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811 Know what's below. Call before you dig.

Excavator Beware®

Natural gas safety trainer's guide

Contents

Introduction

The *Excavator Beware* training program from National Grid is designed to provide excavators with the information they need to work safely around underground natural gas pipelines.

This trainer's guide will help you make the most of the *Excavator Beware* program. It contains five sections:

- **Know your audience.** An overview of excavators' learning preferences.
- **Natural gas basics.** Information on how natural gas works and some terms to know.
- **Plan your session.** Tips for preparing an effective training session.
- **Your five-step training for survival.** Step-by-step training guidance.
- **Before and after quiz.** Reproducible utility safety quiz to help trainers and participants evaluate the program's impact.

Section one: Know your audience

Understanding how excavators learn best will help you tailor your training session to this unique audience. Take into consideration the following:

- **Excavators are very focused on working efficiently.** Excavators may face pressure to cut corners where safety is concerned in the interest of saving time and money. Acknowledging this from the start—and cautioning against it—will put you all on the same page.
- **Excavators tend to be action-oriented learners** who do best when given an opportunity to practice and repeat recommended behaviors.
- **Excavators prefer practical (rather than theoretical) information.** Keep the focus on real-life situations.

Section two: Natural gas basics

This section will help you answer questions about natural gas from session participants.

What is natural gas?

Natural gas, like petroleum, is a fossil fuel. It is found in pockets deep underground, and is harvested by drilling. Here are some basic properties of natural gas:

- Natural gas is nontoxic.
- Natural gas ignites at about the temperature at which a cigarette burns.
- Natural gas burns within a specific concentration range: between approximately 5% and 15% gas to air. At the ideal 10% concentration, natural gas burns cleanly.
- Natural gas is lighter than air. Whenever possible, it will rise. If contained, it will move laterally or **migrate**, seeking an upward path, and it will follow the path of least resistance.

- Natural gas is odorless. National Grid adds mercaptan, which smells like sulfur or rotten eggs, to natural gas. It helps most people smell a leak. But not all gas is odorized. And in some cases, the odor of natural gas can be masked by other smells, or the gas can be stripped of its odor.
- Do not rely on your nose alone to detect a gas leak. Use your senses of sight and hearing as well, and be alert for the following signs:
  – A hissing, whistling or roaring sound
  – Dirt blowing into the air from a hole in the ground
  – Continuous bubbling in water
  – Dead or dying vegetation (in an otherwise moist area) over or near a pipeline
  – An exposed pipeline after a fire, flood or other disaster
  – A damaged connection to a gas appliance

The natural gas transmission and distribution system

To harness and transmit natural gas, we use thousands of miles of pipes. There are three types of pipes used in the system: transmission pipelines, distribution lines (or mains) and service lines.

High-pressure **transmission pipelines** move large volumes of natural gas from refining plants across long distances.

- Black and yellow markers with National Grid's emergency number indicate the need for extra care around high-pressure gas pipelines. Look for these markers at railroad crossings, fence lines and street intersections. If you notice any type of suspicious activity or excavation occurring near a pipeline marker, or you see a damaged marker, call the emergency number immediately.
- For security purposes, these markers do not show the exact location, path, depth or number of gas pipelines in the area. In addition, pipelines may not follow a straight course between markers. So do not rely on these markers to tell you where it is safe to dig. **Always notify the 811 service before digging.**
- If your 811 locate indicates you will be working within **15 feet** of a high-pressure gas pipeline in Massachusetts or Downstate New York, or within **20 feet** of one in Upstate New York, National Grid MUST be on-site during the excavation.

  Always contact your state 811 center before digging and for the most current requirements.

Distribution lines (also known as gas mains) bring natural gas from transmission pipelines into the residential and commercial areas where it is used.

Service lines bring natural gas from distribution lines to individual structures. Pressure, created at various points along the lines, moves the gas through the pipes. The size of natural gas lines varies greatly from 1 inch to 4 feet in diameter; the pressure can vary from ¼ pound per square inch to 1,000 pounds per square inch. The size of a gas line is NOT a reliable indicator of the internal pressure.

Section three: Plan your session

A well-organized, informed instructor will gain participants' respect and be far more effective. Below are some recommendations to help you prepare for the utility safety training session with confidence.

Know your material

Always preview the materials before showing them to session participants. Gathering information in advance can be useful and make the training materials more relevant. Review all the materials and rehearse your presentation well before the session.

Make the material relevant

Identify the key situations that excavators in your training session may encounter, and focus the group's attention on these topics during training:

- **Where are the natural gas transmission lines** in your area?
- **What type of digging activities** might bring excavators close to natural gas lines?
- **What natural gas hazards** have participants encountered in the past? Recently?

Tailor the session to the training space, audience size and allotted time

Remember that excavators are hands-on, action-oriented learners. The session will need to include opportunities to simulate recommended practices and to discuss potential applications of the material. Room size and arrangement can have a measurable impact on the participation level. Consider:

- **Will all materials be visible** to all participants, or do you need additional space or equipment?
- **Are the seats arranged in a way** that will foster discussion?
- **Is there adequate space** for participants to conduct simulations?
- **Is there adequate lighting** for all participants to see the instructor and materials and to take notes if necessary?
- **Will everyone be able to hear?**

Just as room and audience size can impact the effectiveness of training, so can session time. No one learns well sitting for long periods. On the other hand, cramming too much information into a short session can reduce retention. Plan your session to allow time for discussions and simulations. If there is not time for all the materials, consider which ones will be most effective for these participants.

Section four: Your five-step training for survival

Follow these steps for a high-impact meeting that will keep participants involved and reinforce essential safety information:

1) Advertise the meeting.

Post a notice well in advance of the meeting in a highly visible location.

2) Pass a sign-in sheet.

Keep attendance records of all safety meetings. Someday you may have to show who attended the meeting, what the session covered and when it was held.

3) Offer an overview.

Tell participants what you will cover in the meeting and what you hope they will learn. This is a good time to convey the importance of this information—that it can help protect excavators, their co-workers and the public from utility-related injury or death.

4) Present the Excavator Beware *booklet and visor card.*

Discuss the utility safety information in these materials and the natural gas emergencies that participants might encounter. Review these vital safety tips with participants periodically to refresh their memories.

5) Conduct a discussion.

Participants will retain more information if they get involved in a discussion:

- **Remind participants of the circumstances of any recent natural gas emergencies** in your region. Discuss how information in the materials is relevant to those incidents.
- **Review the proper 811 notification procedures and the utility color code.** Discuss why following the law and allowing extra time for a utility locate can prevent injuries and save time and money in the long run. Discuss additional safety measures such as pre-marking the dig area, hand digging to visually verify the position of marked gas lines before power digging in the tolerance zone, and asking the property owner about any privately owned underground gas lines that do not belong to a utility operator and so would not be marked during a utility locate. *Remind participants to always contact their state 811 center before digging and for the most current requirements.*
- **Review the warning signs of a natural gas leak**, stressing the need to use the senses of sight and hearing as well as smell.
- **Invite participants to ask questions** about the materials and the safety procedures they outline. If they have questions you can't answer, research the answers yourself and provide that information as soon as possible.
- **Ask participants to brainstorm a list of key safety issues** identified in the materials. Review these key issues and discuss incidents that resulted when related safety precautions were ignored. What were the consequences?
- **Ask each participant to name one thing they learned** from the materials or discussion that will help them be safer in the future.

Remember that discussions are intended to reinforce proper behavior—NOT to call out or embarrass participants. Maintain a cooperative, supportive atmosphere at all times, and encourage participants to ask questions and provide feedback.

Section five: Natural gas safety quiz

The quiz on the next page is intended to help instructors and participants assess the program's effectiveness. Administer it before beginning the training, and ask participants to record their answers in the "Before" column. Then administer it again at the end of the session and ask participants to list answers in the "After" column. The quiz is designed for two-sided photocopying.

Quiz answers:

1. A
2. C
3. D
4. D
5. D
6. A
7. D
8. C
9. F
10. A

Name:_____ Date:_____

Excavator Beware natural gas safety quiz

Before	Questions	After
_____	**1. True or false? Yellow paint or flags are used to indicate the presence of natural gas pipelines within your dig area.** A. True B. False	_____
_____	**2. The tolerance zone spans the width of a marked utility plus a specified distance from each indicated outside edge. Which distances are correct?** A. 24 inches in New York and Massachusetts B. 18 inches in New York; 24 inches in Massachusetts C. 24 inches in New York; 18 inches in Massachusetts D. None of the above	_____
_____	**3. If you suspect a natural gas leak, you should:** A. Bury the leaking pipeline B. Use your phone or radio C. Attempt to shut off the gas supply D. None of the above	_____
_____	**4. Which of the following devices should NOT be used in the vicinity of a gas leak?** A. Radios B. Doorbells C. Vape pens D. All of the above	_____
_____	**5. What does the law <u>require</u> that you do to determine the location of underground utility lines before digging on a job site?** A. Identify right-of-way markers B. Check your maps C. Look for pipeline markers D. Notify 811	_____

6. True or false? Before power digging in the tolerance zone, you should hand dig potholes to visually verify the precise position of any marked utility lines within this zone.

A. True
B. False

7. Which of the following is a time to stop digging?

A. If the locate marks are not visible
B. If you don't understand the locate marks
C. If you find an unmarked natural gas pipeline
D. All of the above

8. Black and yellow pipeline markers indicate:

A. Old pipelines that are no longer in service
B. Low-level transmission lines not requiring extra care
C. High-pressure pipelines that require extra care
D. A pipeline's exact location.

9. Which of the following may indicate a natural gas leak?

A. A distinctive, sulfur-like odor
B. Dirt blowing into the air from a hole in the ground
C. A hissing, whistling or roaring sound
D. Continuous bubbling in water
E. Dead or dying vegetation in an otherwise moist area
F. Any of the above

10. True or false? National Grid must be on-site during any excavation within 15 feet of a high-pressure gas pipeline in Massachusetts or Downstate New York, or within 20 feet of one in Upstate New York.

A. True
B. False