CANADIAN GAS ASSOCIATION
ASSOCIATION CANADIENNE DU GAZ

RESPONDING TO NATURAL GAS EMERGENCIES

PowerPoint Presentation

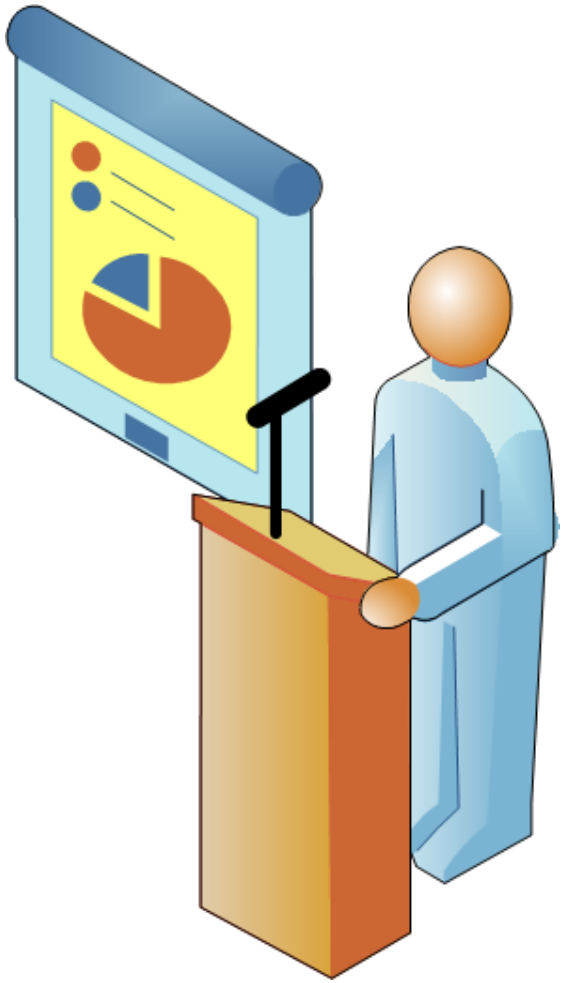
CANADIAN ASSOCIATION OF FIRE CHIEFS • ASSOCIATION CANADIENNE DES CHEFS DE POMPIER

Responding to Natural Gas Emergencies

Housekeeping

- Washroom locations
- Evacuation procedures
- First Aid procedures
- Electronic devices
- Attendance sheet

Your Trainer Today



Course Goal

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

Objectives

By the end of this course, you will be able to:

- List the key properties of natural gas
- Identify the key risks of natural gas
- Explain the behaviour of natural gas
- Identify key components of the delivery system
- Describe a safe and appropriate response given a gas emergency scenario
- Identify local natural gas considerations within your response area

Agenda

- Introduction
- Understanding Natural Gas
  - Properties of natural gas
  - Natural gas migration
  - From Wellhead to Burner Tip
  - Distribution System
- Natural Gas Emergencies
  - General Procedures
  - Incident Response Scenarios
  - Local Considerations
  - Quiz and Wrap Up

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Introduction

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Introduction

- 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

Introduction

- 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 amount of Canada’s energy needs

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Understanding Natural Gas

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Properties

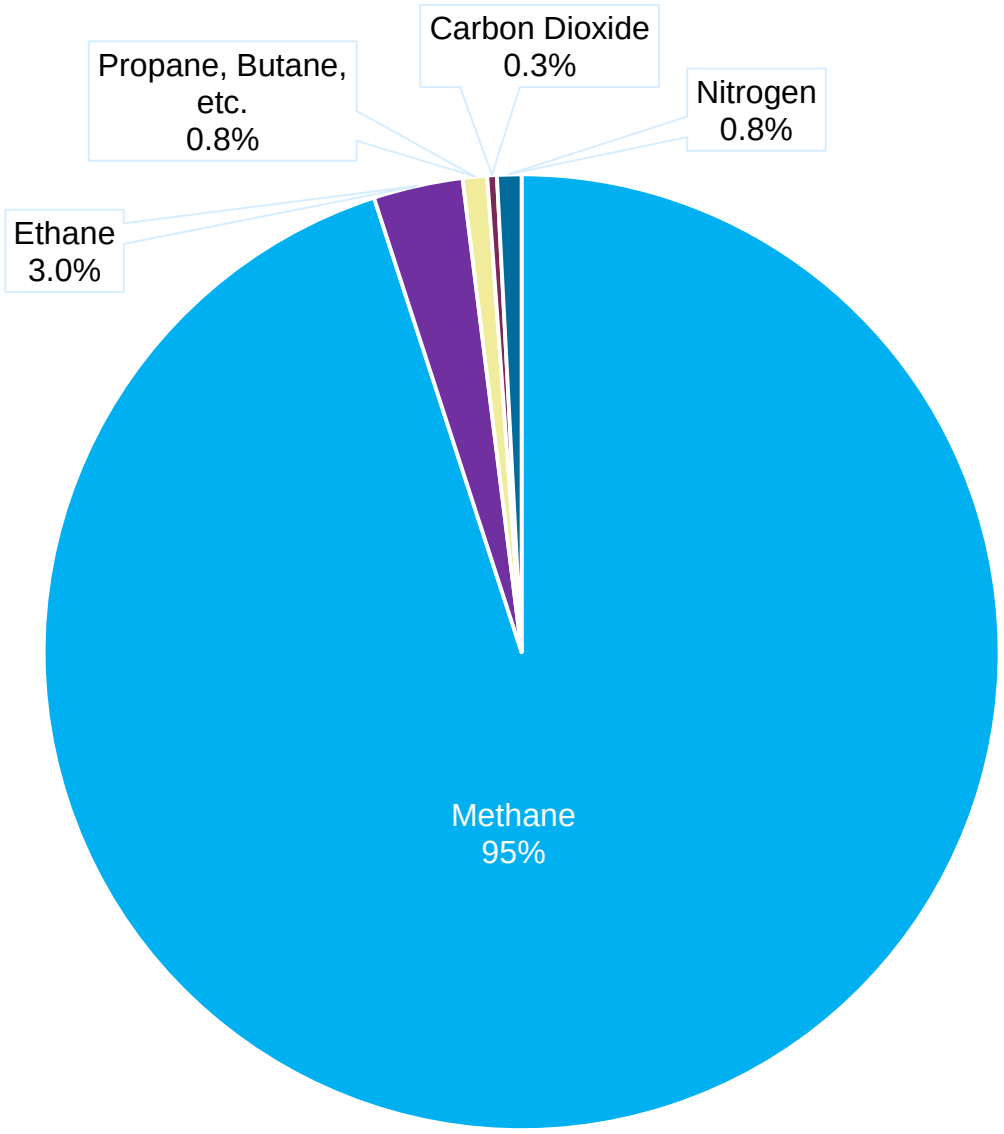
- *Natural Gas Is*…..
  - Colourless, odourless, non-corrosive and non-toxic
  - Lighter than air
  - Not easily ignited (narrow flammable range)
  - Able to produce CO if incomplete combustion occurs

Properties

- Properties of Natural Gas:
  - Composition
  - Toxicity
  - Odour
  - Flammability
  - Combustion

Properties

Composition



Properties

- Toxicity
  - Non Toxic
  - Rises and diffuses quickly
- Odour
  - Odourless
  - Mercaptan odourant added to aid gas detection

Properties

- Flammability
  - Narrow range of flammability

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

Properties

- Combustion
  - Complete: one part natural gas to two parts oxygen
  - Incomplete: lack of oxygen available during combustion process
    - Carbon monoxide a by-product of incomplete combustion

Properties

Incomplete combustion

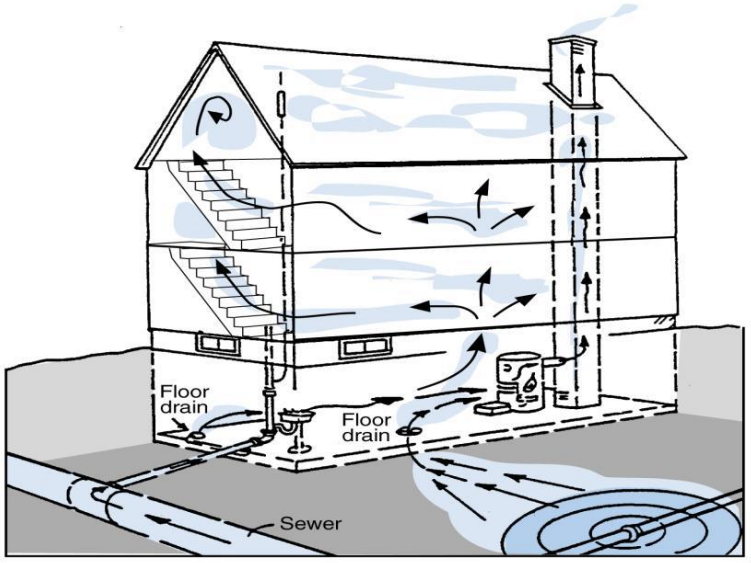
Complete combustion

Natural Gas Migration

- *Natural Gas Can*…..
  - Rise upward (influenced by wind/air flows)
  - Follow path of least resistance
  - Travel a considerable distance underground
  - Fill a building from a leak (outside/inside)
  - Collect in building cavities
  - Pass through the explosive range during ventilation

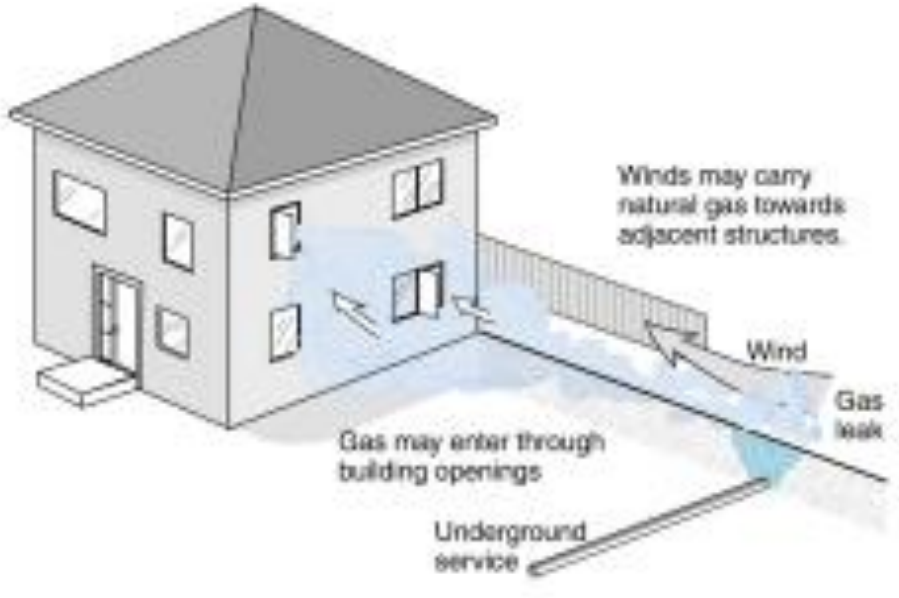
Natural Gas Migration

- Natural Gas Migration
  - Lighter than air and will rise when released
  - Can be drawn into buildings
  - Can collect in ceiling areas, top of stairwells and top floors

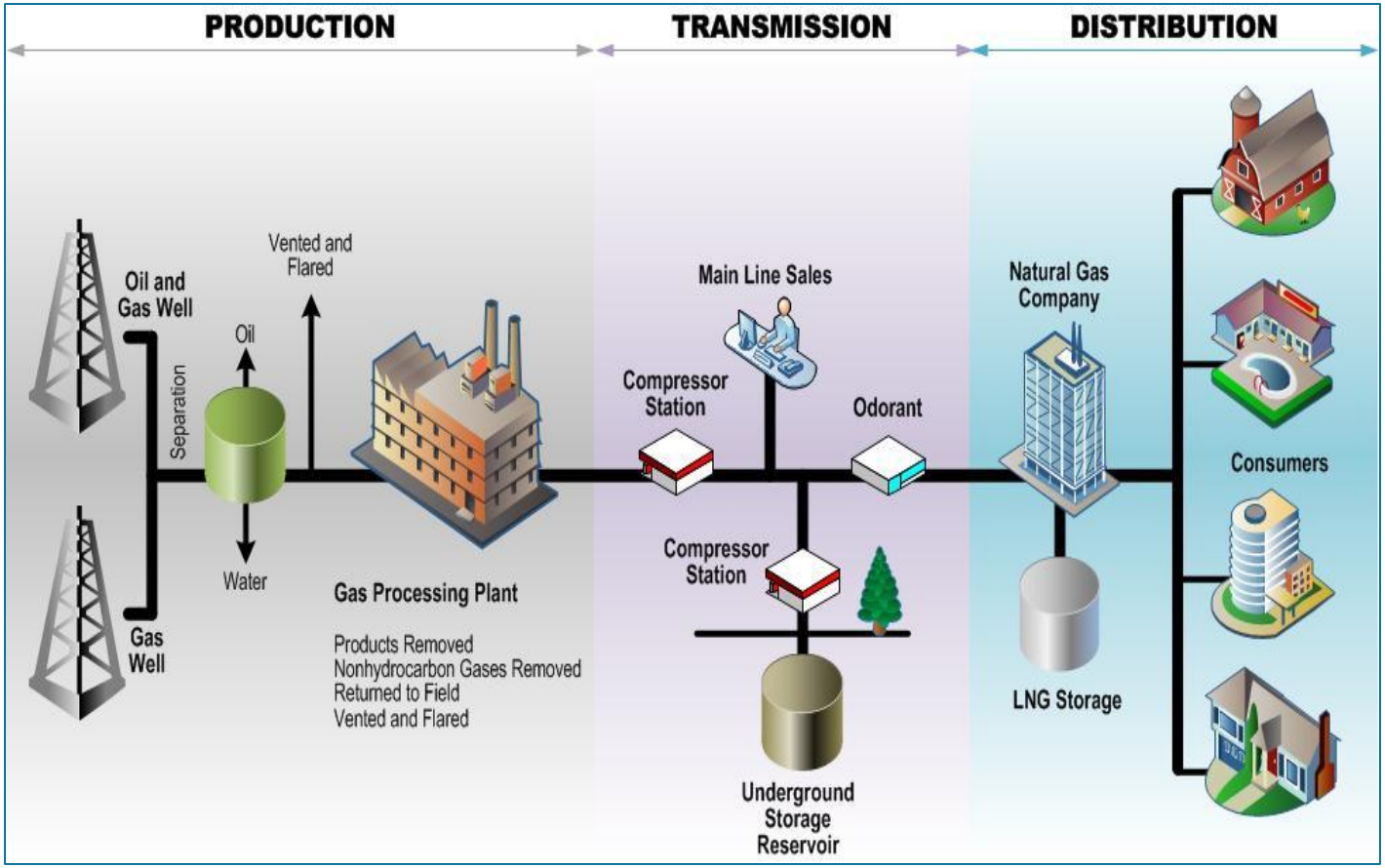


Natural Gas Migration

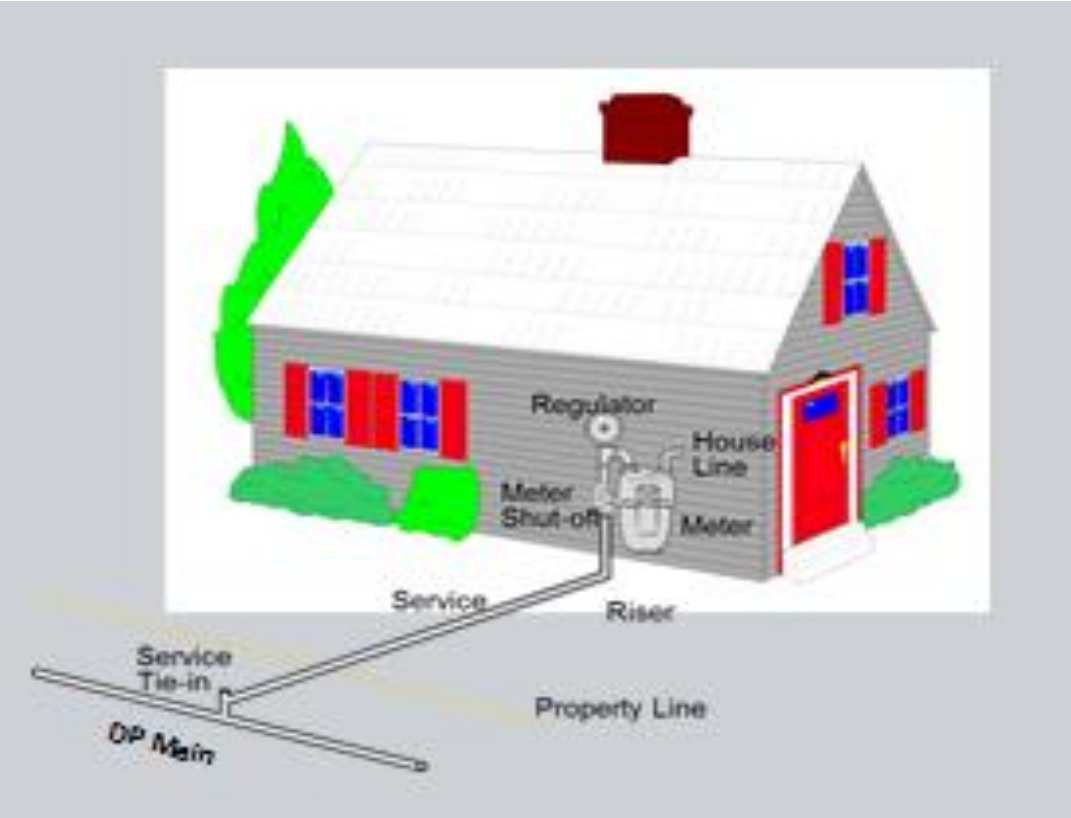
- Natural Gas Migration
  - Surface cover will influence spread
  - Will follow path of least resistance (underground structures) and can travel a considerable distance



Wellhead to Burner Tip

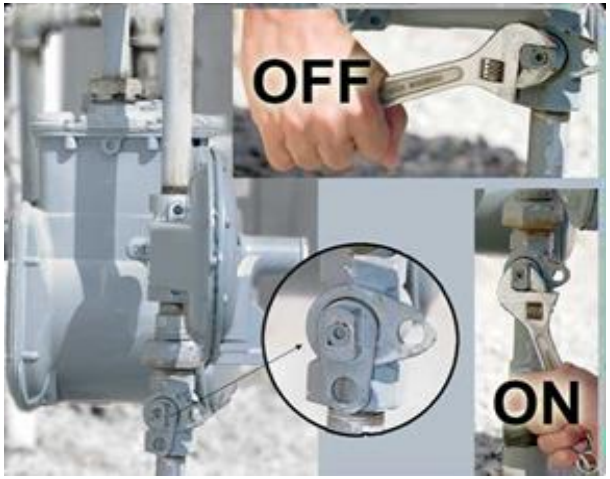


Distribution System



Distribution System

- Shut off Valves



Turn valve a quarter turn

Residential Meter Set

Commercial/Industrial Meter Set

Distribution System

- Pressure Control
  - Regulators: maintain constant pressure levels of gas flowing through the system

Regulator

Distribution System

- Pressure Control
  - Regulator stations: “feed” sections of the distribution system (e.g. Gate Stations and District Stations)

Gate Station

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Natural Gas Emergencies

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Emergency Response

Incident Response - **DO**

- Contact the gas company
- Control ignition sources
- Maintain a safe perimeter
- Evacuate the public to a safe distance
- Constantly monitor and assess the situation
- Check adjacent buildings, sewers and other structures for indications of natural gas
- If a valve must be shut off, *leave it off*

Emergency Response

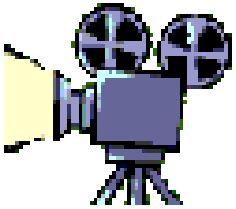
Incident Response – **DO NOT**

- Enter an excavation
- 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/property
- Enter into any fenced gas company facilities unless accompanied by a company employee

Emergency Response

Emergency Response Scenario #1

Clip 1

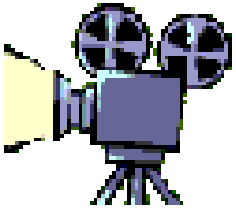


Your turn

Emergency Response

Emergency Response Scenario #1

Clip 2

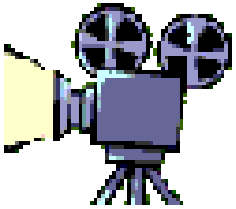


Your turn

Emergency Response

Emergency Response Scenario #1

Clip 3

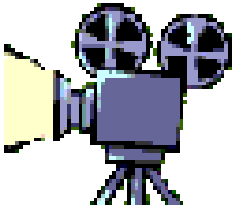


Your turn

Emergency Response

Emergency Response Scenario #2

Clip 1

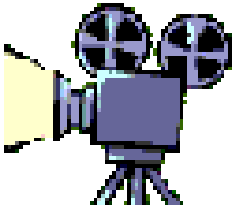


Your turn

Emergency Response

Emergency Response Scenario #2

Clip 2

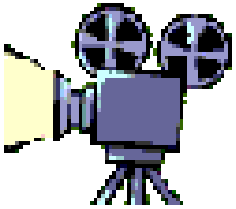


Your turn

Emergency Response

Emergency Response Scenario #2

Clip 3



Your turn

Emergency Response

- Local considerations

Wrap Up

- Complete the quiz
- Any questions or concerns?