



Your Nose Knows: Natural Gas Safety

Total program time: 50 minutes, 3rd-5th Grades

Grade-specific emphasis:

3rd Grade – States of matter, personal safety knowledge, injury prevention

4th Grade – Physical science, forms of energy, personal safety and injury prevention

5th Grade – Earth systems science, non-renewable energy, injury prevention

Desired outcomes: by completing this lesson, students will be able to:

- ✓ Apply **science concepts** while learning about natural gas
- ✓ Apply **safety concepts** while learning about natural gas
- ✓ Better understand what natural gas is and where it comes from
- ✓ Demonstrate an understanding of how natural gas is used on a daily basis
- ✓ Prevent injury and accidents with natural gas and carbon monoxide
- ✓ Better understand natural gas safety rules what to do in an emergency

1. Introduction

- Colorado Springs Utilities subject matter expert background and role
- What does Colorado Springs Utilities do, and what will we learn today?
- Purpose of our visit: knowledge and safety around natural gas in our homes and schools
- Demonstration with a model house: natural gas and spark for natural gas explosion

2. What is NATURAL GAS?

- What is natural gas? A gas that occurs deep beneath the earth's surface and consists of mainly methane with one carbon and 4 hydrogen (CH₄) atoms. Natural gas can be used as a fuel or to make materials and chemicals.
- Natural gas properties:
 - ✓ Odorless, invisible, has no taste and is 40% lighter than air.
 - ✓ Consists mostly of methane CH₄
 - ✓ Ignites and blows up at 1000°F or greater
 - ✓ It can be cooled and turned into Liquid Natural Gas (LNG)
 - ✓ Natural gas is different than Carbon Monoxide or CO

3. How do we use NATURAL GAS?

- Natural gas is used for: heating our homes and water, gas stoves, and clothes dryers. Natural gas is used to power factories that make paper, bricks, and other products
- **ACTIVITY:** natural gas uses with pictures

4. How does NATURAL GAS form?

- Natural gas was formed millions of years ago when plants and tiny sea animals were buried by sand and rock (fossils). Layers of mud, sand, rock, plant, and animal matter continued to build up until the pressure and heat turned them into oil and natural gas. When the dinosaurs and the plants they ate died, the remains were buried under many layers of rock and soil. (poster with illustrations)
- Over time, tremendous heat and pressure created by the layers of earth turned animal and plant matter into natural gas and petroleum (oil). Natural gas is called a **fossil fuel**.

5. How do we get NATURAL GAS from the earth?

- Natural gas is drilled from deep down in the earth. The gas is found in layers of rock with tiny holes - the rock holds the gas like a sponge.
- To bring it to the surface, gas companies drill down hundreds of feet and pump into pipes. Natural gas is NOT a renewable energy source, once it is used it is gone.

6. How do we get NATURAL GAS to our homes, schools, and buildings?

- Natural gas can be sent through a pipeline or put into storage tanks above or below ground. Natural gas travels a long way to get to homes and buildings.
- Natural gas is sent through large pipelines buried underground and sent in smaller pipes to your home. They connect to a meter outside your house which measures how much natural gas your home uses. Pipes are connected to appliances such as furnaces and stoves.
- There are almost 200,000 active gas meters in Colorado Springs.

7. SAFETY AWARENESS: Natural Gas

- In 1937, 300 children and teachers at a school in Texas died from a massive natural gas explosion that was ignited by a spark from an electrical switch. Texas mandated a highly odorous chemical **mercaptan**, be added to natural gas. **Mercaptan** is a chemical substance that has a strong odor of rotten eggs to help people to recognize a leak.
- Natural gas is **explosive**: it can explode when mixed with air in a confined space.
- Natural gas is **flammable**: a small spark can ignite natural gas and cause a fire or explosion. Even a small spark from a light switch or ringing a door bell can cause a fire.
- Natural gas can suck the oxygen out of a room and suffocate occupants.
- Use the **“THREE S’s”** to help recognize a leak:
 1. **SMELL**- a pungent smell similar to rotten eggs.
 2. **SIGHT**- Bubbling water or blowing dirt near a gas meter.
 3. **SOUND**- Hissing near a gas meter or appliance

8. SAFETY AWARENESS of Carbon Monoxide (CO)

- **Carbon Monoxide (CO)** is different than natural gas. Also a dangerous gas that is invisible, odorless, and colorless that is created when fuels such as gasoline, wood, coal, propane, oil and natural gas burn incompletely. Heating and cooling equipment can be sources of CO. You can't **see**, **smell** or **taste** carbon monoxide.
- Carbon monoxide alarms should be located near sleeping areas on every level of the home. If the alarm sounds, immediately exit to fresh air, alert others. (Show CO alarm)

9. Natural Gas Safety Experiment: What can happen if natural gas leaks in a building?

- Demonstration of house explosion: a small spark can ignite natural gas.
- House explosion picture, explanation, safety tips.
- Experts conducting experiment, fire extinguisher in case of an emergency, explosion can be 1000° or hotter.

10. TOP 5 Natural Gas SAFETY TIPS:

1. Call 811 before digging to plant a tree, build a fence or install a deck. Underground lines are located so they are not hit and accidents are prevented.
2. Use the **Three S's** to detect a leak: smell, sight and sound.
3. If you detect natural gas, leave the building IMMEDIATELY to fresh air.
4. Make sure to not turn any lights on, this can generate a spark that could start a fire.
5. Call 9-1-1. Colorado Springs Utilities will come out to assist as well. Do not go back inside until you are told it is safe.