gas odor, hear the hissing sound of gas escaping or see other signs of a leak, take the following precautions:

- DO NOT light a match, candle or cigarette.
- DO NOT turn electrical appliances or lights on or off or use any device to cause a spark.
- Move a safe distance away from the structure, considering the structure may be filled with natural gas and can explode outward to distances of 150 feet/50 meters or more, if there is an ignition source.
- From a safe location, call **Insert Utility name** at 1-800-XXX-XXXX, 24 hours a day, seven days a week (or depending on company procedures
- Call 911.

Are you going to discontinue using this horizontal, or trenchless, method?

We have instituted procedures to enable us to mitigate the issues associated with horizontal/trenchless digging. Our current procedures require determining the exact location of all underground lines – sewer, water, etc. – that may be in potential intersection with a planned trenchless construction path and depth. This is verified either by exposing the underground lines, or if these lines are deeper, digging to a depth over the lines to verify there is no potential intersection during gas line installation.

What will **Insert Utility name do to further communicate about this issue?**

We plan to expand our communications to impacted customers and to plumbing/ sewer cleaning professionals through mailings and through advertorials/editorials in trade newspapers. We also plan to distribute information to major retailers that rent plumbing equipment and will post information on our website at **Insert Utility website** regarding this potential issue.

Will permits be needed for the inspections?

Permits may be needed, depending on the level of activity necessary to inspect and clear potential sewer line/gas line intersections. **Insert Utility name** will pay the permitting fees for any field inspections/repairs that we initiate.

How will your inspections impact the public right of way?

This effort should have limited impacts. Most activities will occur in parkways or on private property. Some activities may also occur at sewer manhole locations. In the rare instance that excavation is needed, it could involve a paving permit and street cut to complete repairs.

C-2: Brochures

Below are examples of brochures to be modified to fit the LDCs business activities.



Source: Sempra Energy



CALL BEFORE YOU DIG CONTACT INFORMATION

Excavation activities are the leading cause of pipeline accidents. To help prevent damage to underground facilities, you must call your state's one-call number at least two working days before you do any digging - it's the law. There is no charge for the service and the call is toll free at 8-1-1 or:

Kentucky 811
8-1-1 or 1-800-752-6007
www.Kentucky811.org

Ohio Utilities Protection Service
8-1-1 or 1-800-362-2764
www.oups.org

DUKE ENERGY CONTACT INFORMATION

If you have any questions, please do not hesitate to contact Duke Energy.

513-421-9500 1-800-544-6900

SEWER LATERAL WORK



Preventing Natural Gas Emergencies

Before performing any type of work on a sewer lateral, precautionary steps should be taken to prevent damage to underground infrastructure.



Preventing Natural Gas Emergencies

FACTS

Directional drilling is an economical, non-destructive (i.e., trenchless) method of installing underground infrastructure. New or replaced natural gas facilities may have been installed through the use of directional drilling or other types of trenchless technology. Before new infrastructure is installed using trenchless technology, existing utilities typically are located through technical equipment or records. However, if the location of the existing utilities is unknown, damage can occur. Although it is typical for the damage to be quickly identified, it may take years for a damaged facility to fail. Damage may also go undetected until future work is done.

If damage results from penetration of a sewer lateral, a potentially hazardous situation exists. This is because sewer laterals are typically cleaned out through the use of mechanical purging equipment (roter) that has the ability to damage buried utilities. Collapsed sewer walls can also cause the roter equipment to be misdirected outside of the sewer, bringing the equipment dangerously close to other buried utilities.

Damage to a natural gas service line can lead to:

- Gas leak/gas migration
- Fire
- Explosion

SAFETY PRECAUTIONS

Before starting the process of **cleaning** out a sewer lateral, remember to:

- Follow your state's Call Before You Dig law
- Look for a Sewer Lateral Tag on the sewer clean out or under the kitchen drain pipe and call 8-1-1 before cleaning out the sewer lateral (if not present, ask if a Sewer Lateral Tag was delivered to the property)

- Use an inline camera to identify the condition of the sewer lateral
- Contact Duke Energy at 513-421-9500 or 1-800-634-4300 for assistance in locating natural gas service lines
- Determine whether the natural gas service line to the property has been recently installed or upgraded
- Determine whether there has been any recent excavation in the area

AWARENESS OF WORK CONDITIONS

During the process of cleaning out a sewer lateral, be alert to any unusual conditions, which may include:

- Hissing sounds
- Natural gas odor
- Blowing dirt
- Bubbling water (possibly in a sink, toilet or other area where water is collected)

EMERGENCY PROCEDURES

If you suspect a gas leak or that contact with a natural gas line has occurred:

- **Leave the premises immediately**
- Instruct others to **leave the premises immediately**
- Contact Duke Energy from a safe location at 513-651-4466 or 1-800-634-4300
- Call 9-1-1
- Keep others a safe distance away

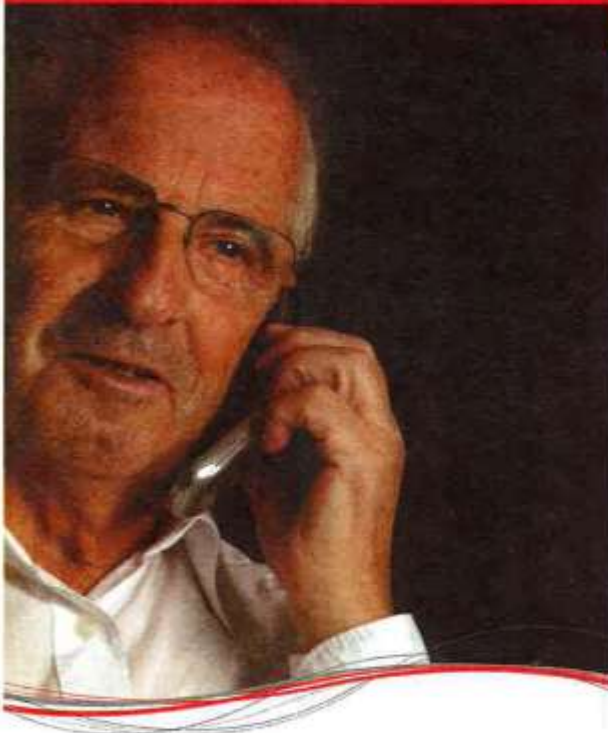
DO NOT:

- Operate any electricity while in the premises
- Operate any pipeline system equipment
- Turn vehicles or equipment on or off
- Use anything that might create a spark, such as a telephone (land line, cordless or cell) or matches without first leaving the area and arriving at a safe location



This NATURAL GAS SAFETY ALERT is to inform you of a potential sewer pipe/natural gas pipe concern.

NATURAL GAS SAFETY ALERT



Please call Xcel Energy before anyone attempts to clear a sewer blockage at your home or business using mechanical equipment.

Most sewer pipe problems are caused by broken pipe, which can be aggravated by tree roots. However, there is a slight possibility that some natural gas pipes could have been inadvertently installed through sewer pipe.

Mechanical equipment used to unclog sewer pipes can penetrate the natural gas pipe and lead to the dangerous release of natural gas.

Call Xcel Energy's dedicated 24-hour Natural Gas Emergency Line at **1-800-895-2999** before you have your sewer pipe cleaned. We will confirm whether an inspection is needed and take appropriate action.

We are committed to your safety.

Thank you for your cooperation.



24-hour Natural Gas Emergency Line

1-800-895-2999



1-800-895-2999
XcelEnergy.com

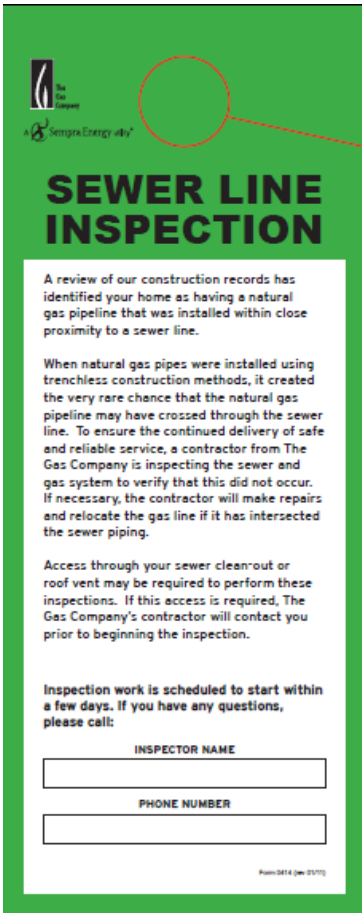


© 2011 Xcel Energy Inc. (Xcel Energy is a registered trademark of Xcel Energy Inc.
Northern States Power Company-Wisconsin, an Xcel Energy Company | 11-08-04 | 06/11 | 2736 | 0089102)

C-3: Door Hangers

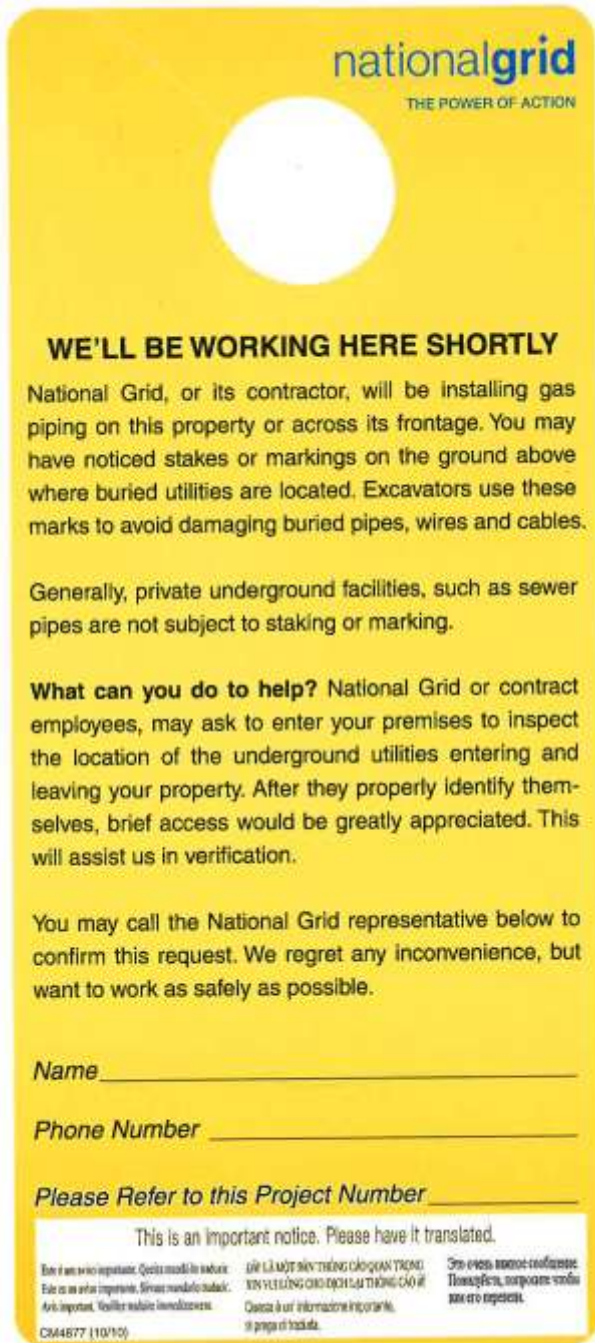
Below are examples of door hangers to be modified to fit the LDCs business activities.

Example of door tag for legacy Investigations



Source: Sempra Energy

Example of pre-construction door tag.



The image shows a yellow door tag with a white circular hole at the top. The National Grid logo is in the top right corner, with the tagline "THE POWER OF ACTION" below it. The main text is in bold and explains that National Grid or its contractor will be installing gas piping. It mentions that excavators use stakes or markings to avoid damaging buried pipes, wires, and cables. It also notes that private underground facilities like sewer pipes are not subject to staking or marking. A section titled "What can you do to help?" asks if the property owner can allow National Grid or contract employees to inspect the location of underground utilities. It states that brief access would be greatly appreciated for verification. A contact information section asks for the property owner's name, phone number, and project number. At the bottom, there is a white box with the text "This is an important notice. Please have it translated." followed by three columns of text in Spanish, Vietnamese, and Chinese, each with a small icon. The bottom left corner of the tag has the number "CS44877 (10/10)".

nationalgrid
THE POWER OF ACTION

WE'LL BE WORKING HERE SHORTLY

National Grid, or its contractor, will be installing gas piping on this property or across its frontage. You may have noticed stakes or markings on the ground above where buried utilities are located. Excavators use these marks to avoid damaging buried pipes, wires and cables.

Generally, private underground facilities, such as sewer pipes are not subject to staking or marking.

What can you do to help? National Grid or contract employees, may ask to enter your premises to inspect the location of the underground utilities entering and leaving your property. After they properly identify themselves, brief access would be greatly appreciated. This will assist us in verification.

You may call the National Grid representative below to confirm this request. We regret any inconvenience, but want to work as safely as possible.

Name _____

Phone Number _____

Please Refer to this Project Number _____

This is an important notice. Please have it translated.

<small>Este es un aviso importante. Quisiera recibirlo traducido. Este es un aviso importante. Si necesito traducirlo. Avis important. Veuillez me faire le traduire.</small>	<small>Đây là một bản thông báo quan trọng. XIN YÊU CẦU CÔNG NHÂN LƯU THỌNG CÁO Ồ Đây là một thông tin quan trọng. đi kèm đi kèm.</small>	<small>See every notice translated. Please refer to the project number and the project.</small>
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CS44877 (10/10)

Examples of post-construction door tags.

nationalgrid
THE POWER OF ACTION

**Urgent Safety Notice
Possible Sewer & Gas Conflict**

Address _____ Date _____

To: Property Owner / Maintainer / Resident

National Grid, or its contractor, has installed gas piping on this property or across its frontage.

We used boring or drilling methods that reduced digging and trenching in the road and on your property. This required that we take several steps to avoid contacting buried sewer, water, telephone and electric lines.

We were not able to verify the location of your sewer line. Please contact the gas crew if they are still working in the vicinity, or call National Grid at the number below, so that we can arrange an inspection of the sewer line from inside your building - at our expense and at your convenience.

We believe we avoided your sewer line, but want to be sure. Damage may not become apparent for some time and can lead to a blockage. In the event we damaged the line, we will see to its proper repair.

We regret the inconvenience, but want to ensure your safety. We urge you to allow us to inspect the sewer line. **If you decline to have the inspection, please hang this tag next to your main sewer cleanout as an alert.** If the line needs to be cleared in the future, determine the cause of the blockage by remote camera inspection before attempting to clear the line. Call National Grid if a gas line is found to be the cause of the blockage. Do not attempt to clear the line.

You may call the National Grid representative below to confirm this request.

Name _____

Phone Number _____

Please Refer to this Project Number _____

This is an important notice. Please have it translated.

See if an auto-translation device is available to read this or on-line interpretation. Strongly encourage reading this important. Veuillez traduire immédiatement.	ĐÂY LÀ MỘT THÔNG BÁO QUAN TRỌNG. MẸN VỚI LƯU Ý CHỌN DỊCH LẠI THÔNG CÁO Ế. Questa è un'informazione importante. è pregato di tradurla.	One over, someone translate. Translacion, someone translate. See the report.
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CN44878 (10/10)

nationalgrid
THE POWER OF ACTION

**Urgent Safety Notice
Possible Sewer & Gas Conflict**

**LEAVE THIS TAG
AT THE BUILDING'S
MAIN SEWER CLEANOUT**

Plumbers / Sewer Maintenance Personnel:
Please read the front of this card

If the sewer line here develops a blockage between the last inside cleanout and the main line, tank, or leach field, determine the cause by camera inspection before use of mechanical clearing methods.

Gas piping was installed on this property or across the frontage using trenchless methods. The clog could be caused by an unintended breakage of the sewer during the gas installation.

If the camera shows that a gas line is involved in the sewer blockage, call National Grid for immediate assistance.

Do not attempt to clear the line.

This tag should stay in place at the main cleanout. Once determined to be clear by camera inspection, check below:

Camera Inspection Found Clear

Date _____

CN44878 (10/10)

Example of possible post-construction door hanger or sticker.

Dear Homeowner:

We have recently installed new natural gas mains and services in your neighborhood. We hope that the work was not disruptive and was completed to your satisfaction.

From time to time, it is possible for a gas line to pierce a sewer line, which can cause back up of the sewer line over time. If your sewer line backs up, you should NOT have the sewer line cleaned out until after you contact ---CONTRACTOR--- so that we can confirm that there is not a gas line running through your sewer line. Failure to check for a gas line before cleaning the sewer could result in an explosion, so it is critical that you call. If ---CONTRACTOR--- finds that a gas line installed by ---CONTRACTOR--- pierced your sewer line, we will pay for the necessary repairs.

We thank you for your patience during the time we have worked in your neighborhood. If you have any questions or concerns about any of your underground utilities, please contact us at _____.

Thank you for your cooperation in helping make ---CONTRACTOR--- remain a Safety and Quality driven company.

Thank You,

---CONTRACTOR---

Office - ()

Fax - ()

C-4: Sewer Tags

Below are examples of sewer tags to be modified to fit the LDCs business activities.



C-5: Press Releases

Below is an example of a press release which may be changed or added to in order to fit the LDCs legal and procedural requirements.

Insert Utility name REMINDS CUSTOMERS TO EXERCISE SAFETY AROUND NATURAL GAS PIPELINES

Multi-Faceted Pipeline Safety Program is a 24/7 Effort

Insert Utility name, insert date – As part of its overall natural gas pipeline integrity program, **Insert Utility name** today is announcing a number of pipeline-related safety tips and activities. The utility would like to remind customers to call **insert phone number of One-Call System** before they dig, to report any construction or damage around natural gas pipelines, and to call the utility immediately if odors of natural gas are detected within or outside the home or business.

In addition, **Insert Utility name** is working on new Distribution Integrity Management programs to:

- Map detailed natural gas system information for its distribution pipelines
- Apply analytical tools that evaluate and prioritize the replacement of these pipelines;
- Add additional protection for above-ground gas equipment;
- Identify, address and repair instances where a gas line has passed through or intersected a sewer line.

This intersection of a natural gas pipeline and a sewer line, called a cross bore, is rare and typically not a risk if left undisturbed. A cross bore, however, can result in a safety risk when a homeowner or plumber attempts repair work to a sewer line outside the premise using mechanical cleaning or “snake” machines. These machines could sever a gas line and cause a gas leak, which could result in a dangerous situation. Although **Insert Utility name** has found only **insert number** plastic natural gas pipeline cross bore in its history, the utility is taking the extra proactive steps to ensure customer safety and draw attention to the situation.

To address possible cross bores, the utility is starting a proactive, **insert number**-year safety inspection programs in areas most likely to experience this phenomenon. **Insert Utility name** estimates the areas potentially affected involve only about **insert number** percent of the company’s **insert number** natural gas customers. The inspection program will occur in portions of the greater **insert name(s)** area and will involve lowering a thin cable and camera into the sewer line. The company will be sending letters to affected customers in advance of any inspections.

Customers who are concerned that their clogged sewer line may intersect with a natural gas pipeline can call **Insert Utility name** at 1-800-XXX-XXXX. The company will have trained staff ready to respond 24/7 to assess the area for cross bores and determine precautions and next steps.

Cross bores are an emerging issue for the nation’s gas utilities and **Insert Utility name** is one of several utilities in the nation to initiate an aggressive inspection program. The methods leading to cross bores, horizontal directional drilling and pneumatic boring, first occurred in the 1970s and avoided opening large trenches to install pipelines and instead bore horizontally underground, minimizing damage to yards and streets. However, in the process, a natural gas pipeline might have bored through some sewer pipelines made of clay or other porous materials.

Improvements in technology and construction practices have reduced the possibility of cross bores. Additionally, in 2008, **XXXX** began installing safety devices restricting gas flow in the event a service line is severed. The company also has advanced video equipment available to inspect sewer lines before and after installing another utility pipeline.

Any time customers smell natural gas they should evacuate the premises, not turn on lights or other appliances that could cause a spark, including lighting matches, candles or cigarettes, and call 1-800-XXX-XXXX.

“We take natural gas pipeline safety very seriously and, although we do not expect to find very many instances of natural gas pipelines within sewer lines nor do we anticipate any associated natural gas leaks or damaged pipes. We ask our customers always to exercise safety around underground utilities and to call us anytime they smell natural gas odor or have any questions or concerns,” said **XXXX**, vice president of field services for **Insert Utility name**.

Insert Utility name also is reminding customers to call **insert the name of the One-Call system in your service territory** by simply dialing **insert the phone number** at least two business days before digging in their yard. As a free service, **insert the name of the One-Call system in your service territory** will contact **Insert Utility name** and other area utilities. Each utility then will locate and mark the underground facilities they own.

Insert Utility name -owned pipelines typically extend from the gas main, in front of or behind the home, to the gas meter.

Customer-owned piping is the line running beyond the gas meter to a building or area where gas-fueled equipment or appliances are located. To have these customer-owned lines located and marked, **Insert Utility name** advises customers to call pipe and leak locating service companies or plumbing contractors who provide these maintenance services.

“Once all lines are marked, customers should carefully use only hand-digging tools within two feet on each side of marked gas lines,” **Insert Utility name** added.

No pipeline damage is too small to report. Even a slight gouge, scrape or dent to a pipeline or its coating could cause a dangerous break or leak in the future. If a customer causes what seems to be only minor damage to a pipeline, or any component attached to the pipeline, he or she should still notify **Insert Utility name** immediately.

In addition to these customer-oriented activities, the company’s pipeline integrity program involves annual patrols of its **insert number** miles of major natural gas transmission pipelines. The 24/7 monitoring of these large transmission pipelines pressures and visual inspections for factors that could indicate pipeline damage.

Insert Utility name also has begun retrofitting segments of a **insert number**-mile transmission pipeline that stretches from **XXX to XXXX**. This retrofit will include installing pipe supports, fittings and valves that will enable a sophisticated sensor to traverse the pipeline’s interior. From **insert date** to **insert date** a total of **insert number** retrofit excavations will be made at locations in **XXXX**

Insert Utility name is a regulated public utility that provides safe and reliable energy service to **insert number** million consumers through **insert statistics as appropriate** million electric meters and more than **XXXX** natural gas meters in **XXXX**. The utility’s area spans **XXXX** square miles. **Insert Utility name** is committed to creating ways to help our customers save energy and money every day.

C-6: Direct Mailing Examples



February 10, 2010

Dear Business Owner/Manager:

On February 1, 2010, a sewer cleaning contractor was injured and a home in St. Paul was destroyed from a natural gas-fueled fire stemming from a natural gas leak caused by the contractor's perforation of a natural gas main that intersected the sewer lateral. We take this issue very seriously and are working with the Minnesota Office of Pipeline Safety and Minnesota Department of Public Safety to address concerns.

We believe sewer/natural gas main conflicts in our service area are rare. However, in cases where our natural gas mains have been moved from their original location (for example, due to road expansions or sewer separation projects) it is possible that our natural gas mains inadvertently intersected some sewer laterals. As long as a natural gas main intersecting a sewer lateral is not penetrated, it poses no safety hazard. However, power equipment used to unclog sewer laterals can penetrate the natural gas main if the clog is located in the vicinity of the natural gas main (typically under the boulevard or sidewalk).

If you are working on a sewer lateral and find that the blockage is in the vicinity of the boulevard or sidewalk, or an area where utilities cross, we recommend using camera equipment to help identify if there are utilities intersecting the sewer lateral. If a natural gas main is found to be intersecting a sewer lateral, you should contact the local natural gas utility before ANYONE attempts to clear the lateral. If you do not have camera equipment and/or cannot determine whether a natural gas main is intersecting the sewer lateral, you should contact the local natural gas utility before ANYONE attempts to clear the lateral. In Xcel Energy's service territory, you can call our dedicated 24-hour Gas Emergency/Dispatch number at 1-800-895-2999.

As always, we are committed to your safety and we thank you for your cooperation.



May 2011

Dear Minnesota Rental Store:

Caution: Avoid Risk To Yourself And Others

Last year, a sewer cleaning contractor was injured and a home in St. Paul was destroyed after the contractor's auger perforated an underground natural gas line that intersected a sewer line. As a rental company you may rent main line sewer augers to customers who have sewer blockages. That is why we wanted to provide this important safety message for you and your customers.

There is a possibility that natural gas lines have been inadvertently installed through some sewer lines and the mechanical equipment used to unclog sewer lines can penetrate a natural gas line and lead to the dangerous release of natural gas.

Together, participating natural gas utility companies in Minnesota are asking all customers to contact the natural gas utility serving the area before they attempt to clear a sewer line.

Xcel Energy	1-800-895-2999
CenterPoint Energy	1-888-944-4564
Minnesota Energy Resources	1-800-889-4970
Alliant Energy - Interstate Power	1-800-255-4268
Greater Minnesota Gas	1-888-931-3411

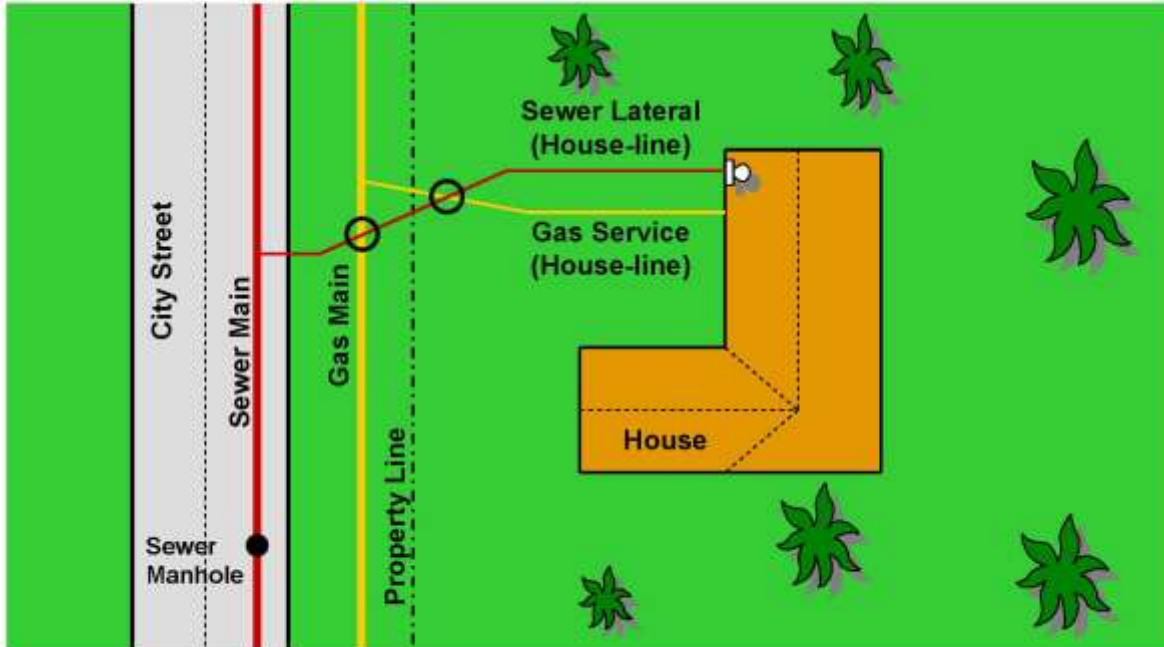
Included with this mailing are hang tags and zip ties to attach to main line sewer augers your company rents. The hang tags include contact information for all the participating natural gas utilities along with an important safety message. The participating utility will examine its records to determine if a potential conflict exists and whether an in-sewer camera inspection may be needed before sewer cleaning equipment is used.

The American Rental Association is providing you this information on behalf of the gas utility companies in the state of Minnesota. If you have a specific question, please contact Brian Elwood, manager, Xcel Energy Corporate Communications at brian.t.elwood@xcelenergy.com.

Thank you for your cooperation.

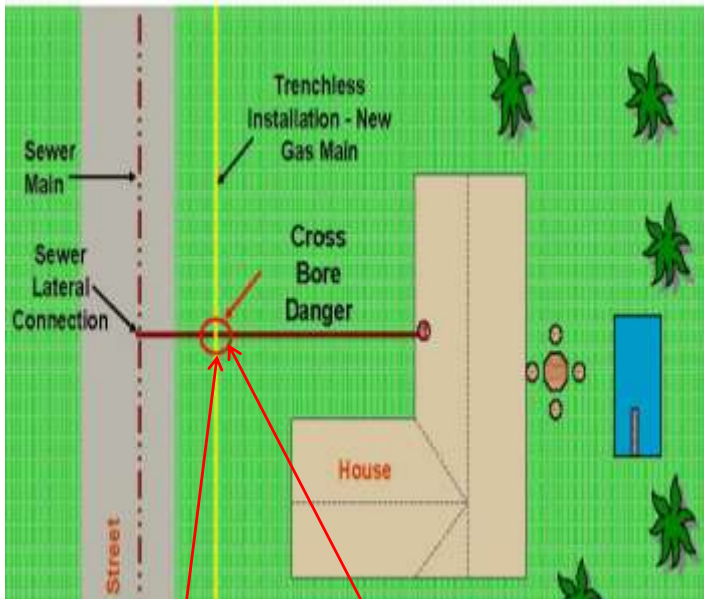
1900-19th Street, Moline, Illinois 61265
309-764-2475 800-334-2177 FAX 309-764-1533
<http://www.ararental.org>

Potential Intersections



○ = Potential Intersection

Sewer Cross-Bore Awareness for Gas Operations



What is a sewer cross-bore?

A sewer cross-bore is the inadvertent placement of a gas main or service through a sewer line. Sewer cross-bores typically occur during trenchless construction.

What can happen as a result of a sewer cross-bore?

The sewer line may become blocked and need to be cleared by a plumber or the building owner with mechanical clearing tools. This may cause the gas line to be cut which could cause an explosion or fire.

How can I avoid causing a sewer cross-bore?

You can avoid causing a sewer cross-bore by excavating and locating sewer lines in advance of trenchless construction.

What do I do if I discover a sewer cross-bore?

If you discover a gas main or service that has been cross-bored through a sewer line, relocate the gas line and properly repair the sewer line. If you discover any other utility's cross-bore, notify the building owner and the other utility.

What do I do if I damage a sewer line?

In the event that you damage a sewer or drain line, you must ensure that it is repaired properly.

Camera Launching

Two Cameras

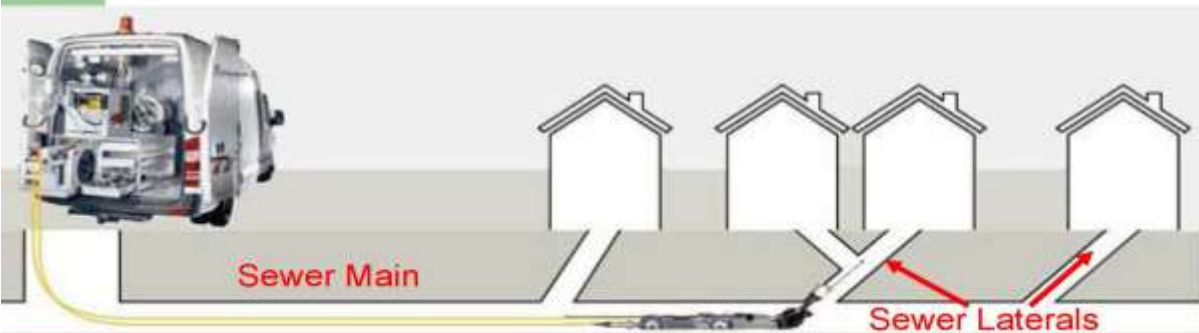
- 1) Straight ahead for sewer main
- 2) 90 degree lateral camera



Camera Launching Showing Laterals



One Camera



Sewer Main

Sewer Laterals

Job Site Briefing – Investigating Potential Cross Bores in Existing Installations

- Establish a tolerance/safety zone with a minimum clearance of 2 foot/0.6 meters horizontal and 1 foot/0.3 meters vertical based on sewer and natural gas mark-outs

- Do not assume the depth or location of any facility, use locating tools to pinpoint the sewer and natural gas lines
- Use a camera to verify no cross bores occurred, or
- Hand dig/pothole at each cross point or parallel construction within the tolerance zone to verify location of natural gas and sewer lines
- Repair all cross bores prior to leaving the site
- Schedule repair of intersected facilities and property restoration

Job Site Briefing – Preventing Cross Bores in New or Replacement Installations

- Establish a tolerance/safety zone with a minimum clearance of 2 foot/0.6 meters horizontal and 1 foot/0.3 meters vertical based on sewer mark-outs
- Do not “blind bore” or assume the depth or location of any facility, use locating tools to pinpoint the sewer lines
- Use a camera for pre and post installation inspection to establish the condition of the sewer prior to installation and to verify no cross bores occurred during the installation, or
- Hand dig/pothole at each potential cross point or parallel construction within the tolerance zone
 - Observe/verify location of natural gas and sewer lines
- Repair all cross bores identified during post installation inspection prior to leaving the site
- Schedule repair of intersected facilities and property restoration

Section 11

Sewer Location and Breach Prevention

Page 2 - Section A - Safety

Section B – Sewer Location

Page 3 - Section C – Recorded Data (DVD)

Page 4 - Section D – Breach Located

Page 5 - Appendix "11-A" - Required Sewer Video Dvd Labeling Format

Page 8 - Appendix "11-B" - Camera Guidelines If a Breach Is Encountered

Page 10 - Appendix "11-C" - Sanitation District Contact Information

A. Safety

1. Duke Energy requires all pipeline Contractors to video inspect all sewers and drain lines located within the limits of any horizontal directionally drilled service and/or gas main after installation.
2. All Work performed must comply with OSHA Confined Space Regulations.
3. Proper traffic control is required, based on the permitting agency where Work is to take place. The contractor must notify MSD on a daily basis of what they intend to do that day. Duke Energy will handle the acquisition of the necessary permits to perform the Work.
4. All Sewer Districts must be notified at least 24 hours prior to entering their facilities.

B. Sewer Video

1. Designated main sewer lines and sewer laterals shall be inspected by means of a remote Closed Circuit Television (CCTV) system. A "general flush" cleaning shall be included in the normal pre/post camera inspection. If a blockage in the sewer/drain line cannot be removed by performing the "general flush" and is found to impede the progress of the video recording, then the contractor shall attempt to complete that section by televising from the next manhole, or other access, in the opposite direction to complete this section. The reversal in the camera's direction must immediately follow the previously impeded direction of the inspection. An audio explanation must accompany this portion of the video.
2. All sewer laterals must be accounted for when directional drilling main and/or services on a particular street. In a situation where it is believed that the laterals exit the rear (opposite of street side) of the building, a pre-locate will be required in order to verify all tap locations. This video inspection shall be recorded on a DVD and be submitted to Duke Energy. If a lateral location cannot be verified using a main line sewer camera for a particular address, then the Contractor shall access the inside of the property to use a "push camera" in the lateral exiting the property to determine its exact location.
3. All sewer video work performed within the service territory of the Cincinnati Metropolitan Sewer District (CMSD) shall be done in accordance with the "Sewer Main, Lateral and Drain Line Video Recording within Cincinnati Metropolitan Sewer District Service Area" specification. The video contractor shall be responsible to get the necessary training from CMSD to perform this work.
4. It will be necessary for the camera view to be centered within the sewer pipe in order to provide an accurate measurement of important physical features located inside the sewer. These measurements shall be displayed and documented on the DVD. All video must provide accurate measurements from manhole to manhole and the

manholes should indicate either the street address or intersecting streets. Pipes larger than 40" in diameter may require an actual entry into the pipe to record the information. The limits of the trunk line video must be within the extreme limits of the estimated property lines of the last house where the gas main was installed.

C. Recorded Data (DVD)

1. A sketch of the trunk line must accompany each DVD. Each tap must be shown on the sketch. The sketch must be in a readily available electronic format. The sketch must be recorded on the appropriate DVD in a legible fashion.
2. Individual sewer laterals must be inspected at a minimum from the trunk line to the foundation of the house. If it is not possible to inspect the lateral from the trunk line and there is no clean out to be found, then it will be necessary to inspect the lateral from the roof vent. If it is found that there is no possible way to video the lateral, a waiver must be utilized.
3. The CCTV inspections will be conducted entirely in a digital format. Two (2) properly marked DVD copies will be sent to the Duke Representative within two (2) weeks after the completion of the job.
4. The following information must be "Light Scribed" on the surface of each submitted DVD. See Appendix "11-A" for required DVD labeling.
 - a. Job Number
 - b. Contractor Performing Work
 - c. Name of Municipality
 - d. Street/Streets' Name
 - e. Address Range - list all addresses and label them M-C or C-M
5. The following guidelines must be adhered to so as to facilitate retrieval of sewer information in the future:
 - a. The submitted DVD's must be recorded in a format that the software program "WIN DVD" can view. Other formats may be allowed after a Duke review and approval.
 - b. No more than one job is to be placed on each set of disks
 - c. Each set of DVD's shall have no more than one city block's worth of information recorded
 - d. A paragraph describing the Work done and the location must be included on each disk as a .PDF file
 - e. A sketch depicting the trunk line and laterals must be included on each disk as a readily available electronic format.
 - f. Each disk must be able to be copied
 - g. It shall be the recording Contractor's responsibility to provide properly recorded DVD's with the correct documentation on the DVD. If it is found that the DVD's

supplied are not able to be read or missing the above requirements, a new recording will be required at no additional cost to Duke.

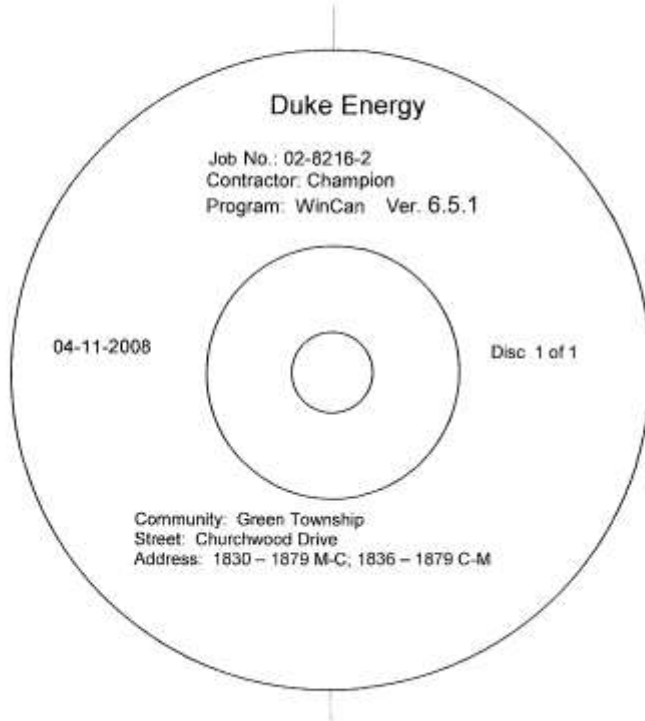
6. If a job requires more than one disk, the disks must be marked as a set, e.g. Disk 1 of 2, etc. Each DVD must still include all pertinent information as listed above.

D. Breech Located

1. If a breach due to a gas facility installation by the Gas Contractor is encountered in a sewer main, lateral or drain line, then the Gas Contractor must respond immediately to the site of the breach and video camera all sewer mains, laterals and drain lines within a measured distance of 500 feet in each direction from the location of the breach. If an additional breach is located, an additional measured 500 feet of camera work will be required from the last measured location. See Appendix "11-B".
2. The Northern Kentucky Sanitation District and the Metropolitan Sewer District have requested that they be contacted when their facilities are damaged. Refer to attached letter in Appendix "11-C".

APPENDIX "11 - A"

REQUIRED SEWER VIDEO DVD LABELING FORMAT



- 1) Font is to be Arial size 10, except for the Duke Energy heading which is Arial size 14
- 2) Layout is to be as shown in the above diagram, any deviation needs prior written approval for its use.
- 3) All information shown is to be provided on the disc
 - a. Heading – Duke Energy
 - b. Job No.: Duke Energy Job Number; Only 1 job per set of discs
 - c. Contractor: Contractor who performed videoing of sewer lines
 - d. Program: Video program including version used by contractor
 - e. Date: Date post camera video of Street is completed
 - f. Disc _ of _ : Number of disc and number of disc(s) in set
 - g. Community: Community as stated in the contract documents
 - h. Street: The street shown on disc. No more than 1 block of information per disc
 - i. Address: Street address range shown on the disc
- 4) All information is to be "Light Scribed" onto the disc

In addition to the video each disc shall contain:

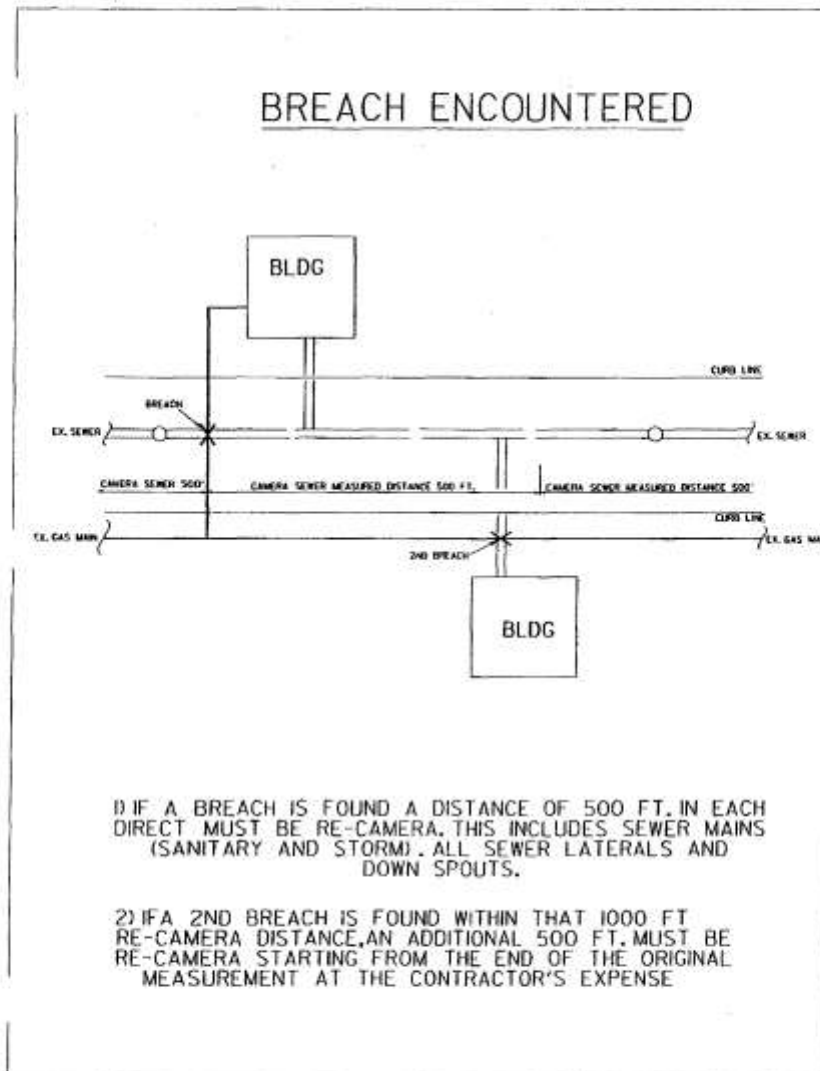
- 1) Description of the work performed and the location as a PDF file.
- 2) A sketch depicting the trunk line and laterals as a PDF file or Excel Spreadsheet.

DVD's must be recorded in a format so that the program can be operated on Duke Energy's computers.

It is the contractor's responsibility to provide properly recorded DVD's with the correct documentation on the DVD. If, it is found the DVD's supplied are not able to be read or missing the above requirements, a new disc will be furnished at no cost to Duke Energy that is readable and meets all of the above requirements.

APPENDIX "11 - B"

CAMERA GUIDELINES IF A BREACH IS ENCOUNTERED



APPENDIX "11 - C"

SANITATION DISTRICT CONTACT INFORMATION



June 15, 2004

Ms. Rhonda Whitaker
Area Manager
Cinergy, ULH&P
107 Brent Spence Square
Covington, KY 41011

Dear Rhonda:

We understand that Cinergy is currently in the process of completing upgrades to gas systems throughout much of Northern Kentucky. While this work was being completed in the City of Southgate, crews damaged a sanitary sewer line on Willow Road near US 27. Gas crews made a repair to the sanitary line but unfortunately it was done improperly.

In the future, if a sanitary sewer line is damaged during a repair, we ask that you contact our Dispatch immediately at 859-578-7466. This will help us to ensure that proper materials and procedures are used to complete the repairs. We ask that if one of your crews completes the repair, that we be notified so that an inspection can be completed prior to the repair being backfilled. If it is more convenient for you, Sanitation District crews can complete the repairs and invoice you for the costs of the repair including time and material.

If you have any questions regarding this matter, please do not hesitate to contact John Fenick, Director of Collection Systems, at 859-578-7455.

Sincerely,



Jeffrey A. Tiger
General Manager

1945 EATON DRIVE • FT. WRIGHT, KENTUCKY 41017-9681 • PH: (859) 578-7450 • FAX: (859) 331-2436

Metropolitan Sewer District (MSD) Repair Request

MSD/Collections needs to be informed of any repairs to one of their sewers so that they can inspect the repair and do not schedule one of their crews to make the repair. MSD/WWC should be contacted at 513-352-4900 when a sewer repair is scheduled. They will send one of their inspectors to the job site to approve the repair. This should save time and money for both MSD and Duke Energy by decreasing the number of failed repairs and double scheduling.

Appendix D – Cross Bore Related Proposed Legislation and Regulations

Proposed Legislation – One-Call Notification Programs

The language, introduced in the form of a Federal bill in the Senate on July 7, 2011 (S. 275) and the House on September 15, 2011 (H.R. 2937), related to minimum standards for State One-Call notification programs is very similar, the Senate language is shown below:

“IN GENERAL - In order to qualify for a grant ...a State one-call notification program shall, at a minimum, provide for:

- Appropriate participation by all underground facility operators, including government operators;
- Appropriate participation by all excavators, including all government and contract excavators; and
- Flexible and effective enforcement under State law with respect to participation in, and use of, one-call notification systems.

Exemptions Prohibited: A State one-call notification program may not exempt (mechanized excavation – wording included in Senate version but not the House) municipalities, State agencies, or their contractors from its one-call notification system requirements.

The language also amends the State Damage Prevention Programs by adding the following – “does not provide any exemptions to (mechanized excavation – wording included in Senate version) municipalities, State agencies or their contractors from one-call notification system requirements.”

For H.R. 2937 the language is virtually identical with the addition of “mechanized excavation” before municipalities in each section as shown by the parenthetical insertion above.

In both bills the effective date for the amendments to take place is two years after the date of enactment of the Act.

Regulations

Minnesota Alert Notice to Underground Gas Pipeline Operators

State Fire Marshal and Pipeline Safety
444 Cedar Street, Suite 147
Saint Paul, Minnesota 55101-5145
Phone: 651.201.7230
Fax: 651.296.9641
TTY: 651.282.6555
www.dps.state.mn.us

Alert Notice to Underground Gas Pipeline Operators

*Preventing Sewer Service Lateral Cross Bores:
Acceptable Practices and Documentation Requirements*

Date: May 10, 2010

Purpose:

The purpose of this Alert Notice is to provide guidance for gas pipeline installers on acceptable installation practices and documentation requirements when installing gas mains and services.

Background:

The Minnesota Office of Pipeline Safety (MNOPS) is now aware of at least 155 instances in Minnesota where gas pipelines were inadvertently installed through privately owned sewer service laterals due to trenchless construction techniques; MNOPS believes there are probably more.

The majority of these "cross bores" were found by plumbers while cleaning sewer service laterals. Since 2000, six gas lines have been punctured by sewer cleaning contractors. On three occasions, the gas ignited, resulting in significant injuries and property damage.

The following Acceptable Practices and Documentation Requirements were developed following a review of industry white papers, a review of previous cross-bore incidents, and discussions with gas distribution pipeline operators on widely available methods and practices.

Acceptable Practices and Documentation Requirements:

Gas pipelines must be installed using one or more of the following methods. Every individual sewer service lateral must be protected by use of one of these methods. Each description below includes documentation requirements.

1. Open Trench Method

The open trench must extend the full width of the property or the full length of the installation. Document all addresses/locations where the installation was performed by open trench.

2. Map and Record Method (Trenchless)

Maps and records of sewer service laterals may be used to demonstrate that no conflict between the gas pipeline and the sewer service lateral is possible. For example, if the gas service enters the front of a structure and the sewer service exits the back of the same structure, the two utilities will not cross. Installer's complete confidence in sewer service lateral maps is essential. Document the criteria by which the lack of conflict was established and all addresses/locations where this method was used.

3. Exposed Sewer Method (Trenchless)

Pothole and expose the sewer service lateral at the gas crossing; the cutting head must be visible in the pothole. Document the distance between the drilling head and the sewer service lateral at all addresses/locations where this method was used. Photographic documentation showing both the drilling head and the sewer lateral is optional, but recommended.

4. Sonde Method (Trenchless)

Sewer service lateral location and depth may be determined by a sonde transmitter at the crossed location. If this method is used, the drilling head must be equipped with a sonde, and must be at least three feet from the sewer service lateral. Each sonde must be calibrated daily. Document the sewer service lateral depth and the drilling head depth at each crossed location along with all addresses/locations where this method was used.

5. Relative Elevation Method (Trenchless)

The highest elevation of an individual sewer service lateral may be determined by entering the structure and verifying the sewer drain's elevation as it leaves the structure. The drilling head must be equipped with a sonde, and the drill must at all times be at least three feet above the highest sewer service lateral elevation. The three-foot separation must be maintained across the entire width of the property. The sonde must be calibrated daily. Document the highest sewer service lateral elevation relative to the drilling head elevation along with all addresses/locations where this method was used.

6. Televising Method (Trenchless)

Individual sewer service laterals may be televised after the gas pipe has been installed. No gas

may be introduced into the new pipeline until the sewer service lateral has been televised. Documentation: provide the televising video along with the written report. Correlate the sewer lateral connection (wye) location with the street address in written report. Use of this method does not alleviate the excavator's responsibility to obtain all available information regarding the location of sewer service laterals prior to installation of a gas pipeline (maps, drawings, diagrams or other records). Upon request by any representative of the Office of Pipeline Safety, excavator should be prepared to produce such information at the job site.

7. Other Trenchless Sewer Service Lateral Verification Methods

With prior approval from MNOPS, other gas pipeline installation methods that demonstrate and document protection of sewer service laterals may be used.

In all methods, documentation must be retained for the life of the pipeline.

None of the above procedures replaces Minnesota Statutes Chapter 216D or Minnesota Rules Part 7560. These methods do not replace the need to mark and locate sewer service laterals prior to construction.

After installation of new gas pipeline by methods 3 through 7, gas pipeline installers should report to local sewer operators the verified locations of individual sewer service laterals. These verifications improve location records of sewer operators. Improved sewer location records make future installation of underground utilities safer.

Installations made between Jan. 1 and May 10, 2010

Installations made between Jan. 1 and May 10 are required to have potentially intersecting sewer lines televised by June 1, 2010; if televising is not practicable, pipeline operators must propose an alternate method to demonstrate that no sewer service lateral damage occurred during installation. MNOPS will respond to any proposal within one week of receipt to ensure that all verification work will be completed by June 1, 2010.

Unacceptable Practices:

1. Listening devices may be used to supplement acceptable practices, but must not be used in lieu of them. Because there is no positive visual verification and no way to accurately document the results, the use of listening devices alone is unacceptable.
2. Any procedure that does not allow for positive documentation of cross bore prevention is unacceptable.

Address questions to:

Tom Prew, Senior Engineer
Minnesota Office of Pipeline Safety/State Fire Marshal Division
Minnesota Department of Public Safety
651-201-7231
thomas.prew@state.mn.us

Code of Virginia, Title 56, Chapter 10.3 – Underground Utility Damage Prevention Act

§ 56-265.19:1 Private sewer laterals and sewer system laterals.

A. Notwithstanding any provision of this chapter to the contrary, the protection of sewer system laterals and private sewer laterals shall be implemented as provided in this section. When an excavation is to take place within a public right-of-way or public sewer easement, the sewer system operator shall exercise reasonable care to mark the approximate horizontal location of sewer system laterals within the public right-of-way or public sewer easement as provided in § 56-265.19.

B. When (i) an excavation is to take place outside the public right-of-way or public sewer easement, (ii) the excavation involves the installation or maintenance of gas or electric utility lines by trenchless technology, (iii) the potential for a conflict with a sewer lateral exists, and (iv) sewer system laterals are located in the public right-of-way:

1. The sewer system operator shall exercise reasonable care to mark the approximate horizontal location of sewer system laterals by:

a. Marking the location of the sewer system lateral where it meets the edge of the right-of-way or public sewer easement, if known; or

b. If the location described in subdivision B 1 a is unknown, marking the location where the sewer system lateral connects to the sewer system main.

2. When the sewer system laterals have been marked in accordance with subdivision B 1 and the excavator reasonably concludes that a private sewer lateral may be impacted by the planned excavation based upon visual evidence, knowledge of the proposed excavation site, or other information available to the excavator, the excavator shall exercise reasonable care to protect the private sewer lateral. For purposes of this subdivision, reasonable care includes the following actions:

a. Reviewing information provided by the private sewer lateral owner;

b. Meeting with the sewer system operator on-site, if the sewer system operator has additional information to provide about the location of private sewer laterals; or

c. Conducting a visual inspection of the proposed excavation site in an effort to determine the probable path of the sewer lateral.

C. When (i) an excavation is to take place within or outside the public right-of-way or public sewer easement, (ii) the excavation involves the installation or maintenance of gas or electric utility lines by trenchless technology, (iii) the potential for a conflict with a sewer lateral exists, and (iv) private sewer laterals are located in the public right-of-way or easement:

1. The sewer system operator shall assist the excavator by one of the following methods, unless the operator marks private sewer laterals in the manner required for its sewer system laterals under subsection B:

a. Provide copies of the best reasonably available records regarding the location of the private sewer laterals by electronic message, mail, facsimile, or other delivery method. If an excavation affects 25 or more private sewer laterals, the sewer system operator's response shall be in accordance with the timelines set forth in § 56-265.17:3. If the provision of records required by this subsection imposes an unreasonable burden or substantial cost upon a sewer system operator, the excavator and the sewer system operator shall endeavor in good faith to reach an agreement to provide the sewer system operator with additional time to provide the records or any other mutually agreeable accommodation.

b. Provide the best reasonably available records on the Internet or another readily accessible electronic system in order that the records may be retrieved by the excavator from a remote location. If the sewer system operator has implemented such a system, then the sewer system operator shall have no further obligations to provide records under subdivision C 1 a.

c. If the sewer system operator has no such records, but has additional information to provide about the location of private sewer laterals, then the sewer system operator shall notify the excavator of such information and, upon request, either meet with the excavator on-site or convey such information to the excavator.

2. When the records have been made available in accordance with subdivision C 1 and the excavator reasonably concludes that a private sewer lateral may be impacted by the planned excavation based upon visual evidence, knowledge of the proposed excavation site, or other information available to the excavator, the excavator shall exercise reasonable care to protect the private sewer lateral. For purposes of this subdivision, reasonable care includes the following actions:

a. Reviewing information provided by the sewer system operator;

b. Reviewing information provided by the private sewer lateral owner;

c. Meeting with the sewer system operator on-site if the sewer system operator has additional information to provide about the location of private sewer laterals; or

d. Conducting a visual inspection of the proposed excavation site in an effort to determine the probable path of the sewer lateral.

D. Sewer system operators shall mark utility lines, other than sewer system laterals and private sewer laterals, as provided by other sections of this chapter.

E. Water system operators shall mark water system utility lines as provided by other sections of this chapter, except that a water system operator shall not be responsible for marking private water laterals.

F. Records regarding the location of private sewer laterals provided on the Internet or otherwise made accessible by an electronic system pursuant to subdivision C 1 b shall also be accessible to other public utilities and cable operators or excavators working on their behalf for purposes of compliance with this chapter.

G. In all excavations, the excavator shall exercise reasonable care to protect underground utility lines.

**Operations Technology
Development, NFP**

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847-544-3400
FAX: 847-544-3401
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