



first responder  
beware®

## Staying safe while protecting others: Natural gas safety for first responders

*Before darkening the room, offer a welcome and an overview.*

*Begin by introducing the program and its topic:*

Welcome to the *First Responder Beware®* session, *Staying safe while protecting others: Natural gas safety for first responders*. Today's session will share strategies for working safely around and handling certain emergencies involving natural gas. By following the procedures we'll cover here today, you can keep yourself, your fellow first responders and the public safe. Now I know that some of you will have heard this information before, and so for you, this program will be a refresher. For others, this may be the first time you're hearing about this topic, but I hope everyone will find the program valuable.

*Darken the room and begin the presentation.*

**Firefighters, police and EMTs are typically first on the scene in an emergency and face the greatest risk from natural gas leaks, fires and explosions.**

**Understanding the potential dangers and dealing with them correctly makes everyone safer.**

**This program is designed to supplement, not replace, your department's standard operating procedures (SOPs).**

bge

#52825 © 2023 Culver Media, LLC 800-428-5837

2

Firefighters, police and EMTs are typically first on the scene in an emergency and face the greatest risk from natural gas leaks, fires and explosions. Understanding the potential dangers and dealing with them correctly makes everyone safer. This program is designed to supplement, not replace, your department's standard operating procedures (SOPs).

*This is a good time to reiterate the importance of this information. It can protect first responders, incident victims and bystanders from natural gas-related injury or death.*

***Please note:*** Each local department will have its own standard operating procedures or SOPs about natural gas safety. Emphasize to participants that this program is not designed to replace these procedures, only to supplement them.

## Natural gas safety basics

- Properties of natural gas
- The natural gas delivery system
- Preventing natural gas ignition
- Responding to natural gas emergencies
- Indoor natural gas leaks
- Outdoor natural gas leaks
- Natural gas fires

bge

#52825 © 2023 Culver Media, LLC 800-428-5837

3

Natural gas safety basics. This presentation will cover key practices you need to know to keep yourself safe around natural gas lines and on the scene of emergencies involving natural gas. Here are the topics we will focus on today:

- Properties of natural gas
- The natural gas delivery system
- Preventing natural gas ignition
- Responding to natural gas emergencies
- Indoor natural gas leaks
- Outdoor natural gas leaks
- Natural gas fires

## Properties of natural gas

- Natural gas has an **explosive (flammable) concentration range** between about 5% and 15% gas to air.
  - At concentrations below 5% gas, the mixture is too lean and will not burn.
  - At concentrations above 15% gas, the mixture is too rich to burn.
- **Burning natural gas will not explode.**
- **Liquefied gases have different properties** than natural gas.
- **Natural gas is lighter than air.**
  - It will follow the path of least resistance and will rise.
  - When underground or in enclosed spaces, gas will move laterally or migrate.
- **A chemical additive called mercaptan produces the familiar sulfur-like smell of natural gas.**
- **A lit cigarette** is enough to ignite natural gas.

bge

#52825 © 2023 Culver Media, LLC 800-428-5837

4

Properties of natural gas. You will someday have to deal with natural gas at an incident scene. So, it's important to know a few basic facts about natural gas, its properties and how it behaves.

- Natural gas has an explosive or flammable concentration range between about 5% and 15% gas to air. A 10% gas-to-air mixture is ideal for clean burning.
  - At concentrations below 5% gas or above 15% gas, natural gas will not burn. While gas should always be treated as highly flammable, in fact it will only burn within this limited concentration range.
- Burning natural gas will not explode.
- Liquefied gases have different properties than natural gas. Emergencies involving propane and butane may require different precautions and procedures than those covered in this program. Refer to departmental SOPs for these liquid gases.
- Natural gas is lighter than air.
  - It will follow the path of least resistance and will rise. Be alert. Natural gas will travel upward through any available space: stairwells, ducts, a crack in the road. It can even seep up through soft ground.
  - When underground or in enclosed spaces, gas will move laterally or migrate. It will travel as far as it can under roads, along utility lines and trenches, or along a ceiling until it finds a way up.
- A chemical additive called mercaptan produces the familiar sulfur-like smell of natural gas. Natural gas has no smell of its own. Treated gas is referred to as odorized.
- A lit cigarette is enough to ignite natural gas.

## The natural gas delivery system

- There are three types of lines in BGE's natural gas network: transmission, distribution and service lines.

LINE TYPE	Transmission Pipelines	Distribution Lines (Mains)	Service Lines
<b>SIZE (diameter)</b>	Up to 30 inches	3/4 inch to 48 inches	Varies
<b>PRESSURE</b>	200 to 720 psi	Varies	Varies
<b>OPERATED BY</b>	Intrastate gas transmission companies and local natural gas utilities	Local natural gas utilities	Local natural gas utilities
<b>LOCATION INFORMATION</b> Note: Landscaping and/or erosion can change depth of lines	Right-of-way corridors; areas marked with transmission pipeline markers		



bge

#52825 © 2023 Culver Media, LLC 800-428-5837

5

The natural gas delivery system. It's useful to know a bit about how gas is delivered to structures.

- There are three types of lines in the natural gas network. These lines are used to transport natural gas.

*Point to the first table column: Transmission Pipelines.*

- Transmission pipelines are the largest and have a pressure of 200 to as much as 720 pounds per square inch. Pipeline markers like this . . .

*Point to sample marker.*

- . . . will include a contact number. You can call BGE at 1.800.685.0123 for help with transmission lines if no contact information is available.
- Natural gas in transmission pipelines may not yet be odorized, especially in areas of low population density. Leaks from these lines may not be detectable by smell alone. Be cautious.

*Point to the second table column: Distribution Lines.*

- More commonly known as natural gas mains, these are smaller lines with a pressure that varies. They are the property of BGE. Call BGE for assistance with distribution lines.

*Point to the third table column: Service Lines.*

- Service lines are the lines that run from distribution lines to individual structures. They have the same pressure as the distribution line that feeds them, but they can still cause a significant leak.

## The natural gas delivery system

- **Between service lines and individual structures are service meters.**
  - Different structures use different types of meters.
- **The size of a pipe is **NOT** a reliable indicator of the gas pressure.**



LINE TYPE	Transmission Pipelines	Distribution Lines (Mains)	Service Lines
<b>SIZE (diameter)</b>	Up to 30 inches	3/4 inch to 48 inches	Varies
<b>PRESSURE</b>	200 to 720 psi	Varies	Varies
<b>OPERATED BY</b>	Intrastate gas transmission companies and local natural gas utilities	Local natural gas utilities	Local natural gas utilities
<b>LOCATION INFORMATION</b> Note: Landscaping and/or erosion can change depth of lines.	Right-of-way corridors; marked with transmission pipeline markers		

- Between service lines and individual structures are service meters. This picture shows a standard, single-unit residential meter.
- Different types of structures use different types of meters.
- The size of a pipe is NOT a reliable indicator of the gas pressure. This information is intended only as an overview. Always assume there's a danger.

## Preventing natural gas ignition

- **Even the smallest flame or spark can cause a natural gas explosion.** Avoid turning electrical equipment or devices on or off in the vicinity of leaking gas:
  - **Do not use any phones, electric switches, doorbells, thermostats or appliance controls.** Prevent their use by others.
  - **Do not step on doormats.** Friction from your boots could generate a spark of static electricity.
  - Use only **intrinsically safe** (Class 1, Division 1) flashlights and radios for the duration of the incident response.



bge

#52825 © 2023 Culver Media, LLC 800-428-5837

7

Preventing natural gas ignition. The single greatest risk from natural gas leaks is explosion. There are some simple procedures that can minimize the chances of an explosion. Some of these may seem far-fetched or overly cautious, but they are not. Each of these mistakes has caused explosions at one time or another.

- Even the smallest flame or spark can cause a natural gas explosion. Avoid turning electrical equipment or devices on or off in the vicinity of a leak. Sparks can come from some unexpected sources, so be vigilant. As gas dissipates and concentrations fall, they may pass through the explosive range. If ignition sources have not been eliminated before ventilation, the gas could ignite.
  - Do not use any phones, electric switches, doorbells, thermostats or appliance controls. All of these devices, including battery-operated equipment, can cause sparks and ignite natural gas. Be alert for evacuees and bystanders who may try to turn off lights, make phone calls or open garage doors. When evacuating the area, remember to knock on doors. Don't ring doorbells.
  - Do not step on doormats, as friction from your boots can generate a spark of static electricity that could ignite the gas. Avoid shuffling your feet or rubbing your hands together as well.
  - Use only intrinsically safe flashlights and radios for the duration of the incident response.

## Responding to natural gas emergencies

- When called for a gas leak or fire or if you smell gas at an incident scene, **assume there's danger**.
- **Contact BGE immediately.**
- **Provide the best possible directions** to the location.
- **Evacuate the area** while you wait for BGE personnel to arrive.
- **Park emergency vehicles away and upwind** from the area.
  - **Do not park over manholes or storm drains.**
  - **Do not set out roadway flares.** They could ignite the gas.



bge

#52825 © 2023 Culver Media, LLC 800-428-5837 8

Responding to natural gas emergencies. In addition to preventing ignition, there are certain procedures you should follow when responding to any natural gas emergency.

- When called for a gas leak or fire or if you smell gas at an incident scene, assume there's a danger.
- Contact BGE immediately whether you know that natural gas is present or just suspect it.
- Provide the best possible directions to the location. As simple as it sounds, giving utility personnel intersections, landmarks and specific buildings will help get them on-site sooner.
- Evacuate the area while you wait for BGE personnel to arrive. Be sure to knock on doors; don't ring doorbells. In residential areas, one house in every direction is the recommended minimum radius. Be alert for migrating gas and evacuate accordingly. Always consult your incident commander for specific instructions.
- Park emergency vehicles away and upwind from the area when natural gas may be present.
  - Do not park over manholes or storm drains. Natural gas can collect in these spaces and explode.
  - Do not set out roadway flares. They could ignite the gas.

## Responding to natural gas emergencies

- **If you can do so safely, turn off gas only at meters or appliance supply lines—NEVER at underground valves or relief vents and NEVER unchain or unlock a meter valve to close it.**
  - After a service meter valve or appliance supply line has been closed, do not open it under any circumstances. Only utility personnel may restore gas service.
  - Inform BGE of any valve you have closed and its precise location.
- **Do NOT attempt to stop the flow of gas on a struck gas line.** Never attempt to bend, pinch or crimp a ruptured plastic gas line.



Location of valves for meter (above) and appliance supply line (below)



bge

#52825 © 2023 Culver Media, LLC 800-428-5837

9

Knowing when and how to safely shut off natural gas service is key to preventing loss of life and property.

- If you can do so safely, turn off gas only at meters or appliance supply lines—NEVER at underground valves or relief vents and NEVER unchain or unlock a meter valve to close it.
  - After a service meter valve or appliance supply line has been closed, do not open it under any circumstances. Only utility personnel may restore gas service.
  - Inform BGE of any valve you have closed and its precise location. This information is critical for system safety and service restoration.
- Do NOT attempt to stop the flow of gas on a struck gas line. Never attempt to bend, pinch or crimp a ruptured plastic gas line.

*Point to top photo of the gas meter.*

- A  $\frac{1}{4}$  turn to the right will turn off a natural gas meter. These shut-offs may be hand-operated, or you may need a wrench. Gas meters are open when parallel to the pipe and closed when perpendicular to the pipe. Don't mistake other valves (such as grease valves) for the meter shut-off.

*Point to the bottom photo of the appliance supply line.*

- Use the same procedure for shutting off gas service at an appliance supply line.
- Tie and label the meter or appliance supply line to let others know it has been shut off.
- Never attempt to turn gas service back on. Only utility personnel may restore gas service.

## Indoor natural gas leaks

- Indoor gas leaks can result from **malfunctioning gas-fed appliances**.
- **Use extreme** caution when ventilating a building with a natural gas concentration above 15%:
  - As the gas dissipates and the concentration decreases, it will enter the explosive range.
  - All ignition sources must be removed before ventilation proceeds.
  - Ventilate structures from the top to the bottom.
  - Never ventilate structures while people are inside.

Use extreme caution when ventilating a building with a natural gas concentration above 15%.

- Indoor gas leaks can result from malfunctioning gas-fed appliances. If you can identify a specific appliance causing the leak, shut off the gas at the appliance's supply line. If you cannot identify a specific appliance, or when in doubt, use the meter to shut off the gas. Be aware that what appears to be an indoor leak may be the result of gas migrating into the structure. Once service to the structure is off, verify that the leak has been eliminated.
- Do not open windows until you are certain the gas supply has been shut off.
  - Remember that gas concentrations will change as gas dissipates.
  - All ignition sources must be removed before ventilation proceeds.
  - Ventilate structures from top to bottom because natural gas is lighter than air and will rise.
  - Never ventilate structures while people are inside. This includes you. Open windows from outside only. Venting gas can ignite as it passes through the explosive range.

## Carbon monoxide

- Understanding carbon monoxide (CO) leaks:
  - **CO has no color, odor or taste.**
  - CO leaks are **frequently caused when fuel-burning appliances malfunction** or are used **without adequate ventilation.**
- **CO poisoning can look like a common illness but is deadly if untreated.** Know the signs:
  - Flu-like symptoms
  - Confusion
  - Blurred vision
  - Blue lips or skin
  - Loss of consciousness
- **Get victims outdoors immediately and seek medical attention.**



bge

#52825 © 2023 Culver Media, LLC 800-428-5837 11

Carbon monoxide. This deadly gas is not a component of natural gas, but natural gas-burning appliances can be a source of carbon monoxide.

- Understanding carbon monoxide (CO) leaks can help you recognize possible CO poisoning victims.
  - CO has no color, odor or taste, so its victims often don't know they are being exposed.
  - CO leaks are frequently caused when fuel-burning appliances malfunction or are used without adequate ventilation.
- CO poisoning can look like a common illness but is deadly if untreated. CO poisoning can be particularly dangerous for people who are sleeping or intoxicated. People may suffer irreversible brain damage or even die before anyone realizes there's a problem. Learn to recognize the symptoms of CO poisoning, and be alert for them in yourself, your fellow responders and incident victims. The signs of CO poisoning include:
  - Flu-like symptoms, such as weakness, shortness of breath, dull headache, dizziness, nausea or vomiting
  - Confusion
  - Blurred vision
  - Blue lips or skin
  - Loss of consciousness

Get victims outdoors immediately and seek medical attention. One treatment for CO poisoning is exposure to fresh air. In severe cases, pure oxygen is needed.

## Outdoor natural gas leaks

- Outdoor natural gas leaks can be caused by **construction-related pipeline damage, cracks due to extreme weather, pipe corrosion or failure of joints** on cast iron piping.
- **Contact BGE immediately** to shut off the gas.
- **Evacuate the area.**
- **Be alert for migrating gas.** Gas can accumulate in storm drains, construction trenches, buildings and other utility lines.



bge

#52825 © 2023 Culver Media, LLC 800-428-5837 12

Outdoor natural gas leaks. Gas leaks outdoors pose different challenges than those indoors.

- Outdoor natural gas leaks can be caused by construction-related damage to pipelines, cracks due to extreme weather, pipe corrosion or failure of joints on cast iron piping. Be on the lookout for evidence of construction activity and severe weather as indicators of a possible leak.
- Contact BGE immediately to shut off the gas. Do this whenever you suspect a leak. They will respond, turn off the gas and repair the damaged pipeline.
- Evacuate the area.
- Be alert for migrating gas. Gas can accumulate in storm drains, construction trenches, buildings and other utility lines, particularly as it moves laterally and seeks a path upward. As gas migrates, localized concentrations will change. Remember that natural gas can burn or explode as concentrations move through the flammable range.

## Outdoor natural gas leaks

- In addition to the familiar sulfur-like smell, other indicators of an outdoor leak include:
  - **Dirt being blown into the air**
  - **Dead vegetation** in an otherwise green area
  - **A dry spot** in an otherwise moist area
  - **Fire coming from the ground** or appearing to burn above the ground
  - **Water bubbling or being blown into the air**
  - **Roaring, blowing or hissing sounds**
  - **An exposed pipeline** after an earthquake, fire, flood or other disaster
  - **A damaged connection to a gas appliance**



bge

#52825 © 2023 Culver Media, LLC 800-428-5837 13

When on the scene of an outdoor emergency, always be alert for the telltale indicators of a natural gas leak. Depending on the pressure of the gas line, these indicators will vary.

- BGE puts the safety additive mercaptan in natural gas, giving it a rotten-egg odor and making it easier to detect. In addition to this familiar smell, other indicators of a gas leak include the following sights and sounds:
  - Dirt being blown into the air
  - Dead vegetation in an otherwise green area
  - A dry spot in an otherwise moist area
  - Fire coming from the ground or appearing to burn above the ground
  - Water bubbling or being blown into the air
  - Roaring, blowing or hissing sounds
  - An exposed pipeline after an earthquake, fire, flood or other disaster
  - A damaged connection to a gas appliance

Remember that not all natural gas is odorized, and conditions such as weather can make even odorized gas difficult to smell. Do not rely on smell alone to detect natural gas leaks.

## Natural gas fires

- When responding to a fire involving natural gas, **your best and safest course of action is to let it burn.**
- **Call BGE immediately.**
- **Evacuate the area** and protect exposures.
- **Do not park emergency vehicles over manholes** or under overhead utility lines.



bge

#52825 © 2023 Culver Media, LLC 800-428-5837 14

Natural gas fires. Burning natural gas poses special risks and requires extra precautions.

- When responding to a fire involving natural gas, your best and safest course of action is to let it burn. Remember that burning natural gas cannot explode. Your first priority, as always, is to protect life and property.
- Call BGE immediately. They will respond and determine when it's safe for you to proceed.
- Evacuate the area and protect exposures.
- Do not park emergency vehicles over manholes or under overhead utility lines. Natural gas fires can burn overhead lines and cause them to fall. If that happens, you will have a whole other set of problems. Follow your department SOPs for downed lines.

## Natural gas fires

- For structure fires, **shut off the gas supply only if you can safely access the meter.**
- Once the gas supply is off, **remain alert for gas migration and possible reignition.**
- **DO NOT** use water to suppress a natural gas fire, as it is **ineffective and dangerous.**
  - Spraying water into gas lines can flood gas piping, knocking out pilot lights and leading to a serious gas accumulation problem downstream.
  - Use a fog spray to cool and protect combustible exposures.
- **If the fire does not pose a threat to life or property, let it burn.**



bge

#52825 © 2023 Culver Media, LLC 800-428-5837 15

Special procedures should be observed when attempting to contain or suppress burning natural gas.

- For structure fires, shut off the gas supply only if you can safely access the gas meter. Be sure you have correctly identified the meter feeding the fire. Never attempt to shut off the gas at underground or main valves. If there is no meter, if it cannot be reached safely or if you are unsure which meter is feeding the fire, wait for utility personnel to shut off the main supply. They will also help with monitoring concentrations once the flames are out.
- Once the gas supply is off, remain alert for gas migration and possible reignition. Keep all your protective gear on and the area secure until utility personnel and your incident commander give the all clear.
- Do **not** use water to suppress a natural gas fire, as it is ineffective and dangerous.
  - Spraying water into gas lines can flood gas piping, knocking out pilot lights and leading to a serious gas accumulation problem downstream.
  - Use a fog spray to cool and protect combustible exposures.
- If the fire does not pose a threat to life or property, let it burn.
  - Utility personnel and the incident commander will advise you regarding fire suppression.

## Natural gas safety review

- **Prevent ignition** of natural gas.
- When natural gas is involved or suspected in an emergency, **contact BGE immediately**.
- **Park emergency vehicles away and upwind** from the area of a natural gas emergency.
- **Evacuate the area**, and be alert for migrating or accumulating gas.
- Turn off natural gas service at **meters or appliance supply lines only**.
- **Do NOT attempt to stop the flow of gas on a struck gas line**.
- When natural gas is burning, **let it burn and protect area exposures**.

bge

#52825 © 2023 Culver Media, LLC 800-428-5837 16

Natural gas safety review. So let's review the key points of this presentation.

- Prevent ignition of natural gas. Even a small spark can ignite natural gas. Do not use or allow others to use electrically powered devices, including doorbells and radios, in the vicinity of a leak.
- When natural gas is involved or suspected in an emergency, contact BGE immediately.
- Park emergency vehicles away and upwind from the area of a natural gas emergency.
- Evacuate the area, and be alert for migrating or accumulating gas.
- Turn off natural gas service at meters or appliance supply lines only. Never turn off underground valves or release vents.
- Do NOT attempt to stop the flow of gas on a struck gas line. Never attempt to bend, pinch or crimp a ruptured plastic gas line.
- When natural gas is burning, let it burn and protect area exposures. Remember, water is not effective for extinguishing gas fires. Your incident commander and utility personnel will tell you how to proceed.

## Contact Information

- In case of emergency, call BGE at **800.685.0123**.
- For additional information, visit BGE's website at **BGE.COM/FirstResponder**.

Here is some useful contact information. You may wish to jot this down.

- In case of emergency, contact BGE at 800.685.0123.
- For additional information, visit BGE's website at BGE.COM/FirstResponder.



first responder  
beware®

Thank you

Thank you for your attention.

*Take questions and begin discussion.*

*Discuss how this information conflicts with what your audience believed about natural gas and how they may have put themselves or others at risk in the past. Ask what they would have done differently had they had this safety education session before.*

*The educator's guide includes more detail about the properties of natural gas and how the gas delivery system works, as well as exercises and simulations. Consider some of the suggested simulations or use your own.*

*BGE thanks you for helping to keep first responders safe.*