



**Rhode Island
Energy™**
a PPL company

First Responder Beware®

Natural gas safety instructor's guide

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Introduction

The *First Responder Beware* safety education program from Rhode Island Energy is designed to provide firefighters, police, EMTs and paramedics with the information they need to recognize and work safely around utility infrastructure while responding to emergencies.

This instructor's guide will help you make the most of the *First Responder Beware* program. It contains six sections:

- **Know your audience.** An overview of first responders' learning preferences
- **Utility basics.** Information on how natural gas works
- **Plan your session.** Tips for preparing an effective safety education session
- **Your five-step plan for survival.** Step-by-step program guidance
- **Suggested simulations.** Activities to help reinforce safety procedures
- **Before and after quiz.** Reproducible natural gas safety quiz to help instructors and participants evaluate the program's impact. (Answers are provided.)

Section one: Know your audience

Understanding how first responders learn best will help you tailor your safety education session to this unique audience. Take into consideration the following learning preferences:

- **First responders tend to be action-oriented learners** who do best when given an opportunity to practice and repeat recommended behaviors, and they favor a hands-on approach.
- **First responders benefit from significant discussion time during instruction**, including opportunities to relate new information to prior experiences and events.
- **First responders are very focused on core priorities:** their own survival, safe and timely rescue of incident victims and protection of property.
- **First responders respect authority and expertise.** Instructors should have a solid command of the topic and be well organized.
- **First responders are conscientious learners.** If the material is presented as being important to their work and lives, they will be a responsive, eager and respectful audience.
- **First responders prefer practical (rather than theoretical) information.** Keep the focus on real-life situations.

Section two: Natural gas basics

This section will help instructors answer questions about natural gas from session participants. If you need additional information, please contact Rhode Island Energy before your session.

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 can be ignited by a small spark or flame—even a lit e-cigarette or vape pen.

- Natural gas burns within a specific concentration range called the **explosive range** or **flammable range**: between about 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 naturally odorless. Natural gas distribution utilities use chemical **odorants** to give the gas the familiar sulfur-like smell. Gas that has been treated with these chemicals is **odorized**. However, certain chemical or physical processes can strip the odorant from the natural gas so that it no longer smells. This is known as “odor fade.”
- Many natural gas transmission companies do not odorize natural gas transmission lines.
- Natural gas is nontoxic. However, natural gas in confined spaces can displace oxygen, creating an asphyxiation hazard.

The natural gas distribution system

To harness and transmit natural gas, we use millions of miles of pipes. Natural gas travels through transmission lines and main lines (often referred to as distribution mains) on its way to individual service laterals.

Transmission pipelines move natural gas from refining plants across long distances. They are the largest pipelines. Note that natural gas in some transmission lines has not yet been treated with odorants and, thus, has no smell. Distribution mains carry natural gas from transmission pipelines into the residential and commercial areas where it will be used. Service laterals bring natural gas from distribution mains to individual structures.

Between service laterals and individual structures are gas meters. Meters regulate the flow of gas into structures. Different types of structures require different types of meters.

Pressure, created at various points along the lines, moves the gas through the pipes. The size of natural gas lines varies greatly from less than 1 inch to as much as 4 feet in diameter. The pressure can vary from $\frac{1}{4}$ 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. This section provides some recommendations to help you prepare for the natural gas safety education 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 safety education materials more relevant. Review all the materials and rehearse your presentation well before the session.

Make the material relevant

Identify the key utility infrastructure that first responders in your session may encounter when responding to emergencies, and focus the group's attention on these topics during the program:

- **What emergency situations** bring them close to natural gas distribution and/or service lines?
- **Where are the natural gas transmission lines** in your area?
- **What natural gas hazards** have participants encountered in the past? Recently?
- **What experience do participants have with carbon monoxide (CO) poisoning victims**, and how much do they know about the severity, nature and proper response to shock and burn injuries?

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

Consider the size of the meeting space and audience. A large group will require different media than will a smaller one. If the room size is very large for the group, be sure the room is arranged as intimately as possible to keep all participants involved.

Remember that first responders 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 these questions:

- **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?**
- **How much do you have time for?** Just as room and audience size can impact the effectiveness of instruction, 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, which ones will be most effective for these participants?

Section four: Your five-step plan 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 because 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 first responders, incident victims and bystanders from utility-related injury or death.

4) Present the First Responder Beware materials

Discuss the utility safety information in these materials and what natural gas emergencies participants might encounter. Ask participants to review their notes on the materials periodically to refresh their memory of the vital safety tips.

These materials use different types of first responders to exemplify different situations. You might preface them by pointing out that first responders of any discipline could be first on the scene in any emergency. Ask participants to pay special attention to how the information can be applied to their areas of expertise and emergencies they will encounter.

5) Discussion and simulation

Participants will retain more information if they get involved in activities and discussions. Ideally, these exercises should be dispersed throughout the session. Here are some ideas:

- **Remind participants of the circumstances of any natural gas-related emergencies in your region.** Discuss how information in the materials is relevant.
- **Review the warning signs of a natural gas leak,** and discuss how conditions at an incident scene (such as line pressure, different types of structures, population density and other factors) might inform their responses.
- **Invite first responders 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 give them 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?
- **Conduct tabletop simulations of various emergency scenarios.** Use toy vehicles and figures to simulate appropriate actions: where to park, how to avoid natural gas ignition hazards and where to place emergency personnel and bystanders.
- **Ask each participant to name one thing they learned** from the materials or discussion that will help them be safer in the future.

Section five: Suggested simulations

Practice is essential to first responders' survival, and the successful resolution of emergency situations. There is often little time to think, and proper habits can save lives.

(Please note: The scope of this program is limited and does not include specialized devices and equipment. Some departments may use specialized equipment for detecting and/or ventilating natural gas. Follow departmental standard operating procedures regarding specialized equipment.)

Tabletop simulations

The use of tabletop models provides opportunity for small-group collaborations and for simulating multiple scenarios. This approach can be adapted to various room conditions and time constraints. Use of toy figures and scale models allows simulations to be easily reset for repetition. Possible scenarios include the following:

- **Model indoor natural gas leaks.** Have participants demonstrate proper procedures (such as checking for gas migration, parking emergency vehicles and avoiding spark hazards), evacuation strategies and use of standard communications devices.
- **Model outdoor natural gas leaks in residential, rural, commercial and industrial zones.** Have participants identify the source of the leak in different environments. Practice checking for gas migration, parking emergency vehicles and avoiding spark hazards. Also, practice evacuation strategies and use of standard communications devices.
- **Place model infrastructure items, such as natural gas pipelines, meters, etc.,** around structures and ask participants to “arrive” at that scene and identify these pieces of natural gas infrastructure.
- **Describe a scenario where a natural gas fire is taking place.** Have participants demonstrate proper procedures for different hazards and conditions.

Role-play simulations

Role-play simulations are ideal for practicing first-aid techniques and detailed physical actions.

- **Practice responding to indoor natural gas leaks.** Provide scenarios where a leak has been reported as well as those where responders must detect the presence of natural gas and locate its source. Be sure to include scenarios where the source cannot be identified.
- **Use signs to identify spark hazards, possible leak sources and gas infrastructure.** Focus on proper communications, evacuation and ventilation strategies, with special consideration given to migration, spark and explosion hazards.
- **Practice identifying CO poisoning.** Have one participant be the victim, and have others locate and diagnose whether CO is a factor. If your department trains in life-saving techniques, include them here.
- **Practice responding to outdoor natural gas leaks.** Provide scenarios where a leak has been reported as well as those where responders must detect the presence of natural gas. Be sure to include a scenario where the source cannot be identified. Use signs to indicate telltale evidence of a leak. Remember that not all natural gas leaks are detectable by smell alone.
- **Practice the correct procedures for natural gas fires.** Use signs to mark possible areas of migration and accumulation as well as reignition hazards.

Remember that simulations 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 about how simulations might be most effective.

Section six: *First Responder Beware* natural gas safety quiz

The quiz on the next pages is intended to help instructors and participants gauge the program's effectiveness. By administering it before beginning the program and then at the end of the session, instructors and participants alike can observe learning in action. The quiz is designed for two-sided photocopying.

Natural gas safety quiz answers

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

Name: _____

Date: _____

***First Responder Beware* natural gas safety quiz**

Before

Questions

After

1. True or false? Natural gas is lighter than air.

- A. True
- B. False

2. Which of the following is the explosive (flammable) range of natural gas?

- A. 2% to 5% gas to air
- B. 10% to 30% gas to air
- C. 5% to 15% gas to air
- D. 50% to 100% gas to air

3. Which type of pipeline carries natural gas from the refineries across long distances?

- A. Service
- B. Transmission
- C. Distribution (main)
- D. None of the above

4. Which of the following devices should NOT be used in the vicinity of a gas leak?

- A. Garage door openers
- B. Doorbells
- C. Light switches
- D. All of the above

5. When arriving at the scene of a natural gas emergency, where should you park your vehicle?

- A. As close to the scene as possible
- B. Away from storm drains and manholes
- C. Upwind from the area
- D. Both B and C

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Before

After

6. When is it appropriate to shut off natural gas service?

- A. When you can safely reach the gas meter or appliance supply line
- B. When you can access a major underground pipeline valve
- C. When you can access a relief vent
- D. Never

7. True or false? When the incident is resolved you can safely restore natural gas service.

- A. True
- B. False

8. When ventilating natural gas from a structure, you should:

- A. Be sure the supply of natural gas is off
- B. Make sure no one is in the structure
- C. Begin at the top and work down
- D. All of the above

9. If natural gas is burning, you should:

- A. Evacuate the area
- B. Protect area exposures
- C. Both A and B
- D. Attempt to extinguish the fire with water

10. True or false? When trapped in enclosed spaces, natural gas will move laterally or migrate upward.

- A. True
- B. False