CANADIAN GAS ASSOCIATION
ASSOCIATION CANADIENNE DU GAZ

Responding to Natural Gas Emergencies
Trainer Guide

CANADIAN ASSOCIATION OF FIRE CHIEFS • L'ASSOCIATION CANADIENNE DES CHEFS DE POMPIER

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Trainer Overview

Purpose: To provide participants with an overview of the usage and function of natural gas and the procedures to use when responding to a natural gas emergency in their community.

Trainer: This course is to be delivered by a knowledgeable and experienced gas company trainer, or if not feasible, by a fire department trainer experienced in managing and mitigating natural gas emergency situations.

Trainer Guide: Contains important points to be emphasized but it is assumed that the trainer will add additional points or share experiences that he/she feels are necessary to enhance the learning experience of the participants. Please review the accompanying PowerPoint presentation with the Trainer Guide for animations and timing. Course content for the participants is contained in the trainee handouts available on the USB card included in the package.

Each topic in the Trainer Guide contains the following:

- Additional content to be delivered to the participants
- Thumbnail images of PowerPoint slide(s) associated with each topic
- Instructions for any activities: designated at the beginning of the paragraph with underlined bolding (e.g. **Explain**, **Distribute**, **Discuss**, **Refer**, **etc.**)
- References to the participants' course material such as trainee handouts and mini info card.

Local Considerations: Prior to delivering this course be sure to confirm the following information:

- The response structure/procedures of the local gas utility
- Any local or regional considerations that need to be covered in the Local Considerations section of the course

Learning Objectives

Learning Objective	Topic
List three key properties of natural gas	Understanding Natural Gas
Identify the key risks of natural gas	Understanding Natural Gas
Explain the behaviour of natural gas	Understanding Natural Gas
Identify key components of the delivery system	Understanding Natural Gas
Describe a safe and appropriate response given a gas emergency scenario	Natural Gas Emergencies
Identify local natural gas considerations within your response area	Scenarios and Local Considerations

Agenda

The following is an outline of suggested timing for delivering this course. We provide a suggestion for delivering the course within 2.5hrs and 3.75hrs.

Topic	Timing	
	Shorter delivery (2.5hrs)	**Longer delivery (3.75hrs)**
Introduction	15 min	15 min
Understanding Natural Gas	30 min	45 min
Natural Gas Emergencies	75 min	120 min
Local Considerations	15 min	30 min
Quiz and Wrap Up	15 min	15 min
Total Lesson Time	150 min	225 min

Trainee Handouts

Handout Title	Purpose	Course Section
Natural Gas Awareness	Learner Content	Introduction and Understanding Natural Gas
Mini Information Card	Learner Content	Introduction, Understanding Natural Gas and Natural Gas Emergencies
Incident Response	Learner Content	Natural Gas Emergencies

Introduction

Estimated Time: 15 minutes

The natural gas industry in Canada works diligently to ensure the safety of its employees, customers, the general public and first responders. Understanding the usage and function of natural gas as an energy source will assist firefighters/first responders in decision-making when handling natural gas emergencies.

The goal of this course, Responding to Natural Gas Emergencies, is to provide firefighters with the information and tools to promote efficient, safe and effective response to emergencies involving natural gas.

The course is divided into two modules, Understanding Natural Gas and Natural Gas Emergencies:

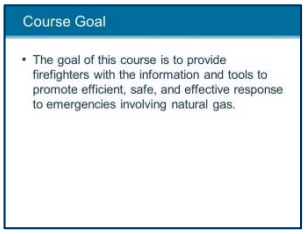
Course Outline

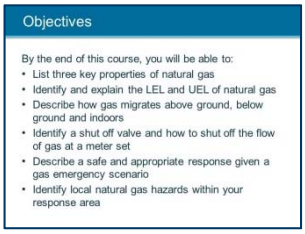
- Introduction
- Understanding Natural Gas
  - Properties of Natural Gas
  - Natural Gas Migration
  - From Wellhead to Burner Tip
  - Distribution System
- Natural Gas Emergencies
  - Emergency Response
    - General Procedures
    - Emergency Response Scenarios
    - Local Considerations

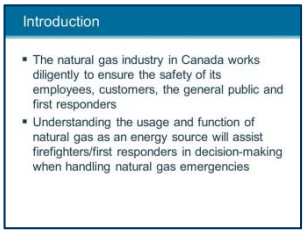
Distribute: The Quiz to participants (see Quiz section). Indicate "Pre-Quiz" by checking the appropriate box at the top of the quiz. Allow ten minutes for completion.

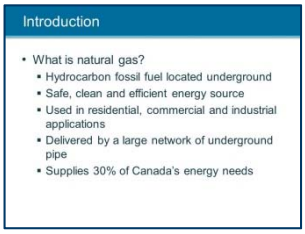
Discuss: Conduct a discussion with the participants – What is natural gas?

- Approximately 95% methane
- Safe, clean, and efficient energy source
- Used in residential, commercial and industrial applications
- Delivered by a large network of underground pipe
- Supplies a significant percentage of Canada's energy needs









Understanding Natural Gas

Introduce: This section of the course will provide insight into the behavior of natural gas and its delivery systems by covering the following topics – the properties of natural gas, natural gas migration, and the distribution system.

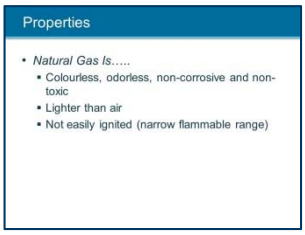
Refer: To the *Natural Gas Awareness Handout* and the *Mini Information Card* for the course content provided to participants.

Estimated Time:
30 – 45 minutes

Properties of Natural Gas

Explain: The properties of natural gas.

Refer: To the *Mini Information Card (Natural Gas Awareness - Properties)*

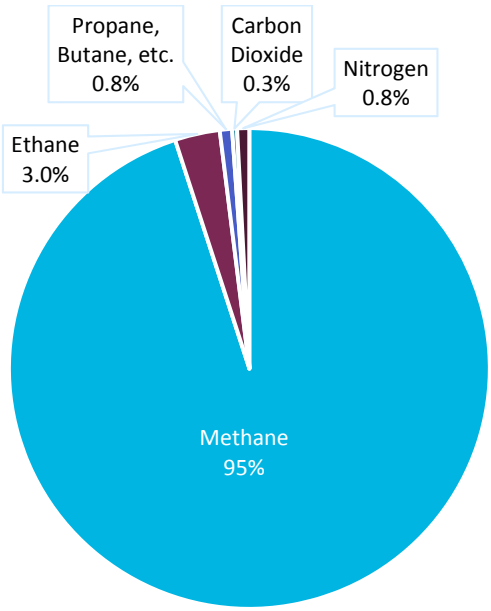


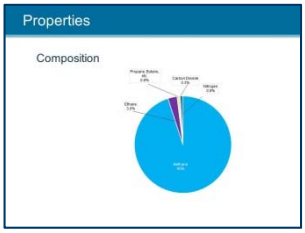
Properties – Natural Gas Is…

- Odourless, colourless, non-corrosive and non-toxic (however, it can cause asphyxiation)
- Lighter than air
- Not easily ignited (narrow flammable range – 4% to 15%)
- Able to produce CO if incomplete combustion occurs

Composition

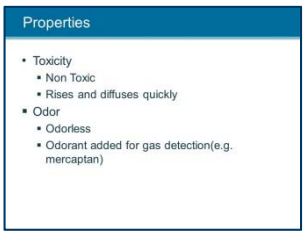
- Composed of a mixture of hydrocarbon gases (e.g. methane, ethane, propane, butane)
- Composition will vary but the largest component is methane (CH_4) at approximately 95%
- Lighter than air
- Colourless
- Odourless





Toxicity

- Non-toxic
- Will displace air and its oxygen in a confined space
- Vapour density: rises and rapidly diffuses during an escape
  - Can collect in areas such as upper floors or attics if they are not well ventilated
  - Opposite of propane and gasoline vapours which being heavier than air will fall and collect in low lying areas

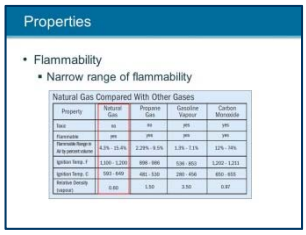


Odour

- Natural gas does not smell in its pure state
- Processed natural gas has an odourant called Mercaptan added to make gas escapes easier to detect
- This odourant is most often added at the transfer point between a transmission line and distribution line

Important: An emergency responder *must not rely on being able to smell natural gas* when responding to an emergency involving a transmission line.

Flammability



- Narrow range of flammability (4 to 15% gas in air)
  - Lower Explosive Limit (LEL) – 4%
  - Upper Explosive Limit (UEL) – 15%
- Relatively high ignition temperature (593°C to 649°C)
- Burns with little or no smoke
- Radiant heat is extremely intense in a natural gas fire
- Natural gas will not support combustion above or below its flammable range

Note: A rich mix of natural gas in air in a structure (e.g. 25%) will not support combustion. However, there is the danger that if vented to atmosphere the mixture could change and pass through the range of flammability.

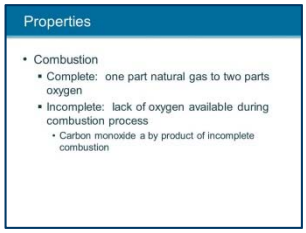
- Ignition sources: static electricity, pilot lights, matches/sparks, created by friction or from electrical switches, appliance ignition systems, doorbells, telephones, two-way radios or starting a vehicle

Important: Any communications equipment or instrumentation operated while responding to a gas escape should be intrinsically safe (explosion proof).

Natural Gas Compared With Other Gases

Property	Natural Gas	Propane Gas	Gasoline Vapour	Carbon Monoxide
Toxic	no	no	yes	yes
Flammable	yes	yes	yes	yes
Flammable Range in Air by percent volume	4.3% - 15.4%	2.29% - 9.5%	1.3% - 7.1%	12% - 74%
Ignition Temp. F	1,100 - 1,200	898 - 986	536 - 853	1,202 - 1,211
Ignition Temp. C	593 - 649	481 - 530	280 - 456	650 - 655
Relative Density (vapour)	0.60	1.50	3.50	0.97

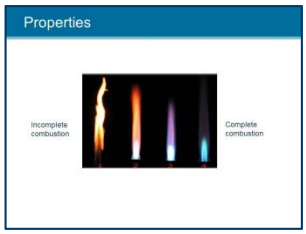
Combustion



- Complete
  - Complete combustion requires one part natural gas to two parts oxygen
  - Produces carbon dioxide and water vapour
- Incomplete combustion

- Occurs when there is a lack of oxygen available during the combustion process
- Insufficient supply of oxygen results in the production of undesirable products such as carbon monoxide and aldehydes

Note: Complete combustion produces a sharp bright blue flame while incomplete combustion produces a luminous yellow flame.



Range of Combustion from 1 (incomplete) to 4 (complete)

- Carbon Monoxide
  - By-product of incomplete combustion
  - Odourless, colourless and tasteless
  - Highly toxic with a wide range of flammability
  - Interferes with the body's ability to absorb oxygen
  - Items that can lead to incomplete combustion within a structure include:
    - Blocked flue passages
    - Bird or animal nests in appliance vents/chimneys
    - Disconnected exhaust and supply air vents
    - Spillage of fumes due to negative pressure
    - Vent not secured to the appliance or chimney
    - Poor/improper furnace operation

Note: Carbon monoxide is one of the leading causes of accidental poisoning deaths in North America - called the "Silent Killer". Types of incidents involve automobiles, portable appliances, and to a lesser extent, natural gas.

Natural Gas Migration

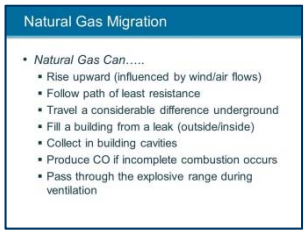
Explain: The principles of the migration of escaping natural gas.

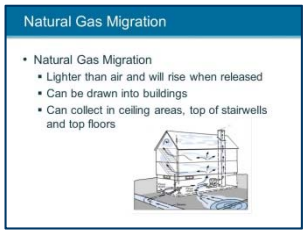
Refer: To the *Mini Information Card (Natural Gas Awareness - Migration)*

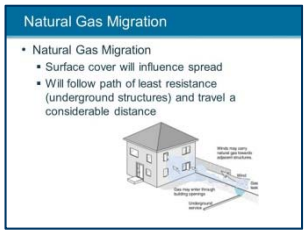
Migration – Natural Gas Can…..

- Rise upward and is influenced by wind direction/air flows
- Follow path of least resistance (e.g. drains/sewers, utility conduits, stairwells, vents, open windows)
- Spread a considerable distance underground and is influenced by ground cover (e.g. concrete/porous soils, frost/unfrozen ground)
- Fill a building from a leak that is either located inside or outside a building
- Collect in ceiling areas, top of stairwells and top floors, service spaces, attic spaces, etc.
- Pass through the explosive range (4% - 15% in air) before fully dissipating when being ventilated

Important: Escaping natural gas follows the path of least resistance and rises upward.

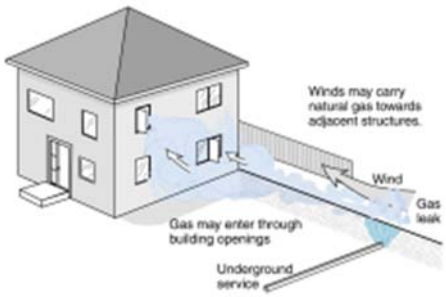






Above Ground

- Lighter than air and will rise when released
- Influenced by the environment (e.g. wind strength and direction)
- Can be drawn into building openings especially if near an operating mechanical air intake



Below Ground

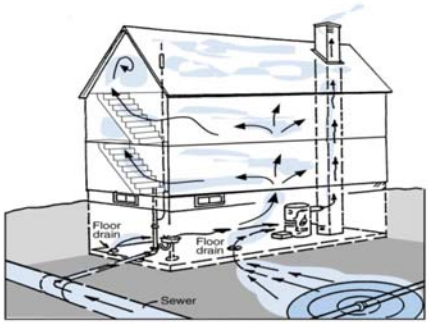
- Released gas will travel upwards to the surface
- Spread under the surface influenced by soils and surface cover
  - Porous soils (e.g. sand and gravel) offer little resistance
  - Loamy soils are less porous and offer more resistance (causes a wider spread pattern)
  - Surface vegetation can cause leaking natural gas to appear as circular patterns

Note: Damaged vegetation (e.g. yellow or dying) or bubbling in a pool of water can be signs of a possible below ground leak. If you suspect a gas leak contact the local gas utility.

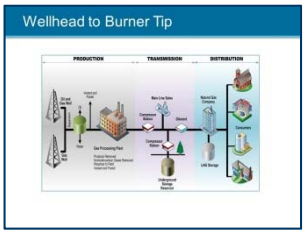
  - Pavement or seasonal frost can cause released gas to spread out over a larger area away from the source of the leak
- Gas release will follow the path of least resistance
  - Underground structures such as drains, sewers, utility conduits
  - Can travel a considerable distance which broadens area for a potential hazard

Indoors

- Natural gas could enter building as a result of an outside leak
- Gas will rise following the path of least resistance (e.g. stairwells, vents and open windows)
- Can collect in ceiling areas, the top of stairwells and top floors
- Other leak sources: indoor gas service lines and gas appliances



From Wellhead to Burner Tip - Production and Transmission Systems



Explain: The systems involved in the extraction, production and transmission of natural gas.

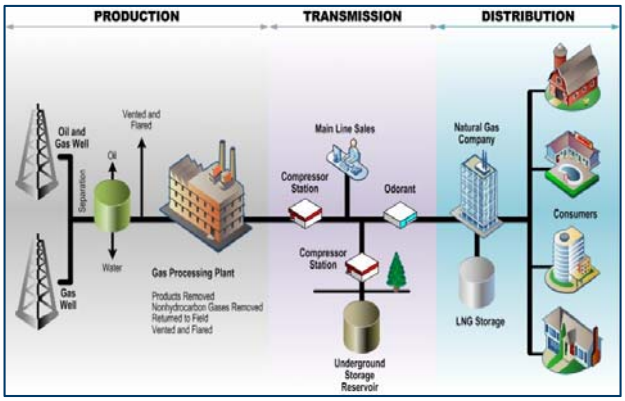
Production

- Raw gas recovered from underground sources by various methods and technologies
  - Vertical and horizontal drilling
  - Hydraulic fracturing
- Once out of the ground, natural gas flows through gathering pipelines to processing plants where it is refined
- Refined product is shipped via transmission pipelines to Canadian users and for export

Transmission

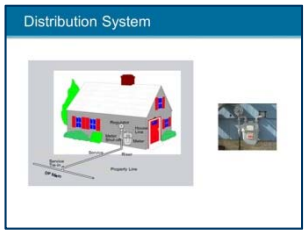
- Transmission pipelines transport natural gas from wells to processing plants and to distribution systems
- Transmission pipelines carry gas at a high pressure (e.g. operating at a pressure greater than 2070 kPa)
- Pressure is maintained by compressor stations
- Natural gas is typically not odourized in a transmission pipeline
- Gate stations and district regulator stations reduce pressure for gas to be used in the distribution system (odourant usually added at this stage)

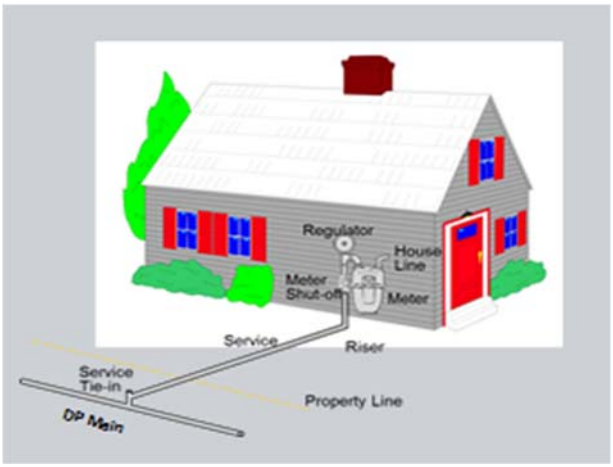
Note: Natural gas in a transmission pipeline may or may not be odourized, depending on the provider. Don't depend on being able to smell gas when attending an emergency involving a transmission pipeline. The gate station is most often the point where the odourant safety feature is added, producing the "rotten egg" smell.



Distribution System

Explain: The components of the natural gas distribution system.





Distribution Mains

- Carry natural gas around, between and through cities, towns, districts and neighborhoods
- Usually located in and along streets at varying depths
- May also be located in utility right of ways and may or may not be marked
- The typical pressure inside distribution systems ranges between 2.5 to 700 kPa

Service Lines

- Branches of the distribution main that supply natural gas to customer buildings/residences
- Services terminate at the meter set

Meter Sets

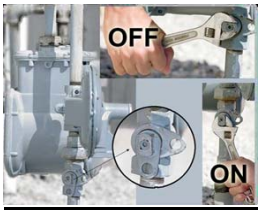
- Located at the termination of the customer's service line
- Includes a shut off valve, one or more gas meters and pressure regulators with relief vents/valves
- Can be installed outdoors, indoors or in a meter box/room located inside a building
- A single service line and pressure regulator may supply one meter or a manifold with numerous meters

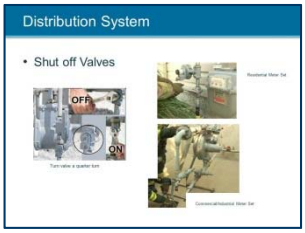
Note: Size, type and number of pressure regulators and relief valves/vents on a meter set depends on the pressure in the distribution main, the total gas load and how much pressure is being supplied to the customer owned piping system. The relief valve is a safety feature which should never be shut off. It can become blocked by ice and snow which can render it ineffective.

Shut off Valves

- Each meter set will have a shut off valve (commercial, industrial and residential)
- Underground valves also exist to turn off gas feeds from a safe distance

Important: Firefighters may shut off the gas supply at the meter set (if necessary and accessible) and if they are trained in the procedure. Only gas utility personnel can turn a meter set shut off valve *back on* and o*nly gas utility personnel* can access underground valves.





Pipeline Materials

- Cast iron
  - No longer installed but may still be in use
  - Being replaced with plastic polyethylene (PE) pipe
- Copper
  - Mostly used for indoor natural gas supply line (according to local codes and regulations)
  - Used as service pipelines in some areas
- Steel
  - High pressure pipelines are always steel
  - Some lower pressure lines are steel as well (distribution and service lines)
  - Protected from corrosion by coating and wrapping
- Polyethylene (PE) Plastic
  - Most commonly installed for new mains and service lines
  - Only installed underground
  - Static electricity can build up and pose a risk in the event of a damaged line
  - No corrosion issues

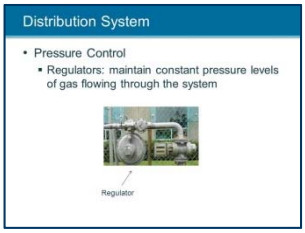
Note: A PE service line will transition to a steel riser which connects to the meter set at the termination of the service line. Static electricity poses a risk which is unique to plastic pipelines.

Explain: The components of pressure control in the distribution system.

Regulators

- Used to maintain constant pressure levels of gas flowing in the system
- Self-Operating devices
- Designed with pressure relief valves
  - Valve will vent natural gas to the atmosphere instead of allowing an over pressure condition to move into the next portion of the system
  - This venting of gas to atmosphere can sometimes result in a noticeable odour

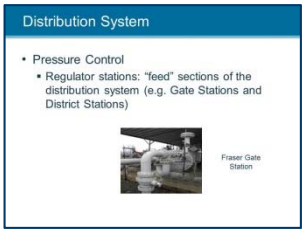
Regulator



Regulator Station

- Many types of regulator stations "feed" sections of the distribution system. Examples include:
  - **Gate Stations:** Odourant added and pressure reduced as gas enters distribution system
  - **District Station:** Supplies gas to the distribution mains of a town, commercial or industrial district or residential neighborhood
  - **Farm and Intermediate Pressure Taps:** Directly feeds from a gate station or a transmission line to a single home or building in a rural area

Gate Station



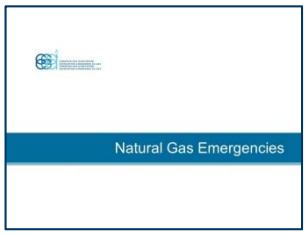
Vertical Subdivisions

- Meter sets located inside a multiple occupancy complex (e.g. high rise building)
- Distribution pressure regulated outside the building
- Gas at metering pressure is piped to the meters located inside the building
    - Meter closets
    - Meters can also be located in each unit or on every floor

Natural Gas Emergencies

Introduce: This section of the course will outline the general procedures for incident response when dealing with natural gas emergencies.

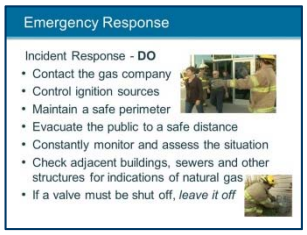
Estimated Time:
25 – 30 minutes



Explain: The general response procedures for dealing with natural gas emergencies.

Refer: To the *Incident Response Handout* and the *Mini Information Card.*

DO:



- **Notify the gas utility immediately**
  - Give location and nearest intersection
  - Provide brief description of situation (e.g. natural gas inside or outside building; burning or blowing gas)
- **Control ignition sources**
  - Smoking, open flames, internal combustion engines and motors
  - Turn off all vehicles

Tip: If machinery is left running around the leak it may be hazardous to turn it off. It may be safer to leave it running as there is a risk of spark during shut down. If uncertain of the concentration of gas, do not turn on or off machinery.

- **Position vehicles upwind if possible**
  - Position apparatus out of harm's way

Note: Avoid parking at front, side or back of building – park at corner of the building if possible. Avoid parking over manhole covers or near the collapse zone when gas is released inside – protects personnel, bystanders/occupants and equipment from harm due to potential explosions.

- **Establish a safety zone**
  - Maintain a safe perimeter for public safety and traffic control
    - If you can smell gas or cannot have a conversation without yelling, you are too close and must extend the perimeter
    - Gas company will adjust the safe distance based on pipeline characteristics such as pressure and nature of the damage

- **Evacuate public to a safe distance if necessary**
- **Monitor constantly and assess the situation**
- **Be alert for odour, broken pipes, excavation collapse or unusual signs**
  - In a natural disaster such as hurricane or earthquake the potential for gas release is great. Exercise caution at every site

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Important: When dealing with a flammable gas in an uncontrolled event, responders should *anticipate and expect that ignition will occur* until assured that the area is safe.

- **Check adjacent structures for indications of natural gas**
  - Buildings, sewers, and other structures

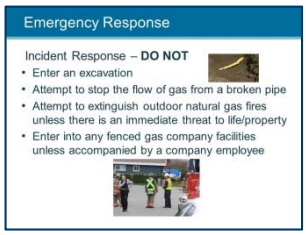
Note: Ensure all building openings are closed if the source of the leak is near a building.

- **Determine if possible, the source of the gas release**
  - Without risk to the responders
- **Coordinate with the utility company for large-scale evacuations if necessary**

Important: If a valve must be shut off, *leave it off.*

DO NOT:

- **Enter an excavation or gas envelope to control escaping gas**
- **Operate electrical devices**
  - Doorbell, cell phone, portable radio, light switch
  - Only operate electrical equipment that is deemed intrinsically safe or explosion proof
- **Attempt to stop the flow of gas from a broken pipe**
- **Attempt to extinguish outdoor natural gas fires unless there is an immediate threat to life or property**
  - Or if the fire is small and the gas supply can be shut off
- **Enter into any fenced gas company facilities**
  - Must be accompanied by a company employee



Explain: The response structure of the gas company located in your area. *You will need to confirm these procedures with the utility prior to the start of this course.*

Suggested topics:

- Time of response
- Who will arrive on scene
- Safety rules which may cause delays (e.g. waiting for locates, dealing with a gas envelope)
- Incident Command:
    - What are the roles of the gas company?
    - What are the roles of the emergency responder?
    - How to identify Incident Commander?

Emergency Response Scenario #1: Indoor Gas Leak

The following sections of this module will consist of two video scenarios that will highlight procedures involved in responding to a natural gas emergency.

Estimated Time:
25 – 45 minutes

> **Trainer Note:** Emphasize to the participants that the responses demonstrated in these videos may be different from their local procedures. Use this opportunity to "localize" the discussion and relate the responses to local fire department protocols. For this reason, dialogue in the videos is intentionally quiet.

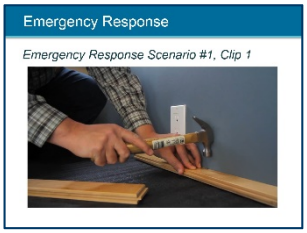
Activity: Have the participants view the introductory video (5 min).

> **Trainer Note:** Depending upon the technology available the video clips can be viewed 1) within the actual Power Point presentation (click on the play/pause button that appears at the lower left of the screen) or 2) on the DVD included in the kit folder.

Explain: The emergency response scenario to be presented.

- Video Scenario #1: Indoor gas leak

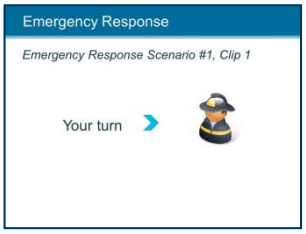
Activity: View Scenario 1, Clip 1.



Discuss: Conduct a discussion with participants based on the content of the clip.

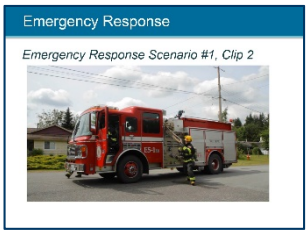
Suggested questions to initiate discussion:

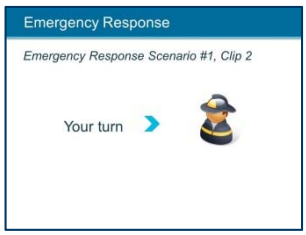
- What information should be obtained from Dispatch?
- What pre-planning should be done en route to the emergency?
- What should you be looking for as you arrive at the scene?
- Is cellphone use okay? – discuss intrinsically safe devices
- What is the correct fire department PPE?
- What incident command considerations are there? How to identify the Incident Commander?



> **Trainer Note**: Feel free to add or substitute your own questions to the ones listed.

Activity: View Scenario 1, Clip 2.





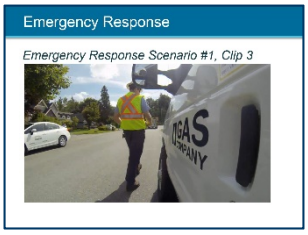
Discuss: Conduct a discussion with participants based on the content of the clip.

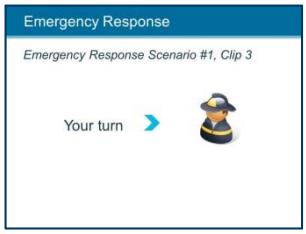
Suggested questions to initiate discussion:

- What are the considerations for positioning the vehicle?
- How to determine whether machinery should be left on or whether it is safe to turn off?
- How would you respond to the scene?
- What information should be obtained from the handyman?
- What should be considered before turning the valve off on the meter set?
- Who and how to operate the wing lock valve at meter set?
- What are the considerations for establishing a safety perimeter or performing evacuation/traffic control?
- What safety rules/practices will the local gas company be following (e.g. related to LEL and working in gaseous atmospheres)?

> **Trainer Note**: Feel free to add or substitute your own questions to the ones listed.

Activity: View Scenario 1, Clip 3.





Discuss: Conduct a discussion with participants based on the content of the clip.

Suggested questions to initiate discussion:

- What information should be obtained from the gas company?
- Is there any difference here as to how your own department would respond?

> **Trainer Note**: Feel free to add or substitute your own questions to the ones listed.

"What if" questions:

- What if the concentration of gas is above 15% of the LEL?
- Where would you look if this is a situation involving migrating gas?
- What if there is a need to evacuate (e.g. neighbours)? When would you evacuate? To what distance would you evacuate people?
- What if the meter is not accessible for shut off?

Emergency Response Scenario #2: Outdoor Gas Leak

Explain: The emergency response scenario to be presented.

- Video Scenario #2: Outdoor gas leak

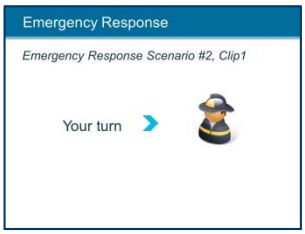
Estimated Time:
25 - 45 minutes

Activity: View Scenario 2, Clip 1.

Discuss: Conduct a discussion with participants based on the content of the clip.

Suggested questions to initiate discussion:

- What information should be obtained from Dispatch?
- What pre-planning should be done en route to the emergency?
- What should you be looking for as you arrive at the scene?
- What incident command considerations are there? How to identify the Incident Commander?



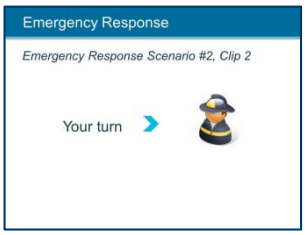
> **Trainer Note**: Feel free to add or substitute your own questions to the ones listed above.

Activity: View Scenario 2, Clip 2.

Discuss: Conduct a discussion with participants based on the content of the clip.

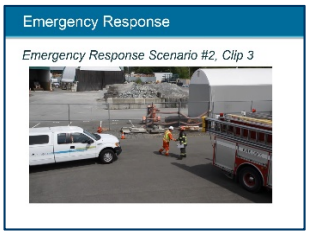
Suggested questions to initiate discussion:

- What are the considerations for positioning the vehicle?
- How to determine whether machinery should be left on or whether it is safe to turn off?
- How would you respond to the scene?
- What information should be obtained from the foreman?
- What are the considerations for establishing a safety perimeter or performing evacuation/traffic control?
- What safety rules/practices will the local gas company be following (e.g. related to LEL and working in gaseous atmospheres)?



> **Trainer Note**: Feel free to add or substitute your own questions to the ones listed above.

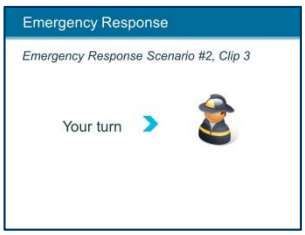
Activity: View Scenario 2, Clip 3.



Discuss: Conduct a discussion with participants based on the content of the clip.

Suggested questions to initiate discussion:

- What information should be obtained from the gas company?
- Is there any difference here as to how your own department would respond?
- What are emergency locates, and why might it be required to wait for them? Discuss call/click before you dig.



Trainer Note: Feel free to add or substitute your own questions to the ones listed above.

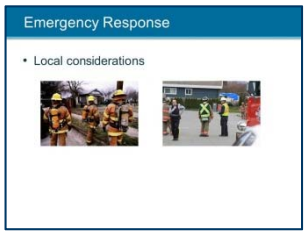
"What if" questions:

- What would be your response if the gas ignites?
- What if the backhoe is left running?
- What if the backhoe operator is injured by flying debris?
- What if emergency locates are required before resolving the gas leak?
- What if the direction of wind changes?

Local Considerations

Introduce: At this point let's discuss how local considerations can play a part in your emergency response.

Estimated Time:
15 – 30 minutes



Explain: Any situations that may be encountered on a local level when responding to a natural gas emergency.

Possible situations could include the following:

- Stations
- High pressure pipelines
- Liquefied Natural Gas (LNG) plants
- Sour gas (Hydrogen Sulfide gas)
- Incident command
- Natural Gas Vehicles (LNG, CNG)
- Odourant leak
- Sewer pipe cross bore
- Wildland-urban interface fires

Wrap Up

Estimated Time:
15 min

- Distribute the quiz (see Quiz Section) for completion. Indicate "Post-Quiz" by checking the appropriate box at the top of the quiz.
  - Allow 10 minutes to complete the quiz

Note to Trainer: If time permits it is recommended to review the quiz answers with the participants as a group.

- Ask if there are any questions or concerns

Quiz Section

- Natural Gas Emergencies Quiz
- Natural Gas Emergencies Quiz Answer Guide

NATURAL GAS EMERGENCIES QUIZ

☐ Pre-Quiz ☐ Post-Quiz Score _____ out of 20 marks

STUDENT INFORMATION	Name:	

COURSE INFORMATION	Course Name:	
	Instructor:	
	Date:	

Enter the correct answer in the space provided. Questions are each worth 1 mark unless otherwise specified.

☐ 1. The largest constituent of natural gas is:

a. Ethane
b. Methane
c. Butane
d. Propane

☐ 2. What is added to natural gas to create that "rotten egg" smell?

a. Hydrogen sulfide
b. Mercaptan
c. Calcium Hypochlorite
d. Sodium Hydroxide

☐ 3. The range of flammability of natural gas in air is:

a. 6% to 20%
b. 5% to 18%
c. 4% to 15%
d. 3% to 12%

☐ 4. Opening windows and doors to let natural gas escape is a very effective ventilation method.

True (T)
False (F)

☐ 5. Incomplete combustion of natural gas can be identified by:

a. A bright blue flame
b. A dull red flame
c. A luminous yellow flame
d. A lack of visible flame

☐ 6. Which type of soil provides the least resistance to natural gas migrating upward from below ground?

a. Porous
b. Loamy
c. Clay
d. Rock

☐ 7. In an emergency involving natural gas at a residence or business, the flow can be shut off by closing the shut off valve on the meter set. Once the emergency is over, anyone can turn the valve back on.

True (T)

False (F)

☐ 8. Natural gas carried in transmission lines differs from natural gas in distribution lines in that is at a higher pressure and is <u>usually unodourized</u>.

True (T)

False (F)

9. Only gas utility personnel can operate an underground valve.

True (T)

False (F)

10. Complete the following statement: "Natural gas is non-toxic, it will however…"

a. …make it very difficult to see.
b. …lead to certain death if inhaled in any quantity.
c. …displace the oxygen we require to breathe.
d. …create long term respiratory effects.

11. Which of the following are sources of ignition with respect to natural gas?

a. Light switch turned off and on
b. Blackberries, flashlights, pagers
c. Starting a vehicle and operating a doorbell
d. All of the above

12. Select the correct property of natural gas:

a. Natural gas has the same specific gravity as carbon monoxide
b. Natural gas is heavier than air
c. Natural gas is lighter than air
d. Natural gas has an upper flammable range of 25%

13. To avoid ignition, any communications equipment or instrumentation operated while responding to a gas escape must be intrinsically safe or explosion proof.

True (T)

False (F)

14. Select the methods through which migrating natural gas can enter a building *(2 marks)*:

a. Through sewers and other utilities
b. Through cracks in walls or building openings
c. Only from appliances within the building in question
d. It cannot as it is lighter than air

15. Natural gas pipeline fires should never be extinguished unless they pose an immediate threat to people or property.

True (T)

False (F)

16. If you encounter a broken plastic pipeline in the field, do the following:

a. Make area safe and call the gas company
b. Backfill the damage to suppress the leaking gas
c. Bend the pipe over to stop the flow of gas
d. None of the above

17. Which underground structures provide low resistance for escaping gas to travel a considerable distance from the source of the leak?

a. Storm drains and sewers
b. Telephone conduits
c. Cable and electrical corridors
d. All of the above

18. Identify which of the following are characteristics of natural gas *(2 marks)*:

a. Will travel the path of least resistance
b. Rises and won't collect in low areas
c. Always has a distinct odour
d. Produces a lot of smoke when it burns

NATURAL GAS EMERGENCIES QUIZ ANSWER GUIDE

☐ Pre-Quiz ☐ Post-Quiz Out of 20 marks

COURSE INFORMATION

Course Name:	
Instructor:	
Date:	

Questions are each worth 1 mark unless otherwise specified.

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True (T)

False (F)

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False (F)

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True (T)

False (F)

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