

The Often Forgotten Underground World



Cross Bores



NASTT's No-Dig 2010

**Mike Kemper,
NPL Construction Company
May 4, 2010**



Who is NPL?

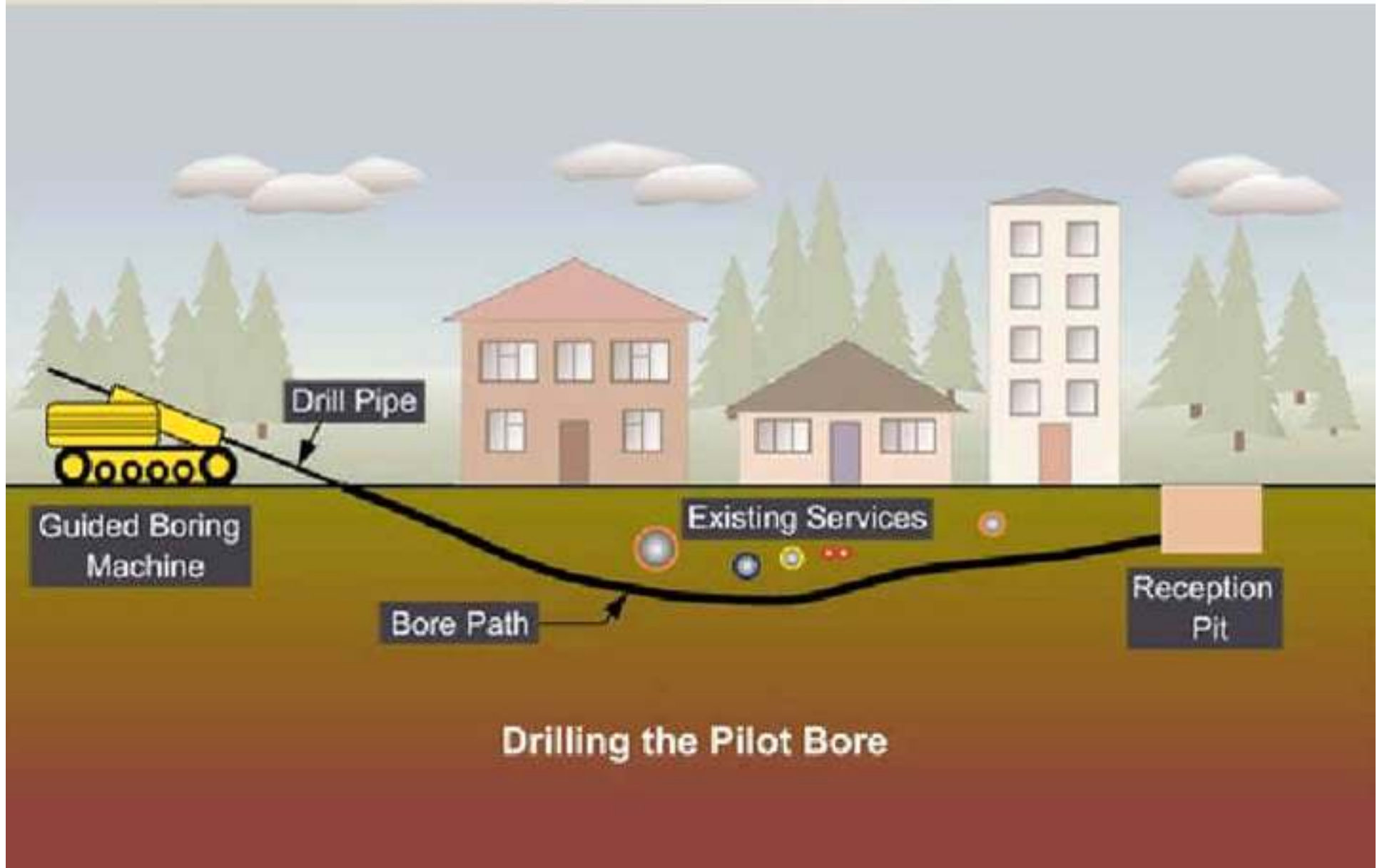
CORE BUSINESS:

The safe installation & maintenance of reliable energy distribution systems



- 2000 employees
- 5M work hours
- 13.5M feet installed/replaced
- Fleet of over 3000 units ranked in Top 20 in construction industry
- Heavy One-Call user

What is trenchless technology?

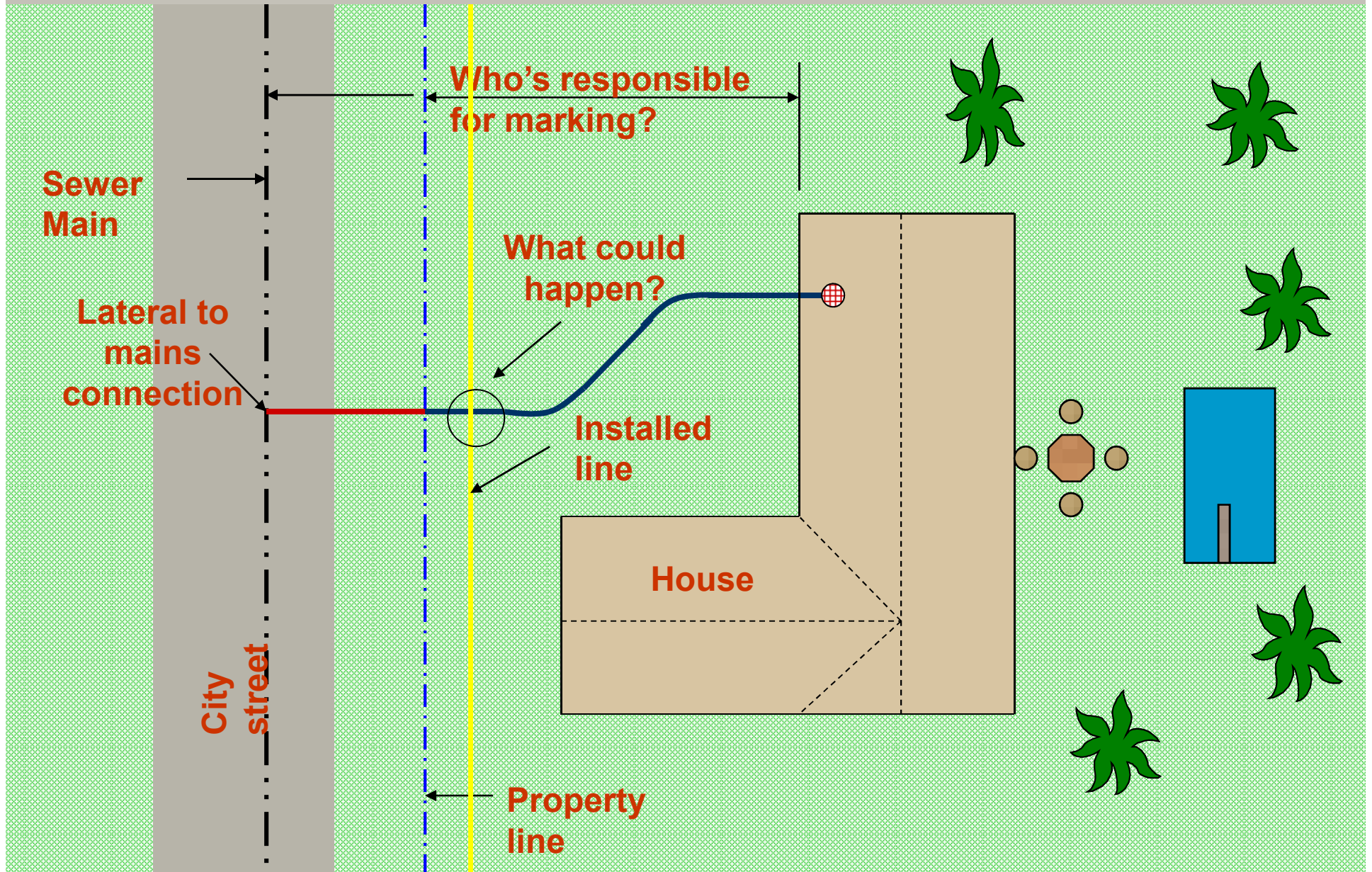




How about these?



Do we have a problem?



Madill, OK 1992



Some hits are a time bomb!

Madill, OK 2007



Headline: March 13, 2006

***“ Woman, Granddaughters Barely
Escape Explosion ”***



Story: February 1, 2010

“The gas-fueled fire that destroyed a St. Paul home is being investigated by Minnesota's Department of Pipeline Safety ...”

- KSTP TV









“Houston, we have a problem”

- Captain James Lovell,

Spacecraft Commander of Apollo 13, 1970

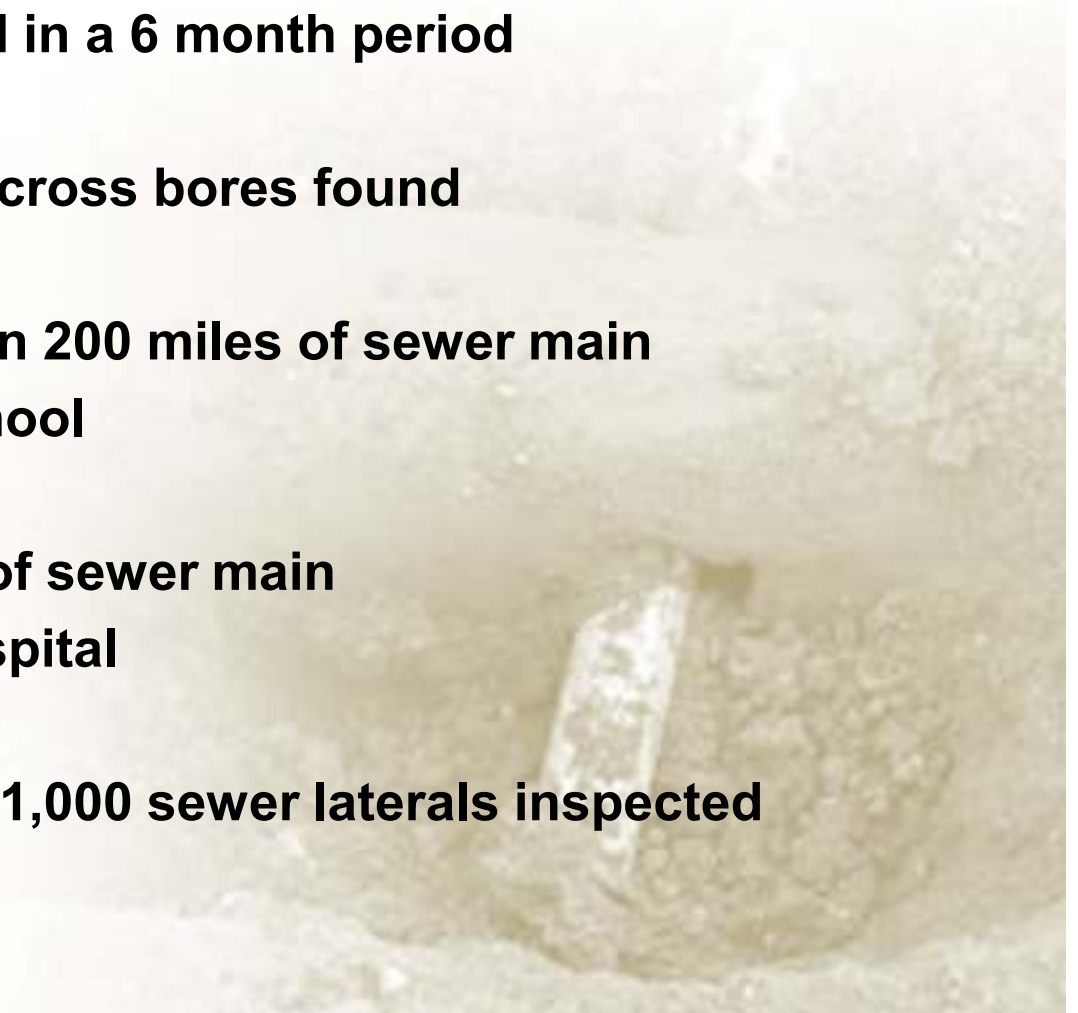


How often does this happen?



What we know:

- **Minnesota Public Utilities Commission**
 - 27 cross bores reported in a 6 month period
- **City A, CA**
 - 4 blocks inspected. 24 cross bores found
- **City B**
 - 2 cross bores per mile in 200 miles of sewer main
 - One cross bore at a school
- **City C**
 - 3 cross bores per mile of sewer main
 - One cross bore at a hospital
- **City D**
 - 2% cross bores out of 11,000 sewer laterals inspected



Odds of getting a hole in one

1 in 10,000
.01%



Montana Gimmie

How often do explosions happen?

Known explosions in past 10 years

- Austell, GA
- Bellwood, IL
- Burlington, VT
- Cincinnati, OH
- Clayton County, GA
- Fairfax, OK
- Gilbert, AZ
- McKinney, TX
- Madill, OK
- Massena, NY
- Merriam, KS
- Middletown, OH
- Mobile, AL
- Phoenix, AZ
- Rochester, MN
- St. Paul, MN
- Tucson, AZ
- White Bear Lake, MN

The exposure is:

- **Low Frequency - High Severity**
- **Long Term vs. Short Term**
- **A “predictable surprise”**





Unmarked sewer lines are risky business



One bad move...

Even when it seems as though you were born to do the job, things can go wrong.



So what should we do?

Plumbers

Academia

Legislators

Regulators

Contractors

Manufacturers

Owner/Operators



Academia

The Use of Trenchless Excavation Equipment in Relation to the Marking of Underground Facilities 2008





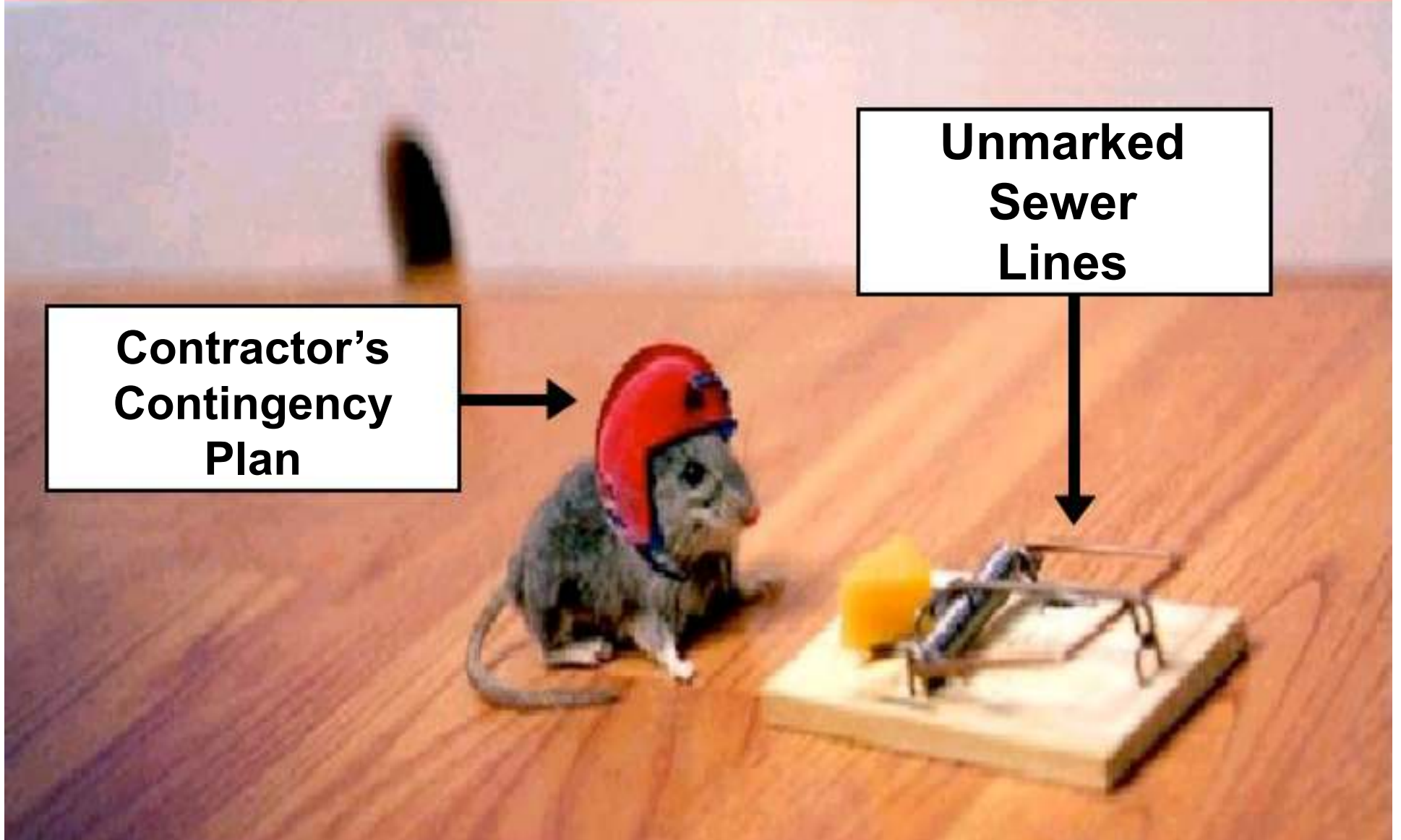
“How important is the issue of unmarked sewer lines to your business?”

- **40 responses from major trenchless contractors in the US**
- **Average Importance: 9.26 out of 10**

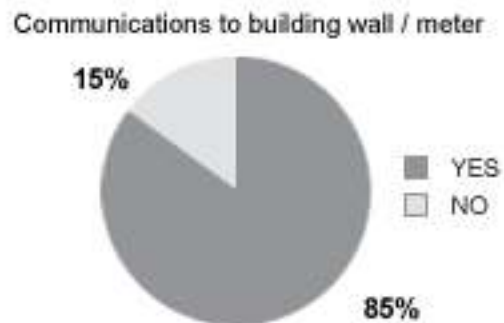
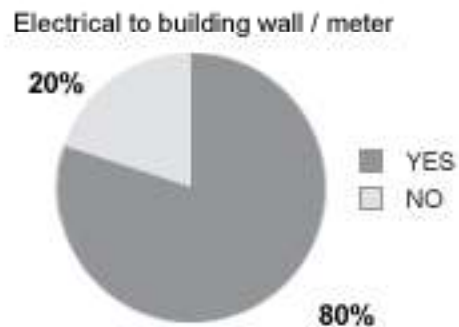
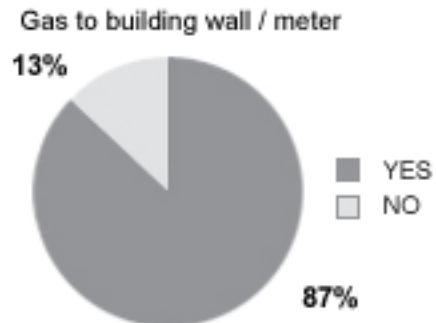
Do you want your contractor gambling?

**Contractor's
Contingency
Plan**

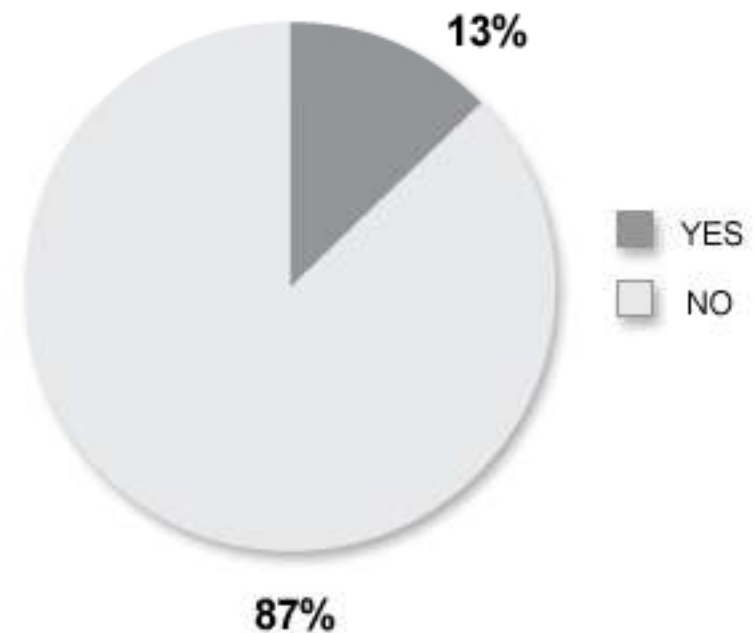
**Unmarked
Sewer
Lines**



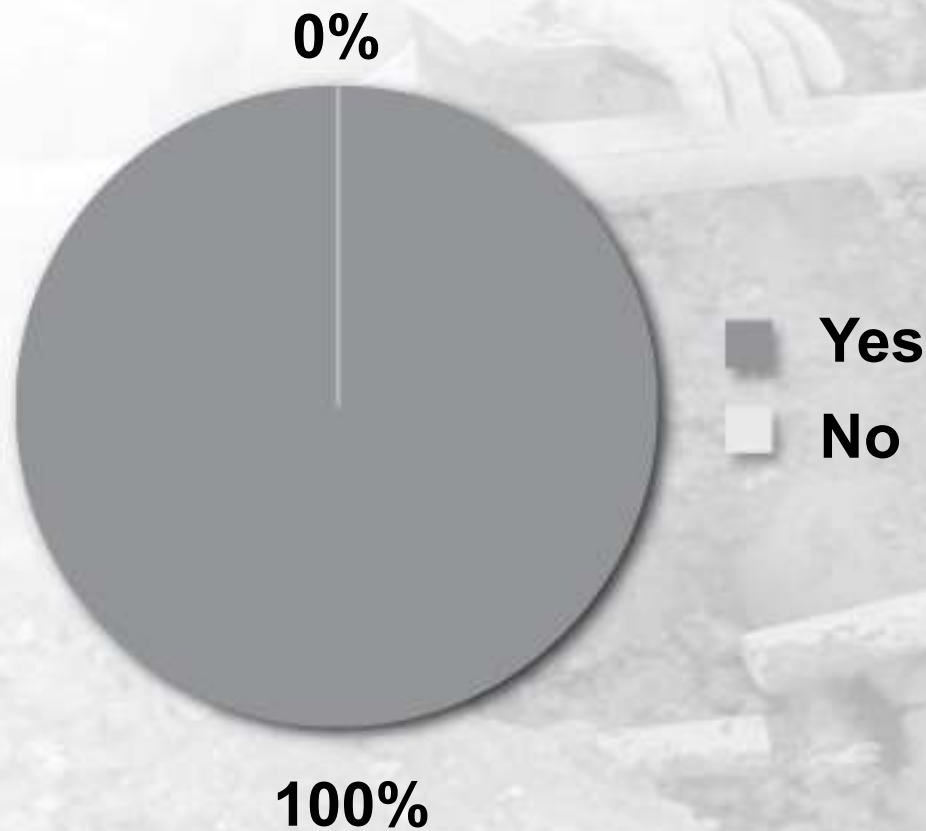
“Are owner / operators you work for required to mark their facilities?”



Requirement of owners to mark UG utilites -
Sewer to building wall / meter



Does there need to be better enforcement of violators?



Regulators



Legislators

- 40+ states already require some level of locating by the sewer owner/operator
- Recent progress in AL, AZ, GA, KS, MN, NM, NV, SD, TN, VA, WI ...
- More can be done in most states
 - New installations
 - Replacement installations

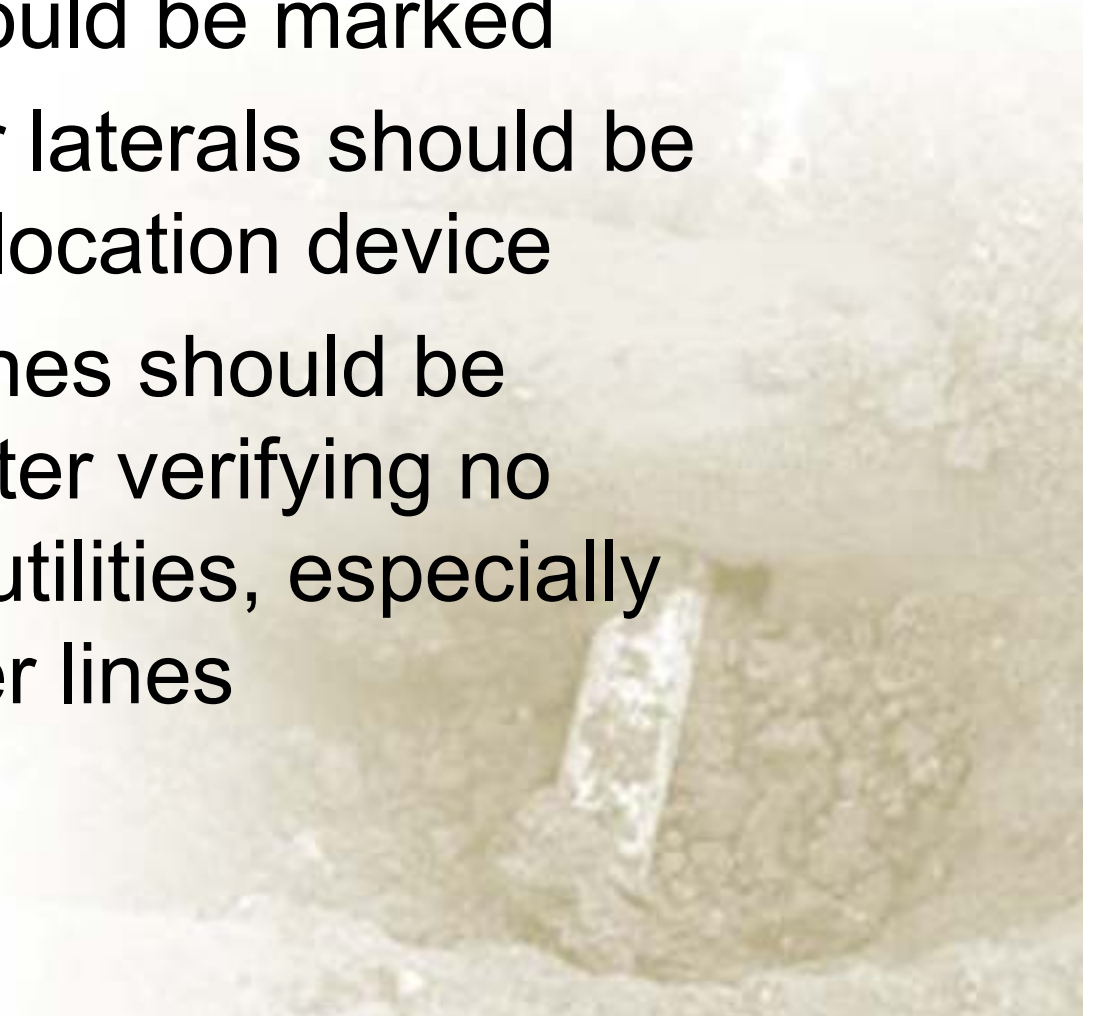


Contractors



Installation Solutions

- All underground facilities, including sewer lines, should be marked
- All new sewer laterals should be installed with a location device
- All new gas lines should be installed only after verifying no conflict with all utilities, especially unmarked sewer lines

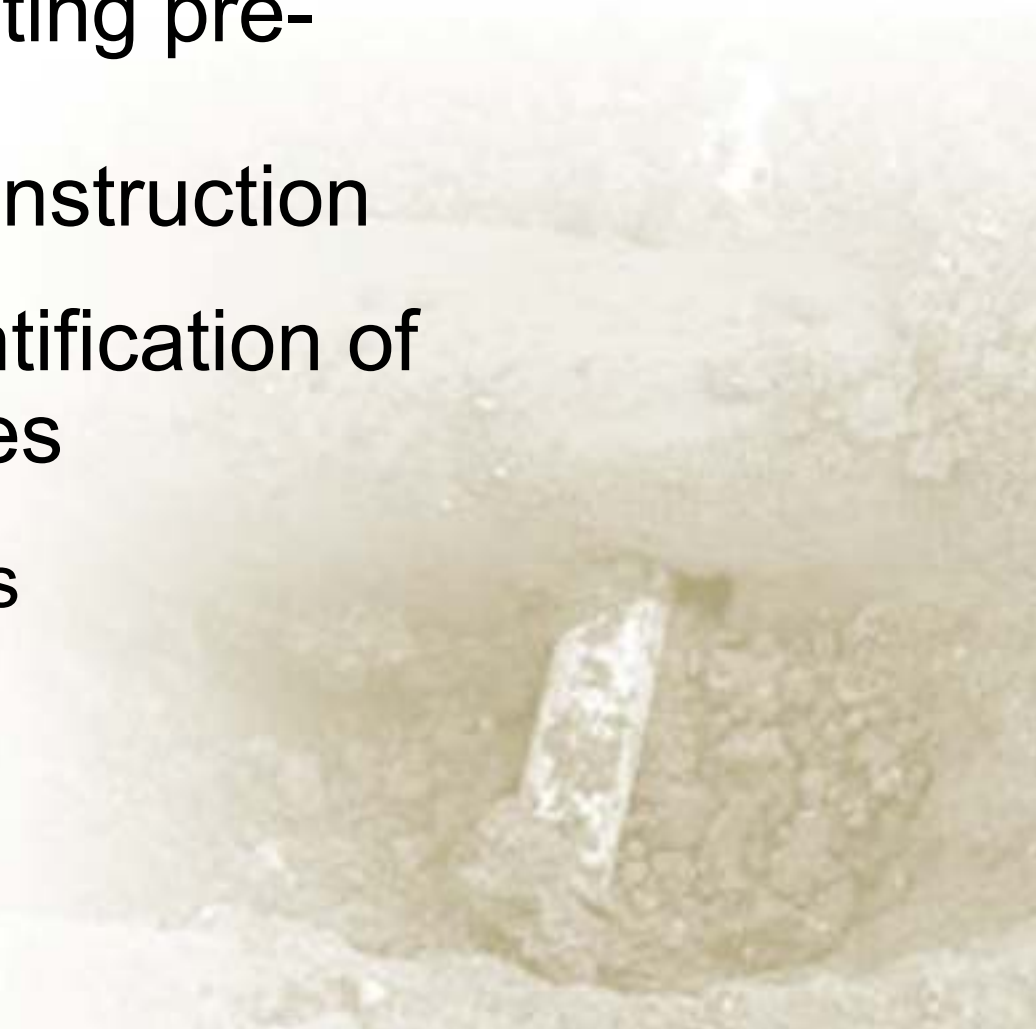


Industry Literature



- Guidelines for locating pre-construction and verification post construction
- Guidelines for Identification of Legacy Cross Bores
- Sample ordinances

www.crossboresafety.org



CONFIDENTIAL & PROPRIETARY

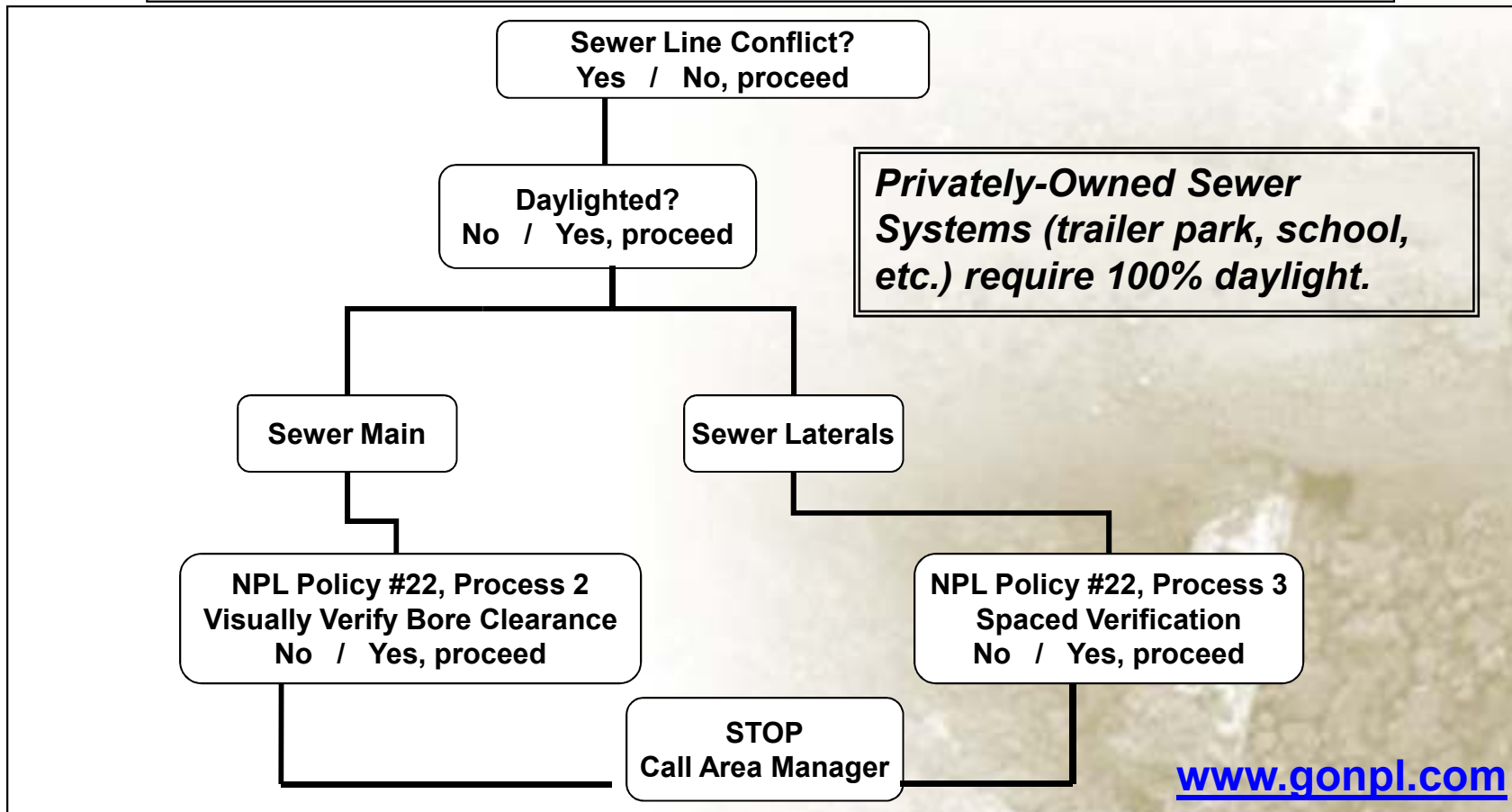
TRENCHLESS TECH UTILIZED

FOR

GAS LINE INSTALLATIONS

(Bore Card Required by Each Crew at Each Address)

Conflict is defined as either crossing a sewer line within 4' or paralleling one within 4'.



Owners/Operators

Reduction of risk can be achieved:

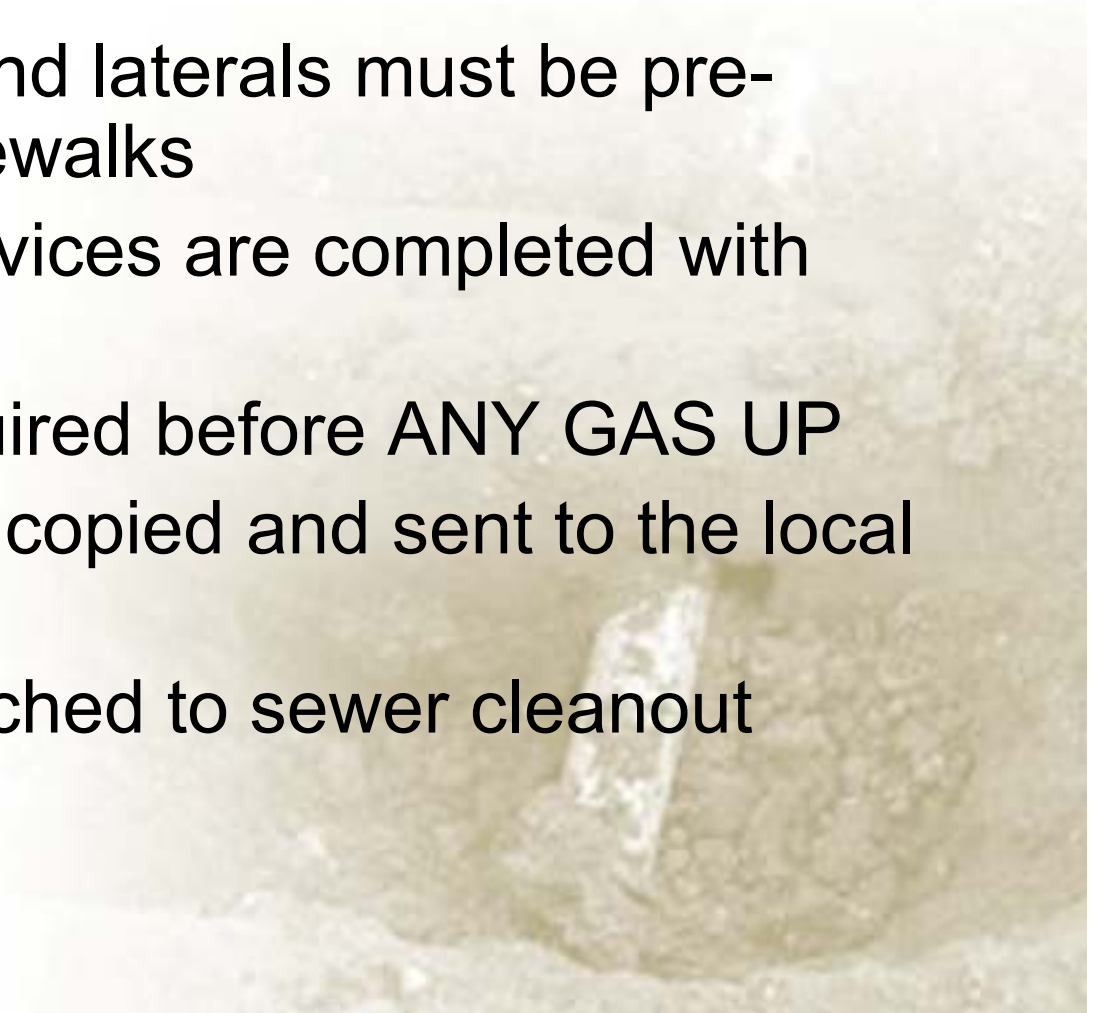
- **Formal program to address?**
 - **2008 AGA Survey of 60 LDC's:
26% said yes.**
- **Better policies**
- **Relatively new technology for both
new and legacy installations**



Duke Energy's sewer locate & inspection process

New installations:

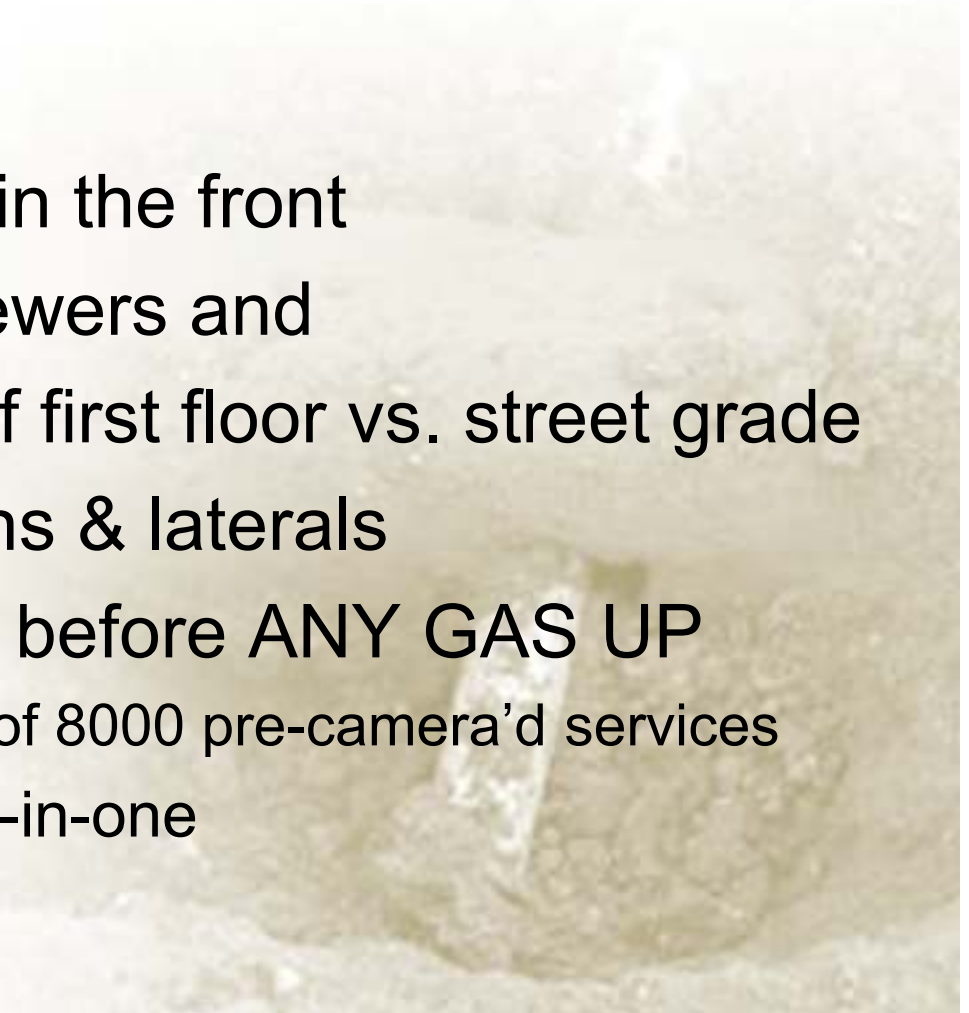
- All sewer mains and laterals must be pre-located to the sidewalks
- Curb-to-meter services are completed with open trench
- Post Camera required before ANY GAS UP
- All recordings are copied and sent to the local sewer district
- Sewer Tag is attached to sewer cleanout



Duke Energy's sewer locate & inspection process

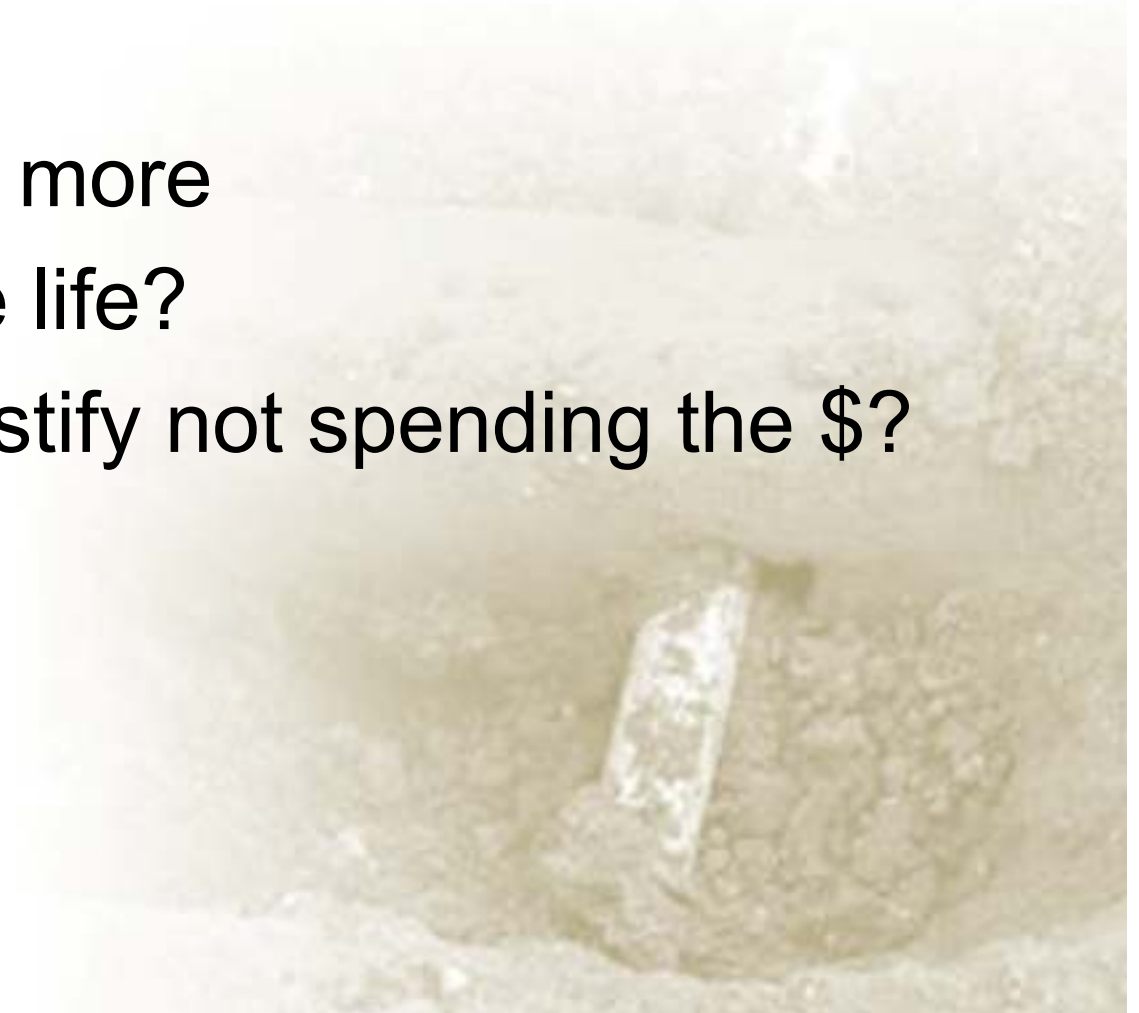
Replacement installations:

- Site visit all projects
- Determine if sewer is in the front
- Determine depth of sewers and
- Document elevation of first floor vs. street grade
- Pre-locate sewer mains & laterals
- Post-camera required before ANY GAS UP
 - 8 cross bores found out of 8000 pre-camera'd services
 - .1% vs .01% for a hole-in-one



Cost?

- Duke Energy:
 - Less than 5% more
 - Is it worth one life?
 - How do we justify not spending the \$?



Legacy solutions

- Find installed problems ... before they find us.





Incident in Phoenix, AZ, May 8, 2004



SWG's Sewer Lateral Investigation Program

- Priority Customer Classes:
 - Schools
 - Hospitals
 - Nursing homes
 - Trailer parks
 - Apartment complexes
- Sewer Laterals Database
- Field Investigations
- Public Education



Investigation Methods

- Maps and Records review
- Electronic separation
- Video inspection
- Dig and Inspect





The Launch



And there she goes...







Overall SLIP Conflicts Data

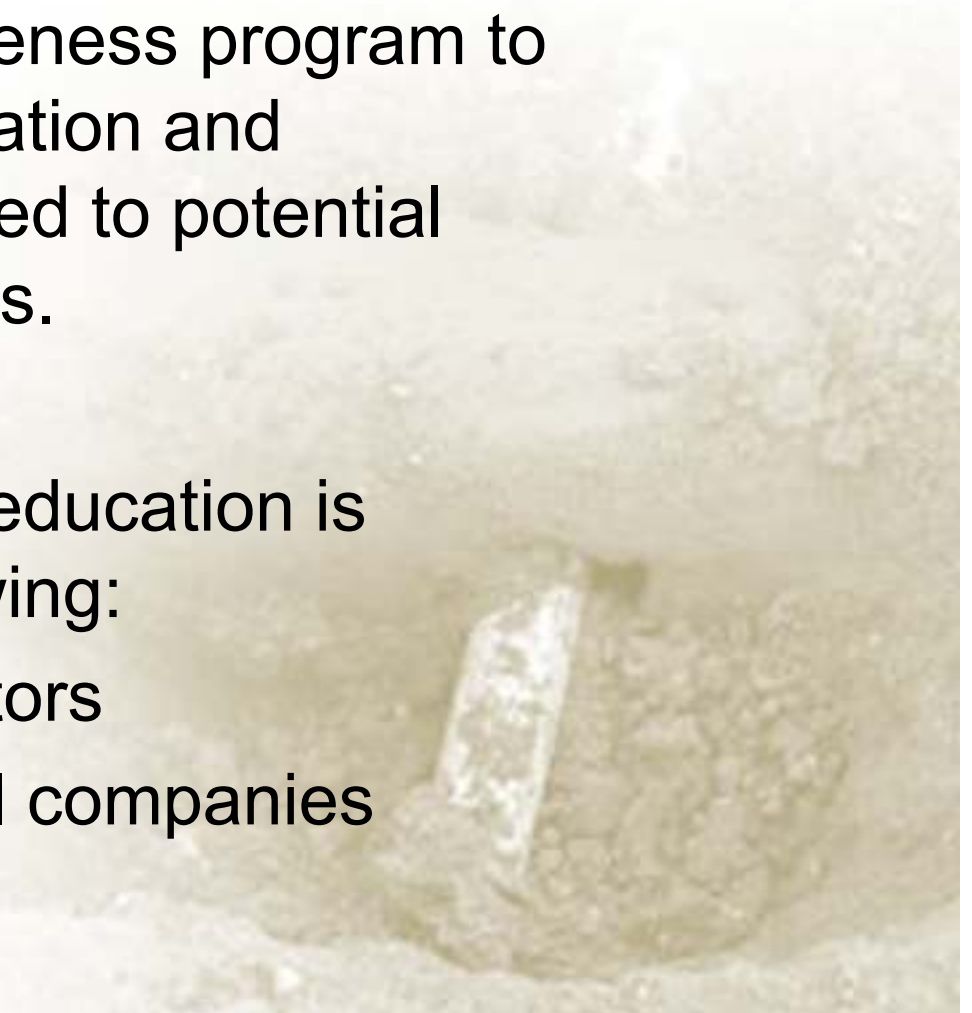
	Total Investigations	Conflicts	%
Central Arizona	213,959	67	.03
Northern Nevada	34,602	27	.08
Southern Arizona	270,417	18	.01
Southern California	24,619	3	.01
Southern Nevada	109,548	5	.01
Total	653,145*	120	.02/.05*

*** c. 35% of investigations were done in field**



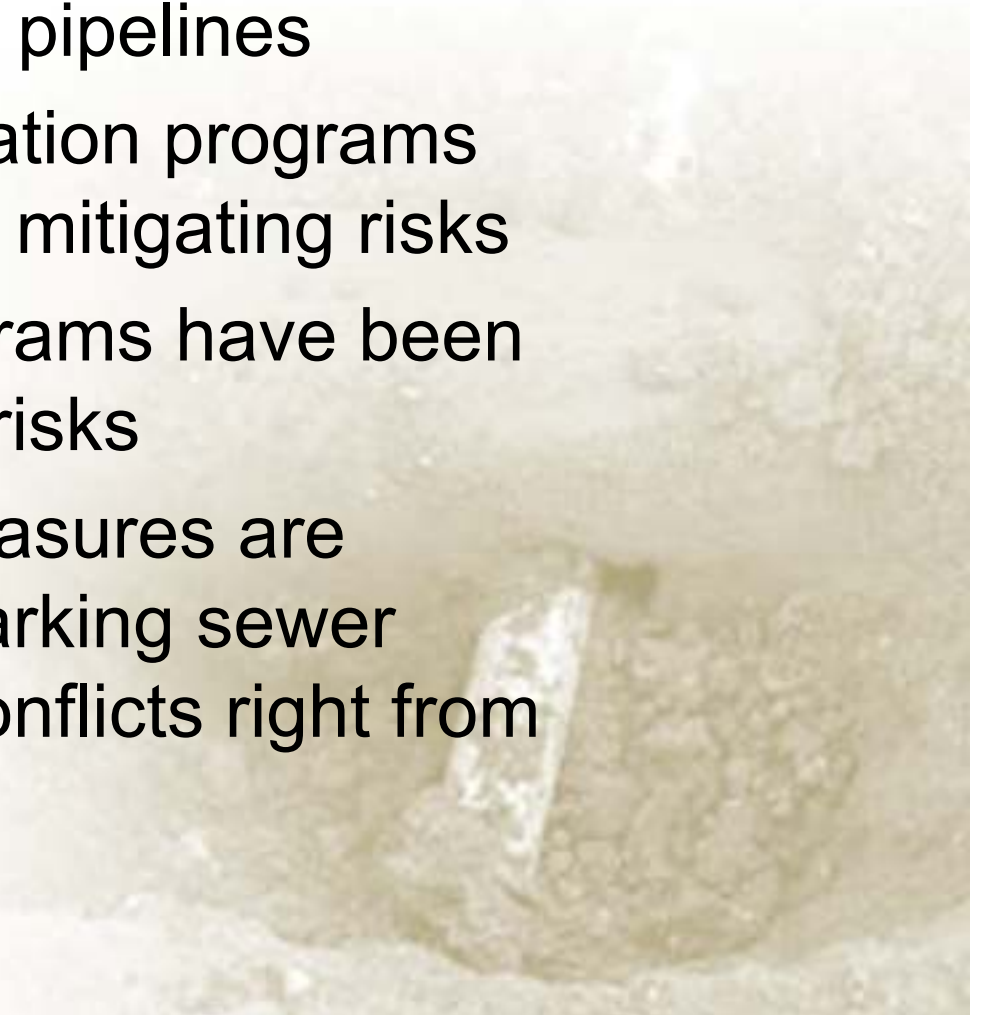
Public Education & Communication

- Targeted public are part of an ongoing public awareness program to provide further education and communication related to potential sewer lateral conflicts.
- The targeted public education is directed to the following:
 - Plumbing contractors
 - Equipments rental companies



SWG's SLIP Summary

- Sewer lateral conflicts are threats to the integrity of distribution pipelines
- Sewer lateral investigation programs have been effective in mitigating risks
- Public education programs have been effective in mitigating risks
- More preventative measures are needed in terms of marking sewer laterals to eliminate conflicts right from the start

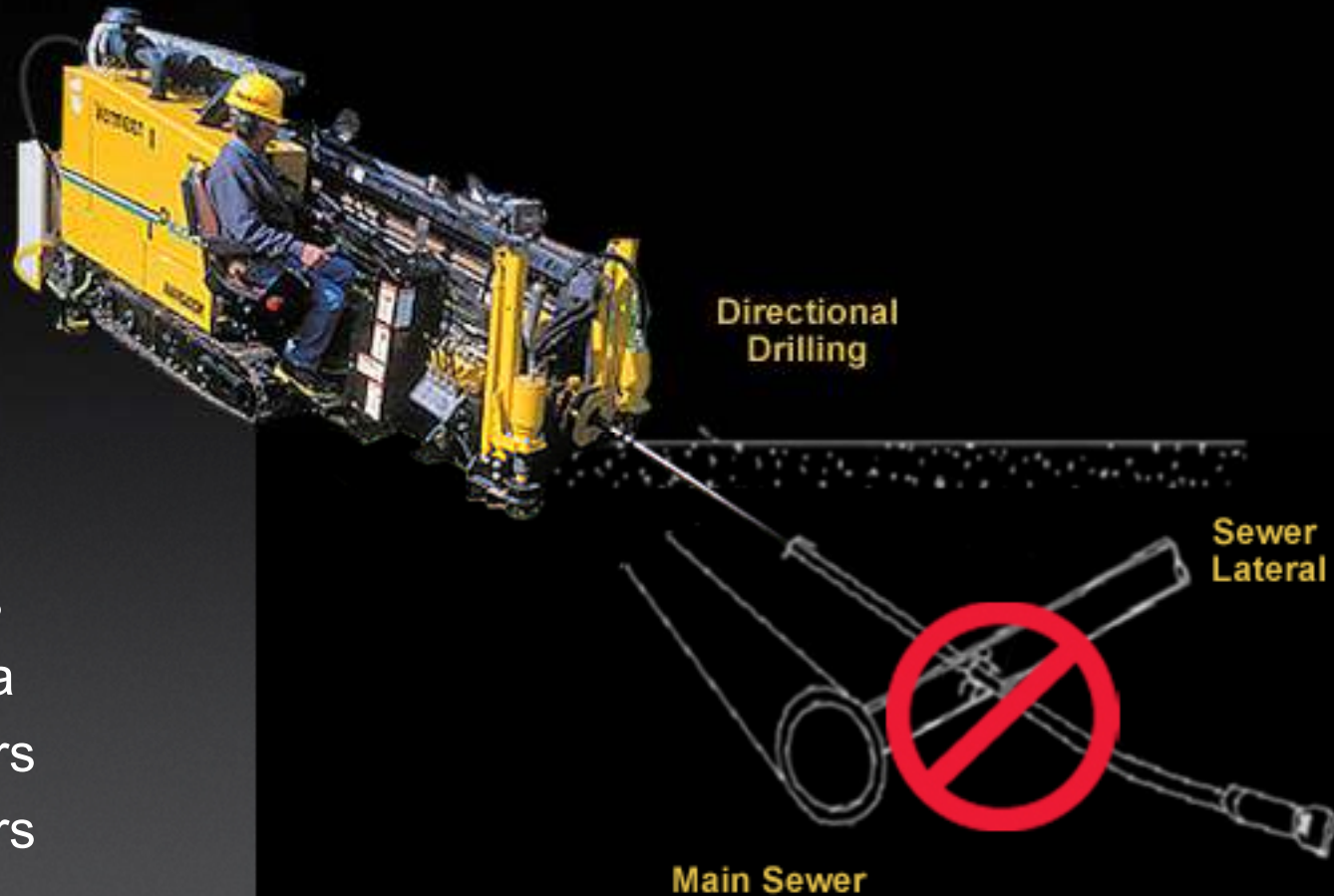


**“Luck is not
a strategy”**

**- Steve Ewing
Past Chairman AGA,
Vice Chair, DTE**



Goal: Protect all parties



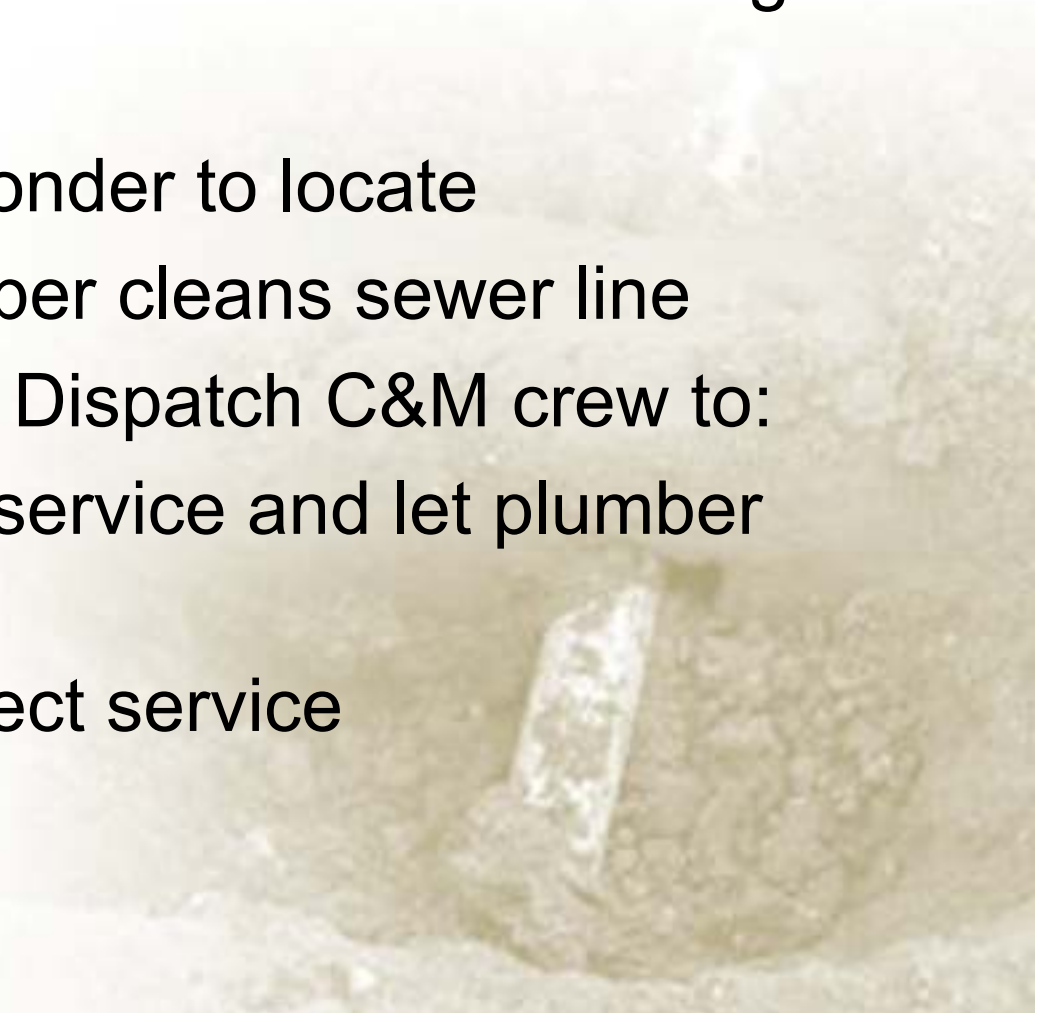
Public
Plumbers
Academia
Legislators
Regulators
Contractors
Manufacturers
Owner/Operators

A hand holding a royal flush of diamonds (Ace, King, Queen, Jack, Ten) against a dark blue background. A large, semi-transparent question mark is overlaid on the cards. The text "Questions??" is centered in white.

Questions??

Duke's Verification Process

- Plumber or Customer calls re: sewer blockage
- Duke sends 1st responder to locate
 - No conflict – Plumber cleans sewer line
 - Potential conflict – Dispatch C&M crew to:
 - disconnect gas service and let plumber clean line
 - test and reconnect service



Legislators

- 40+ states already require some level of locating by the sewer owner/operator
 - Is that the home/building owner or municipality?
 - Courts have ruled that home/building owner does not have expertise to be responsible for location of sewer laterals.
 - Does the State require them to join the One-Call system?

Legislators

- Recent progress in AL, AZ, GA, KS, MN, NM, NV, SD, TN, VA, WI ...
- More can be done in most states
 - New installations
 - Replacement installations



Sewer work safeguards

Natural gas pipelines may be located close to a sewer line, so please take immediate action if you should see or smell any of the following signals the next time you clean out a sewer line with a roter device:

- A strong natural gas odor at the cleanout or inside the building served by the sewer line
- Bubbles rising through standing water or in the toilet bowl

If these signals are present, stop what you're doing, and:

- Have everyone immediately evacuate the premises, and as they do so, leave the building's doors open
- Do not turn on or off any light switches, or use other sources of ignition
- From a safe distance, call Southwest Gas and 911 for immediate assistance

Should you sense or see, but not penetrate, an obstruction in the line, call the Southwest Gas emergency number below for immediate assistance to ensure that the gas line has not been damaged. There is no charge for this service.

In addition, should you be called to an address that indicates a blockage in the sewer lateral connecting a house or business to the main sewer, please call 811 for an emergency line locate to determine the location of our underground lines before starting any clean-out process.

For emergency assistance, call:

- Southern California – 1-800-867-9091
- Central Arizona (Phoenix area) – 1-800-528-4277
- Southern Arizona (Tucson, and other Southern Arizona communities) – 1-800-722-4277
- Northern Nevada, Northern California – 1-800-772-4555
- Southern Nevada (Bullhead City, Ehrenberg, Parker, Laughlin and Needles) – 1-800-447-5422

Story: March 16, 2006

After seeing bubbles in the water and smelling the natural gas, the plumber told the grandmother and her three grandchildren to get out of the home immediately.



- **Middletown, Ohio building inspector:**

"The plumber did absolutely nothing wrong. He had no way of knowing the gas line had been breached."

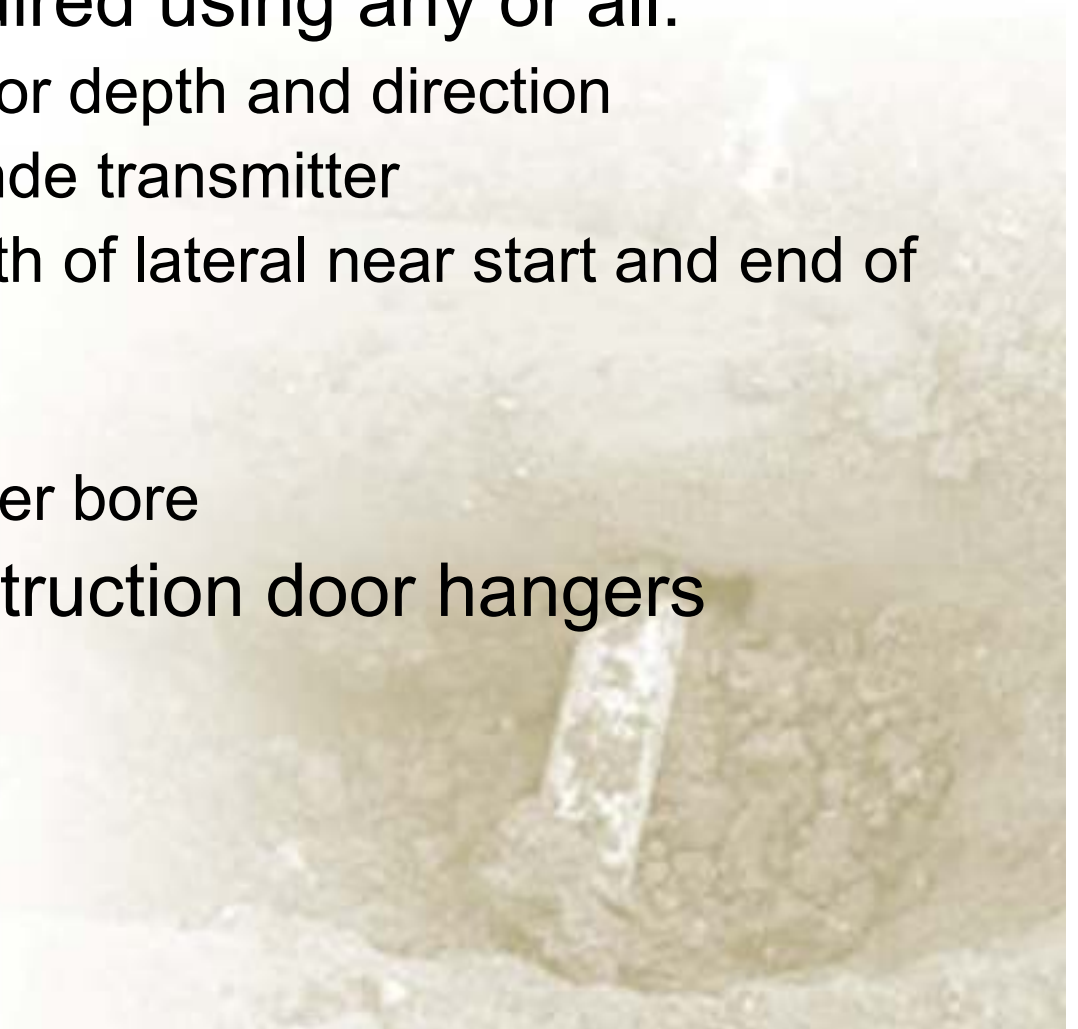
Manufacturers

- 2005: 258 (5 per week) HDD hits in US
- Potentially affecting HDD use

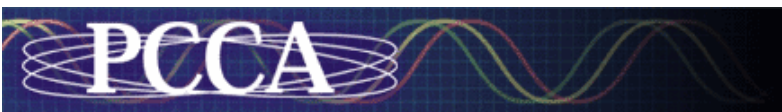


One LDC's standard

- Verification is required using any or all:
 - Check manholes for depth and direction
 - Fish tape with Sonde transmitter
 - Excavate 1' > depth of lateral near start and end of bore
 - GPR, if it works
 - Camera before/after bore
- Pre and post construction door hangers



Associations



Industry standards

- HDD Consortium, Horizontal Directional Drilling - Good Practices Guidelines
- EMI, Safety Manual: Directional Drilling Tracking Equipment
- DCCA, Horizontal Drilling: Safe Operations Guidelines
- NULCA, Excavation Practices & Procedures for Damage Prevention: A Guide For Protection of Underground Facilities
- CGA, Minimum Damage Prevention Guidelines: Excavation Practices For Underground Facilities
- Manufacturer's Manuals
- State One-Call Manuals

