

OSC 12
Ohio Safety Congress & Expo

WELL AT HOME. SAFE AT WORK.

264 Natural Gas: What You Should Know

Don MacBride

Thursday, March 29, 1:15 to 2:15 p.m.

Ohio Bureau of Workers' Compensation

The Basics of Natural Gas

Presented by:
Don MacBride
Safety and Technical Training
Instructor
Dominion East Ohio Gas



Natural Gas Explosion Damage



Natural Gas Explosion Damage



Myths About Natural Gas

1. It's easy to burn!
2. Produces carbon monoxide when burned!
3. CO is an odorless, colorless, silent killer!



What is Natural Gas?

- 95% Methane
 - Heat content of 850 BTU/CF
 - Not hot enough to meet federal fuel gas guidelines
- Remaining 5% =
 - Butane ~ 3200 BTU/CF
 - Propane ~ 2500 BTU/CF
 - Ethane ~ 1600 BTU/CF
 - Fingerprint of natural gas



What is Natural Gas? (cont.)

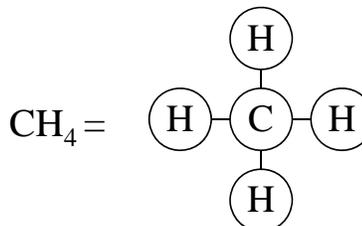
Methane + Ethane + Propane + Butane =

“Natural Gas”

- Heat value of 1000+ BTU/CF
- Dominion’s average heat value ~ 1040 BTU/CF

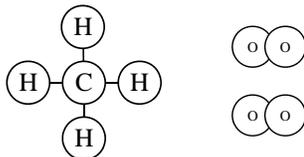


1. Natural Gas is a compound of carbon and hydrogen.



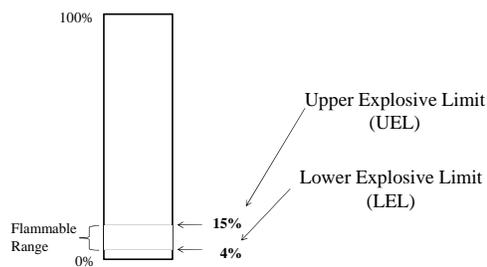
The Combustion Process

- Required for combustion:



Flammable Range

Natural Gas Concentration In Air



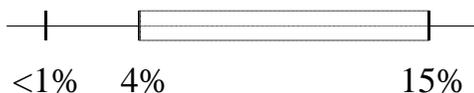
Odorant

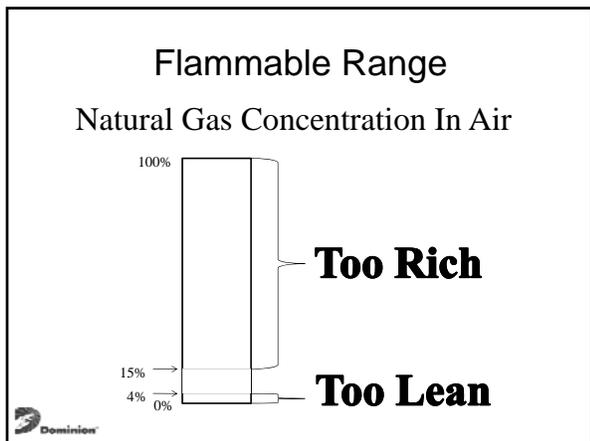
- Natural gas is odorless
- An odorant is added to the gas stream as a primary safety measure in the industry
 - The odorant aids in Leak Detection by Company personnel
 - Allows customers to smell the gas if leaks develop inside the home
- Odorant levels are routinely checked by Company personnel



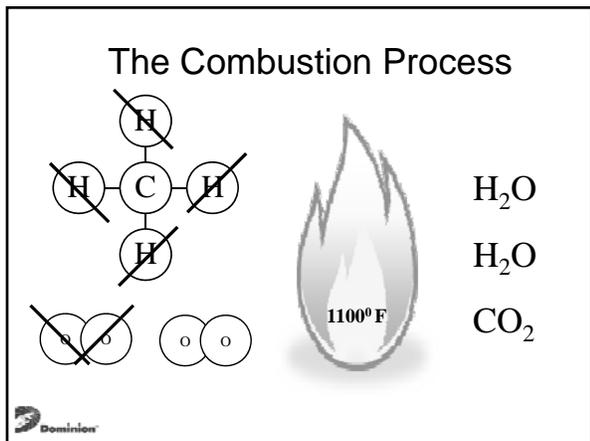
Odorant Level vs. Flammable Range

- **The odorant is added at a concentration so that leaks are detectable below 1% gas in air**





- ### “Let’s Prove It”
- Combustion Chamber Demo
 - Depending on the concentration of gas inside a structure, consider the effect venting may have . . . and the possible risks!
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- ### Complete Combustion Yields:
- H₂O Water Vapor
 - H₂O
 - CO₂ Carbon Dioxide
 - ~~Carbon Monoxide ?~~
-

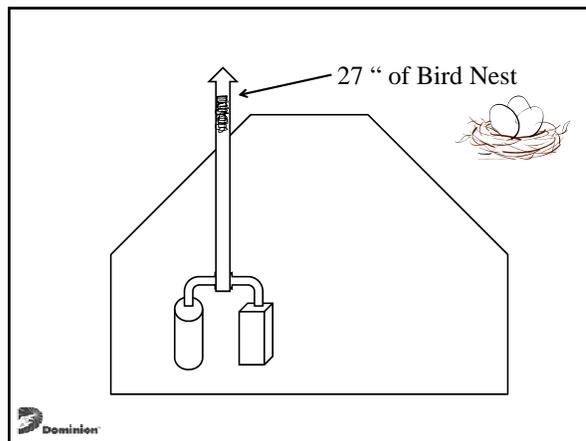
Carbon Dioxide vs. Carbon Monoxide

CO ₂	CO
Di = 2	Mono = 1

- ### So, where does CO come from?
- Lack of oxygen can cause Carbon Monoxide to be produced during combustion
 - Appliances in closet, no vents
 - Plastic on windows / air tight homes
 - Lack of maintenance of gas appliances
-

Not the silent killer ...

- MCF = 1000 Cubic Feet
- Standard home burns 20 MCF of natural gas per month.
- 1 MCF yields about 11.2 gallons of water vapor
- So: 20 MCF x 11.2 gallons H₂O per MCF = **>220 gallons of water vapor per month!**



Blocked Chimney's Do Not Kill

It is a lack of Maintenance on the Appliances.



Air Required for Combustion

- 30 cubic feet of air is required to burn just one cubic foot of gas.
- 30 times more air than gas !!
- Why?



Air Required for Combustion (cont.)

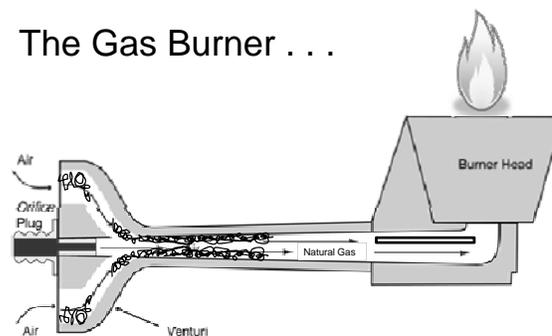
Because air contains only 20.9% oxygen.

The balance of the air (79%) is nothing more than inert gasses that has nothing to do with keeping us alive

It has nothing to do with the combustion process.



The Gas Burner . . .



is a Vacuum!



Bunsen Burner Demo



Why Aren't There More Accidents?

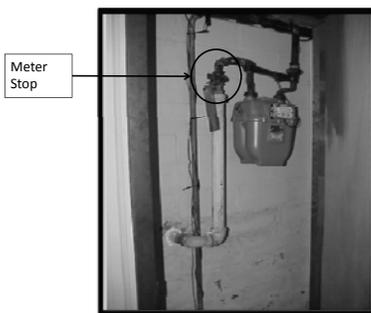
- It's Hard to Burn Natural Gas!
 - Must be present within its flammable range in order to burn
- Odorant Added
 - The natural gas industry adds an odorant to natural gas so that customers and the general public can smell gas at concentrations well below the lower explosive limit



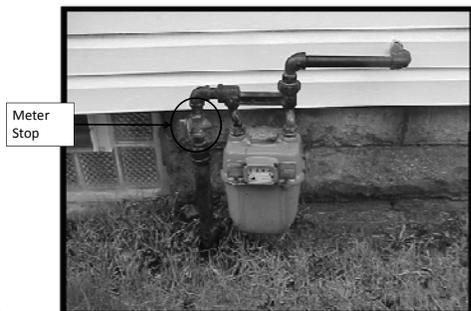
Our Residential System



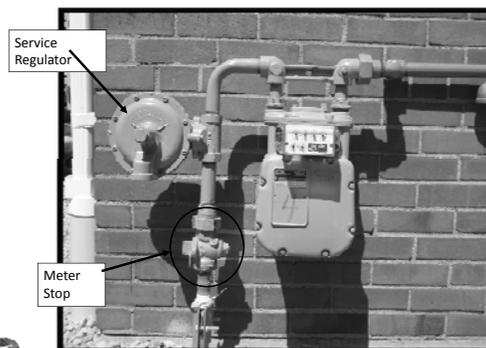
LP Meter Manifold – Inside



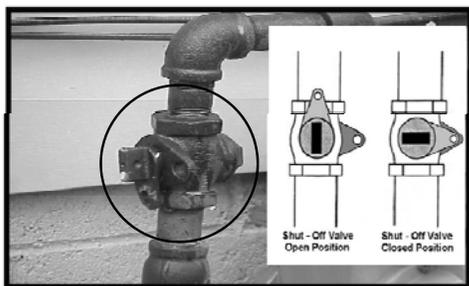
LP Meter Manifold - Outside



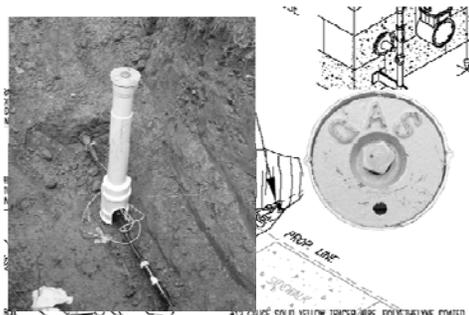
MP Meter Manifold



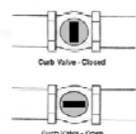
The Meter Stop



Curb Valve



Curb Valve



Turn-On Gas

What's involved?

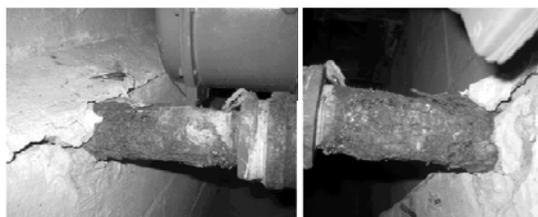


Steps performed when turning on gas:

- Visually inspect the entire piping system for any open ends, proper materials and proper support.
- Check the entire piping system for gas leaks. Including performing an Interior Service Line Leak Survey.
- Light the appliances (furnace, water heater, stove clothes dryer, pool heater, gas light).
- Inspect the appliances for safe operation (check the ignition, flame, pilot safety, Chimney draft).
- **Red tag** the unsafe appliance(s).
- Check the piping system for atmospheric corrosion



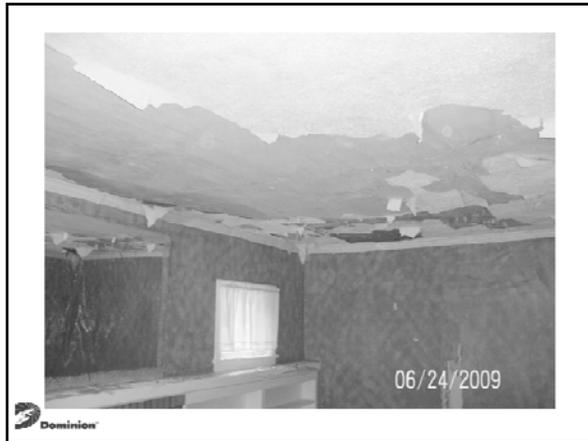
Inspect for Atmospheric Corrosion





The Importance of Stressing
Winterizing a Home in Cold
Climates





? Questions ?

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