

## Presenter's Notes



The slide features a background image of a gas leak emergency at night with firefighters. A blue wave graphic separates the top text from the main image. The Rhode Island Energy logo is in the top right. A dark blue banner at the bottom contains the program title and contact information.

Staying safe while protecting others

Rhode Island Energy™  
a PPL company

**First Responder Beware®** Natural Gas Safety for First Responders

*Click on each slide to advance.*

 **To report emergencies, call 911 and Rhode Island Energy immediately.**  
Natural gas emergencies: 1-800-640-1595  
Always call 911 if you suspect a gas leak!

**Smell Gas. Act Fast. Call 911.**


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

*Begin by introducing the program and its topic:*


- Welcome to *First Responder Beware: Staying Safe While Protecting Others, Natural Gas Safety for First Responders*. Today's session will cover 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.*

**Natural gas safety for first responders**



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



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- Firefighters, police and EMTs are typically first on the scene in an emergency and face the greatest risk from natural gas leaks and fires.
- 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: that 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 SOPs for 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
- Carbon monoxide poisoning
- Outdoor natural gas leaks
- Natural gas fires



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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.

The topics we are going to focus on are:

- Properties of natural gas
- The natural gas delivery system
- Transmission pipeline markers
- Preventing natural gas ignition
- Responding to natural gas emergencies
- Indoor natural gas leaks
- Carbon monoxide poisoning
- Outdoor natural gas leaks
- Natural gas fires

## Properties of natural gas



### Natural gas is lighter than air.

- It will follow the path of least resistance and will travel upward through any available space.
- When underground or in enclosed spaces, natural gas will move laterally or migrate.

### Natural gas is odorless. The addition of mercaptan produces the familiar sulfur-like smell.

- You may not always be able to smell mercaptan, so never rely on your nose alone to detect a gas leak. Monitor the atmosphere with your department's approved and calibrated air-monitoring equipment.



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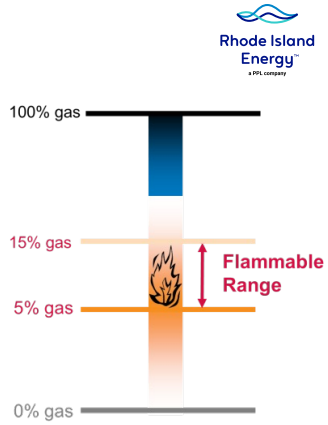
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You will someday have to deal with natural gas at an incident scene. So it's important to know a few basic facts about natural gas, its properties and how it behaves.

- Natural gas is lighter than air. This means it will naturally tend to rise.
  - It will follow the path of least resistance and will travel upward through any available space. Be alert. This can include stairwells, ducts or cracks in the road. It can even seep up through soft ground. Leaking gas will flow out of open windows and doors naturally, making this an effective method of venting a room or building.
  - When underground or in enclosed spaces, natural 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. This explains how gas can accumulate in buildings at some distance from the site of a leak.
- Natural gas is odorless. The addition of mercaptan produces the familiar sulfur-like smell.
  - You may not be able to smell mercaptan if you have been exposed to it for a long time, the mercaptan odor is masked by other odors or the odor fades due to chemical or physical processes that strip mercaptan from the gas. So never rely on your nose alone to detect a natural gas leak. Monitor the atmosphere with your department's approved and calibrated air-monitoring equipment.

### Properties of natural gas

- Natural gas is **highly flammable**.
- Natural gas will **burn when the gas-to-air ratio is between about 5% and 15%**.
  - At concentrations **below 5% or above 15%**, natural gas will not burn.
- **Liquefied gases, such as propane, have different properties** than natural gas.



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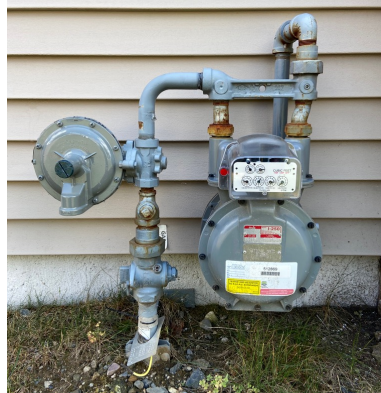
Natural gas is highly flammable. This means that first responders must exercise extreme caution to prevent ignition hazards in the vicinity of any natural gas leak.

- Natural gas will burn when the gas-to-air ratio is between about 5% and 15%.
  - At concentrations below 5% or above 15%, natural gas will not burn.
- Liquefied gases, such as propane, have different properties than natural gas. Propane is heavier than air and may accumulate in trenches, drains and other low areas. Propane is used in most gas grills, so if an incident involves a gas grill leak or fire, keep this behavior in mind.

## The natural gas delivery system



- **Natural gas travels through three types of pipelines** on its way from the wellhead to individual service laterals:
  - Gathering pipelines
  - Transmission lines
  - Distribution mains
- **Service laterals carry natural gas from distribution mains to customers' gas meters.**
- **In general, the closer natural gas gets to the end user, the smaller the pipeline and the lower the pressure.**




Single-unit residential meter


It's useful to know a bit about the how gas is delivered to structures.

- Natural gas travels through three types of pipelines on its way from the wellhead to individual service laterals:
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  - Transmission lines
  - Distribution mains
- Service laterals carry natural gas from distribution mains to customers' gas meters.
- In general, the closer natural gas gets to the end user, the smaller the pipeline and the lower the pressure.

### Transmission pipeline markers



- **High-visibility markers** indicate the approximate location of transmission pipelines in rights-of-way.
- **These markers include the pipeline company's name**, the type of product carried and an emergency phone number.
- You can also find the general location of gas transmission pipelines in your area on the National Pipeline Mapping System (NPMS) website at <https://www.npms.phmsa.dot.gov>.




*Rhode Island Energy pipeline marker.*

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It's important to know how to recognize pipeline markers.

- High-visibility markers indicate the approximate location of transmission pipelines in rights-of-way. For security purposes, these markers DO NOT show the exact location, path, depth or number of gas pipelines in the area. But they will give you a general sense of the location of Rhode Island Energy's high-pressure lines. They are usually found where a pipeline crosses a highway, railway, waterway or natural boundary.
- These markers include the pipeline company's name, the type of product carried and an emergency phone number.
- Rhode Island Energy's transmission pipeline markers look like this. If a natural gas leak is detected or even just suspected in the vicinity of one of these markers or if you see suspicious activity near a marker, notify Rhode Island Energy immediately at the number shown.
- You can also find the general location of gas transmission pipelines in your area on the National Pipeline Mapping System (NPMS) website at <https://www.npms.phmsa.dot.gov>. For the specific location of transmission pipelines that cross your area of jurisdiction, state and local officials may apply at the same website for access to the Pipeline Information Management Mapping Application, or PIMMA.

### Preventing natural gas ignition



- **Even the smallest flame or spark can ignite leaking natural gas. Avoid turning electrical equipment or devices on or off in the vicinity of a leak.**
- **DO NOT use spark-producing equipment.** Intrinsically safe radios and flashlights should be used for the duration of any incident response.
- **Avoid using doorbells, wall switches, garage door openers or cell phones,** and prevent their use by others.
- **DO NOT step on doormats.** Friction from your boots could create a spark of static electricity.



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It's vital to know the correct precautions for preventing gas ignition when a natural gas leak is detected.

- Even the smallest flame or spark from an appliance, cigarette, e-cigarette or vape pen can ignite leaking natural gas. Avoid turning electrical equipment or devices on or off in the vicinity of a known or suspected gas leak.
- **DO NOT** use spark-producing equipment. Intrinsically safe radios and flashlights should be used for the duration of any incident response.
- Avoid using doorbells, wall switches, garage door openers or cell phones, and prevent their use by others.
- **DO NOT** step on doormats. Friction from your boots could create a spark of static electricity.



## Responding to natural gas emergencies



**Notify Rhode Island Energy through your dispatcher as soon as practicable for all gas emergencies, and take these precautions:**

- Approach cautiously and stay upwind.
- Park safely away from collapse zones and manholes.
- Secure the perimeter.
- Evacuate **330 feet** in all directions.
- Stay out of manholes and sewers.
- Eliminate ignition sources.
- Use full SCBA and PPE.
- Monitor the atmosphere.




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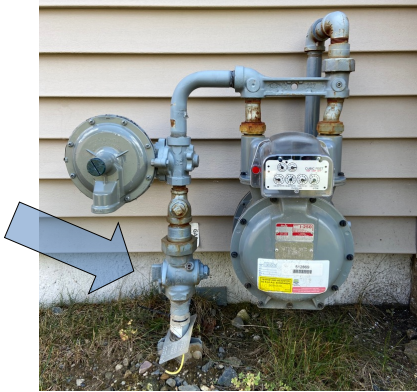
In addition to preventing gas ignition, there are certain procedures you should follow when responding to any natural gas emergency. Notify Rhode Island Energy through your dispatcher as soon as practicable for all gas emergencies, and take these precautions:

- Approach cautiously and stay upwind. Stage apparatus out of the path of the leak and a safe distance away—typically 50 to 200 feet, depending on the situation.
- Park safely away from collapse zones and manholes. Stay clear of storm sewer grates as well.
- Secure the perimeter. Reroute traffic if necessary.
- Evacuate *at least* 330 feet in all directions. For larger leaks, consider initial downwind evacuation for *at least* a half-mile. (The incident commander will consult with a Rhode Island Energy emergency representative to determine the final extent of the evacuation.)
- Stay out of manholes, sewers or any type of underground vault. Natural gas can accumulate in these underground spaces.
- Eliminate ignition sources, such as vehicle engines, flame-producing devices, and anything that could produce sparks.
- Use full self-contained breathing apparatus (SCBA) and personal protective equipment (PPE).
- And last but not least, monitor the atmosphere using multiple monitors.

### Responding to natural gas emergencies



- **NEVER** attempt to open or close underground pipeline valves.
- **First responders who have been trained to do so may turn off gas at aboveground meter valves or appliance supply lines.**
  - A quarter turn to the right will turn off a meter. Use the same procedure at an appliance supply line.
  - Inform Rhode Island Energy of any valve you have closed and its precise location.
- **After the service valve has been closed, DO NOT open it under any circumstances.**



Single-unit residential meter

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When you respond to an incident involving a structure that is fed by natural gas, you must follow very specific procedures regarding gas pipeline valves.

- NEVER attempt to open or close underground pipeline valves. Doing so could cause dangerous pressure changes in the system.
- First responders who have been trained to do so may turn off gas at aboveground meter valves or appliance supply lines. 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.
  - A quarter turn to the right will turn off a meter. Use the same procedure at an appliance supply line.
  - Inform Rhode Island Energy of any valve you have closed and its precise location. This information is critical for system safety and service restoration.
- After the service valve has been closed, DO NOT open it under any circumstances. Only Rhode Island Energy employees are permitted to turn gas service back on.

## Indoor gas leak response



Natural gas leaks inside buildings present a significant hazard. Take these precautions:

- Have a charged hand line with fog nozzle ready.
- DO NOT use spark-producing equipment.
- Evacuate *at least 330 feet* in all directions.

Coordinate with Rhode Island Energy before ventilating.

- Remove all ignition sources. Ventilate structures from the top down.
- Use extreme caution when ventilating a building with a gas concentration above 15%. As gas disperses, concentrations will pass through the flammable range.



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- Natural gas leaks inside buildings present significant hazards. Take these precautions:
  - Have a charged hand line with fog nozzle ready. The general rule is you should not put out a gas fire, but you may use a fog spray to cool combustible exposures and assist with rescue operations.
  - DO NOT use spark-producing equipment. Only intrinsically safe radios and flashlights should be used.
  - Evacuate *at least 330 feet* in all directions.
- Coordinate with Rhode Island Energy before ventilating.
  - Remove all ignition sources. Ventilate structures from the top down.
  - Use extreme caution when ventilating a building with a gas concentration above 15%. As gas disperses, concentrations will pass through the flammable range. 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 and ventilation has occurred, verify that the leak has been eliminated.

## Carbon monoxide



### Understanding carbon monoxide (CO) leaks

- CO is a colorless, odorless, poisonous gas.
- 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
- Nausea/confusion/slow breathing
- Loss of consciousness

**Make sure victims get fresh air and seek medical attention immediately.**



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Every year approximately 1,500 people in the U.S. die from being poisoned by 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 the dangers of leaking carbon monoxide, commonly known as CO, requires knowledge of some basic properties and causes.
  - CO is a colorless, odorless, poisonous gas. Because it cannot be detected through the senses, it is important to exercise extreme caution if there is the possibility of carbon monoxide in a room or building.
  - CO leaks are frequently caused when fuel-burning appliances malfunction or are used without adequate ventilation. Warning signs of CO presence may include a sooty buildup around appliances and unusually high humidity indoors.
- CO poisoning can look like a common illness, but it is deadly if untreated.
  - Flu-like symptoms, such as headache, tiredness and dizziness, are signs of early exposure at low concentrations.
  - With continued exposure or higher concentrations, these may progress to nausea, confusion and slow breathing.
  - Prolonged exposure can lead to loss of consciousness or even death. It is important to be aware of all of these symptoms.
- Make sure CO poisoning victims get fresh air and seek medical attention immediately. If the building uses natural gas, notify Rhode Island Energy as soon as practicable through your dispatcher.

### Outdoor gas leaks



- Outdoor natural gas leaks can be caused by **construction-related damage, cracks due to extreme weather or pipe corrosion.**
- **Contact Rhode Island Energy 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.




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Gas leaks outdoors pose some different challenges than those indoors.

- Outdoor natural gas leaks can be caused by construction-related damage, cracks due to extreme weather or pipe corrosion. Be on the lookout for evidence of construction activity and severe weather as indicators of a possible leak.
- Contact Rhode Island Energy immediately to shut off the gas. Do this whenever you suspect a leak. They will respond, shut 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 gas leak indicators



**In addition to the familiar sulfur-like smell, other indicators of an outdoor leak include:**

- 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
- A damaged connection to a gas appliance
- An exposed pipeline after a disaster

*Natural gas pipelines may be orange, black or yellow.*



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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.

- In addition to the familiar sulfur-like smell, indicators may include:
  - 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
  - A damaged connection to a gas appliance
  - An exposed pipeline after a fire, flood or other disaster.

*Natural gas pipelines may be orange, black or yellow.*
- In any gas leak incident, use a combustible gas leak indicator, or CGI, to be certain a flammable atmosphere does not exist.

## Outdoor gas leak response



- **Evacuate at least 330 feet in all directions.** Large leaks may require downwind evacuation for *at least a half-mile*.
- **Have a charged hand line with fog nozzle ready for use.**
  - In the event of a fire, a fog spray may be used to cool combustible exposures, assist with rescue and extinguish flames not originating from a gas pipe.
- **Use a CGI to identify the general area of the leak.**
  - Check for gas migrating into nearby buildings (especially basements), storm drains and construction trenches.



There are certain precautions you should follow when a natural gas leak is detected or suspected in an outdoor area.

- Evacuate *at least 330 feet* in all directions. Larger leaks may require downwind evacuation for *at least a half-mile*.
- Have a charged hand line with fog nozzle ready for use.
  - In the event of a fire, a fog spray may be used to cool combustible exposures, assist with rescue and extinguish flames not originating from a gas pipe.
- Use a CGI to identify the general area of the leak.
  - Un-ignited gas can migrate to the surface from an underground leak or from a damaged gas line in an open excavation.
  - Check for gas migrating into nearby buildings (especially basements), storm drains and construction trenches.



### Natural gas fire response

- When responding to a fire involving natural gas, **your best and safest course of action is to let it burn.**
  - Burning natural gas will not cause an explosion.
- **Allow the gas to burn until the source can be turned off.** When the gas supply is depleted, the fire will extinguish itself.
- **Evacuate the area** and protect exposures.



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. Your first priority, as always, is to protect life and property.
  - Burning natural gas will not cause an explosion.
- Allow the gas to burn until the source can be turned off. When the gas supply is depleted, the fire will extinguish itself.
- Evacuate the area and protect exposures.



## Natural gas fire response



- **DO NOT use water to suppress a natural gas fire.**
  - Use a hand line with fog nozzle to cool exposures and to extinguish open flames not originating from a gas pipe.
  - Avoid spraying water at the point where natural gas is being released.
- **Shut off gas ONLY at the service valve before the meter or the appliance supply line.**
- Once gas is off, **remain alert for gas migration and possible re-ignition.**

- **DO NOT** use water to suppress a natural gas fire.
  - Use a hand line with fog nozzle to cool exposures and to extinguish open flames not originating from a gas pipe.
  - Avoid spraying water at the point where natural gas is being released. If you introduce water into a gas line, you could flood the line and cause serious problems in the distribution system.
- Shut off gas **ONLY** at the service valve before the meter or the appliance supply line. **DO NOT** shut off gas pipeline main valves. **DO NOT** shut curb valves unless you have been properly trained in curb valve operation.
- Once gas is off, remain alert for gas migration and possible re-ignition.

### Natural gas safety review




- **Prevent ignition** of natural gas. Eliminate spark hazards at the scene of a gas leak, and use intrinsically safe equipment.
- When natural gas is involved in an emergency, **notify Rhode Island Energy through your dispatcher as soon as practicable.**
- **Park emergency vehicles** upwind and away from collapse zones and manholes.
- **Evacuate the area** and be alert for migrating or accumulating gas.
- **Coordinate with Rhode Island Energy before ventilating.** Remove all ignition sources, and ventilate from the top down.
- NEVER attempt to open or close **underground pipeline valves.**
- When natural gas is burning, **let it burn and protect area exposures.** Remember, water is not effective for extinguishing gas fires.

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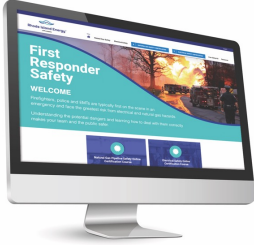
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So let's review the key points of this presentation.

- Prevent ignition of natural gas. Eliminate spark hazards at the scene of a gas leak, and use intrinsically safe equipment.
- When natural gas is involved in an emergency, notify Rhode Island Energy through your dispatcher as soon as practicable.
- Park emergency vehicles upwind and away from collapse zones and manholes.
- Evacuate the area and be alert for migrating or accumulating gas.
- Coordinate with Rhode Island Energy before ventilating. Remove all ignition sources, and ventilate from the top down.
- Never attempt to open or close underground pipeline valves.
- When natural gas is burning, let it burn and protect area exposures. Remember, water is not effective for extinguishing gas fires.



**Thank you for your attention.**



Visit Rhode Island Energy's website at [rienergy.e-smartresponders.com](http://rienergy.e-smartresponders.com) for additional information and to earn a Certificate of Completion in our natural gas safety course.

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Thank you for your attention. Rhode Island Energy thanks you for helping to keep yourself, your community and your fellow first responders safe.

Visit Rhode Island Energy's website at [rienergy.e-smartresponders.com](http://rienergy.e-smartresponders.com) for additional information and to earn a Certificate of Completion in their natural gas safety course.

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Natural Gas Safety for First Responders



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Always call 911 if you suspect a gas leak!

**Smell Gas. Act Fast. Call 911.**



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*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 instruction before.*

*The instructor's guide includes more detail about the natural gas distribution system and incident response tactics. It also includes a gas safety quiz, suggested discussion topics and simulations for group use.*

*Rhode Island Energy thanks you for helping to keep first responders safe.*