



FOX 5

10:06 57°

**GAS EXPLOSION LEVELS WEST VIRGINIA HOME,
5 PEOPLE WERE INSIDE AT THE TIME**



MERCAPTAN:



THE SMELL OF DANGER



LEARNING TARGET

Today's learning target is to acquire an in depth understanding as to the history behind the use of odorant, federal regulations and life safety awareness pertaining to natural and LP gases.



DO YOU KNOW.....

DANGER DOESN'T HAVE A SMELL?



- Danger means risk, the threat of adverse effects. That is a concept not a thing.
- Danger does not release chemical compounds that can be detected by olfactory senses.
- Most animals that have olfactory senses use them to sense other things that might pose a danger to them.

The New
London Junior-
Senior High
School

MARCH 18, 1937
NEW LONDON,
TEXAS

NEW LONDON, TEXAS - JUNIOR-SENIOR HIGH SCHOOL

- New school built during the depression 1932 at \$1M (\$18.4M today)
- Installed 72- natural gas space heaters
- Built on sloping grade with a large air cavity space below structure

WHY DO WE ODORIZE NATURAL GAS?



LONDON HIGH SCHOOL BEFORE EXPLOSION

WHY DO WE ODORIZE NATURAL GAS?



Ruins of London School,
after Explosion,
March 18, 1937

BACKGROUND



- Early in 1937, the school board canceled their natural gas contract and had plumbers install a tap into Parade Gasoline Company's residue gas line to save money
- The natural gas extracted with the oil was considered a waste product and was flared off.
- Untreated natural gas is both odorless and colorless, so leaks are difficult to detect and may go unnoticed.
- Gas had been leaking from the residue line tap and built up inside the enclosed crawlspace that ran the entire 253-foot (77 m) length of the building's facade

IN THE FLIP OF A SWITCH....

- Thirteen minutes before school dismissal, a shop teacher flipped a switch to turn on a power sander and a spark set off a gas explosion.
- The gas explosion killed more than 300 students, teachers and visitors.
- No expense had been spared during the construction of the new school, except when it came to safety.



THE OFFICIAL COURT OF INQUIRY

- Acknowledged a series of design, building and operations problems, and unheeded warnings, yet named no one responsible.
- They concluded that school officials were just "average individuals, ignorant or indifferent to the need for precautionary measures, where they cannot, in their lack of knowledge, visualize a danger or a hazard." (Court of Inquiry, 1937.)
- The disaster resulted in a Texas, followed by Federal law that required adding a warning odor to natural gas, thus saving millions of lives in the US and all over the world.

INVESTIGATION FINDINGS

- The April 1937 edition of the Quarterly National Fire Protection Association ran a 14-page summary of the London School disaster of the previous month. Among the conclusions in the report prepared by H. Oram Smith with the Texas Inspection Bureau, was that "the value of a distinctive malodorant in all gas supply systems by which leaking gas may be readily detected is clearly evident."
- Smith wrote there was only one explosion associated with the disaster and no fire.

INVESTIGATION FINDINGS

"Yet there is evidence of a most terrific force in the great extent of devastation and loss of life that came almost instantly; testimony of bodies tossed 75 feet in the air; an automobile 200 feet distant crushed like an eggshell under a two-ton slab of concrete that had been hurled from the building," Smith wrote. He said at the established point of origin of the blast the explosion had to "break through an 8-inch concrete floor slab before starting on its path of destruction."

ODORIZAZION BECOMES LAW

- "As a result of this tragedy, the 45th Legislature enacted House Bill 1017 ... giving the Railroad Commission the authority to adopt rules and regulations pertaining to the odorization of natural gas or liquefied petroleum gases," the commission archives said.
- In May 1937, the Texas Railroad Commission, at the time referred to as the most powerful board of resource regulators in the world, had passed an order in memory of those killed in New London that today continues to impact the lives of people worldwide.
- "On July 27, 1937, Gas Utilities Docket 122 was adopted, and the commission began enforcement of odorization requirements for natural gas."

1937: FEDERAL LAW

- Public pressure was on the government to regulate the practice of engineering because of the faulty installation of the natural gas connection at the London School believed to have resulted in the natural gas leak.
- Many other states soon enacted rules requiring an odorant be added to natural gas, and later in 1937 federal requirements were made law.
- Odorants are considered non-toxic in the extremely low concentrations occurring in natural gas delivered to the end user.

OPTIMISTIC ASIDE

- If a positive angle can be found in the tragic explosion of the London School on March 18, 1937, it could be that numerous lives have probably been saved as a result
- The major positive that came from the New London school explosion was legislation requiring gas companies to add an odor to their product so anyone can determine when natural gas is leaking



NEW LONDON SCHOOL EXPLOSION

ON MARCH 18, 1937, A MASSIVE EXPLOSION DESTROYED THE NEW LONDON JUNIOR-SENIOR HIGH SCHOOL, INSTANTLY KILLING AN ESTIMATED 296 STUDENTS AND TEACHERS. THE SUBSEQUENT DEATHS OF VICTIMS FROM INJURIES SUSTAINED THAT DAY BROUGHT THE FINAL DEATH COUNT TO 311. THE EXPLOSION WAS BLAMED ON A NATURAL GAS LEAK BENEATH THE SCHOOL BUILDING. WITHIN WEEKS OF THE DISASTER THE TEXAS LEGISLATURE PASSED A LAW REQUIRING AN ODOR TO BE ADDED TO NATURAL GAS, WHICH PREVIOUSLY WAS ODORLESS AND THEREFORE UNDETECTABLE. THIS MEMORIAL TO VICTIMS OF THE EXPLOSION WAS ERECTED IN 1939.

(1939)

PIPELINE & HAZARDOUS MATERIALS SAFETY ADMINISTRATION



PHMSA: CFR PART 192.625(A)



CFR 49 Part 192.625(a) **Odorization of Gas**

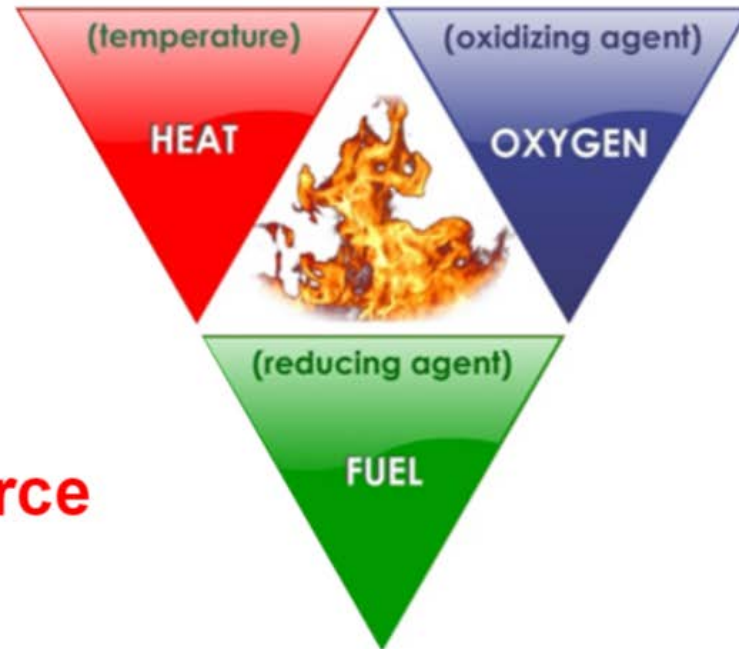
Requires all combustible gas in distribution lines to be odorized so that it is readily detectable by a person with a normal sense of smell at a concentration in air of one-fifth of the lower explosive limit.

WHAT IS REQUIRED FOR GAS TO COMBUST?

REQUIREMENTS

for Gas Combustion:

- ✓ **Gas (Fuel)**
- ✓ **Air (Oxygen)**
- ✓ **Ignition Source**



When gas and air are in the right concentrations and are introduced to an ignition source, these resulting leaks become very hazardous causing the potential for fires, explosions and possibly death or injury.

EXAMPLES OF GAS LEAKS GONE WRONG

A massive explosion that leveled a Plantation, FL building and damaged many others, was caused by a gas valve that was turned on the morning of 7/6/19, approximately 4 hours before the blast.

The gas entered the building and the explosion was caused by “an open natural gas valve,” the report said. The ignition source was likely electrical from an air-conditioning system that was being used in the empty business.



EXAMPLES OF GAS LEAKS GONE WRONG

Two workers in Minnesota were removing existing piping as a provision to the relocation of gas meters from the basement of a school building to the exterior of the building when a gas line under pressure was opened and not able to be shut down. As the building was being evacuated, an explosion occurred, *killing two school employees* and injuring nine other people. A fire and partial building collapse ensued



PHMSA REGULATIONS



- PHMSA regulations CFR 49 Part 192.625 requires gas distribution operators to maintain a readily detectable odorant in the gas stream.
- A combustible gas in a distribution line must contain a natural odorant or be odorized so that at a concentration in air of one-fifth of the lower explosive limit, the gas is **readily detectable** by a person with a normal sense of smell.
- **Readily detectable** odor of gas should be one that a spouse, family, or member of the general public would quickly recognize, prompting them to take appropriate action.

MERCAPTAN

- Naturally, natural and liquefied petroleum gas have no odor.
- The smell today many associate with the release of natural gas comes from a malodorant agent added to the gas just for the purpose of allowing it to be smelled should a leak develop.
- What some people describe as a rotting cabbage smell usually associated with natural gas, comes not from natural gas itself but from mercaptans, which are added to gas during processing.
- The London School can be credited with instigating, or at least speeding up and stimulating, laws resulting in requiring the odor agent to be added.

ODORIZAZION



- Odorants like mercaptan are added to the gas in order to warn people of the presence of gas.
- The odorant, if added properly, will give the public sufficient warning to take the necessary measures to protect themselves in the event of a gas leak.

WHY ODORIZE?



Liability:

- Odorization of a gas system is done with a single purpose in mind: Provide the public with an effective warning device to alert them when there is a possible problem.

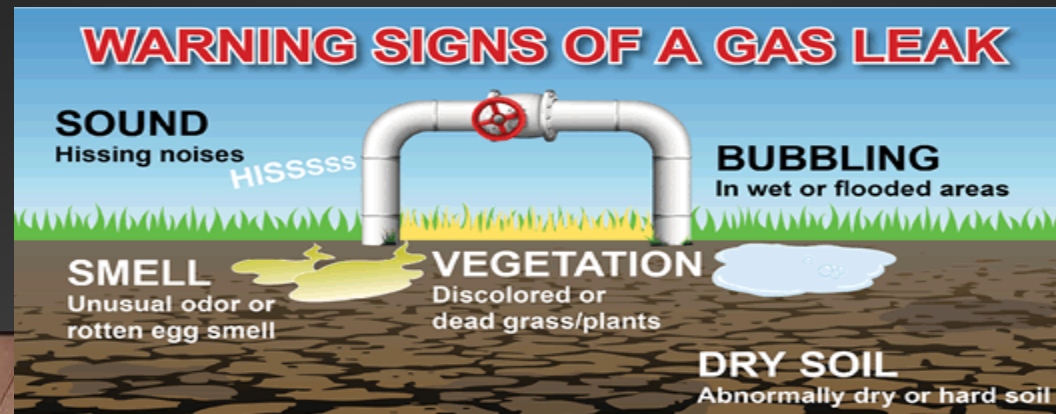
MERCAPTAN

BACKGROUND

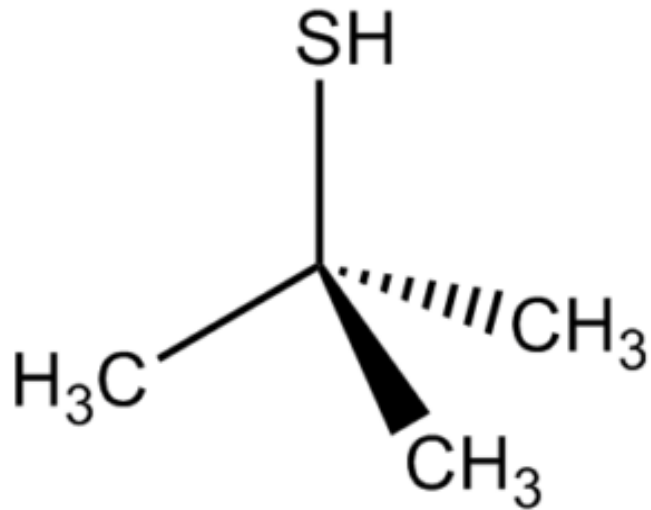
- Numerous studies have been conducted throughout the years to find the best chemical compounds to use for odorization of natural gas.
- These studies have revealed that mercaptans, a class of organosulfur compounds are the best chemicals to use for odorization of natural gas.
- Mercaptans have a repulsive smell that is detectable at extremely minute concentrations in the part per billion range.
- The vast majority of human beings can smell mercaptans at extremely low levels, so these compounds are very effective at odorizing natural gas.

BACKGROUND

- In most cases, liquid natural gas odorant is a blend of tertiary butyl mercaptan and isopropyl mercaptan, although other compounds are sometimes used.
- The odorant is usually added by the gas utility company when it receives the gas from the transmission company.



CHEMICAL STRUCTURE OF TERT-BUTYL MERCAPTAN



Chemical structure of tert-butyl mercaptan

***Found in Nature:**

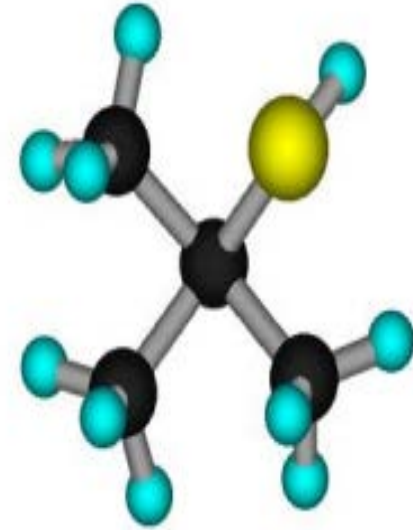
- Skunk spray
- Skunky beer
- Garlic
- Released from decaying organic matter
- Produced when humans digest asparagus

SCENTINEL E

- tert-Butyl Mercaptan 77%
- Isopropyl Mercaptan 16%
- N-Propyl Mercaptan 6%



- Hazard Class Health
 - 2 Fire
 - 3 Reactivity
 - 0



tert- Butylmercaptan (TBM)

TERT-BUTYL MERCAPTAN (TBM)

- This is the most common odorant blendstock in North America. TBM has a strong, gassy odor at low concentrations, and is the most oxidation resistant of the mercaptans.
- However, its relatively high freezing point of 34 degrees F means it must be blended with other organosulfur compounds with lower freezing points so it can be used in climates where the temperature regularly gets below freezing.
- TBM also features the best soil penetrability of all the mercaptans.

TYPES OF MERCAPTANS

- EM Ethyl Mercaptan
- DMS Dimethyl Sulfide
- IPM Isopropyl Mercaptan
- **TBM Tertiary Butyl Mercaptan**
- NPM Normal Propyl Mercaptan
- MES Methyl Ethyl Sulfide
- SBM Secondary Butyl
- THT Thiophane



THE ODORANT IS VERY POTENT



- 1 drop odorizes 100,000 Cubic Feet of natural gas



PROPANE

- Very Potent
- 1 lb. odorizes 10,000 gallons of propane



ODOR FADE

FACTORS AFFECTING ODORIZATION

- Odorant is added in quantities sufficient to produce the odor needed. However, between the odorization site and the customer, many factors can cause odorant to be lost, or can otherwise affect the odorants ability to perform its function.
- These include factors that are internal to the pipeline, as well as factors in the external environment.
- **Odor fade** is when physical and/or chemical processes including adsorption, absorption and oxidation occur, reducing the odorant level in gas.

ODOR FADE: INTERNAL FACTORS

Steel or Cast Iron Piping

- Odorant can adhere to the internal surface of steel or cast iron pipe in a process called adsorption. This effects the quantity of odorant necessary to be effective
- New steel systems are often over-odorized or “pickled” for a period of time to saturate the interior pipe surface with odorant and allow for odorant loss.
- Periodic sniff tests and odorometer tests are utilized to monitor the odor level.



ODOR FADE: INTERNAL FACTORS

Plastic Pipe

- While plastic pipe does not adsorb odorant on its interior surface, new plastic pipe can sometimes have a solvent odor as a result of its manufacture.
- For a period of time this solvent odor may mask the odorant.
- While plastic does not absorb the odorant, this can be a problem if for any reason, an inadequate amount of odorant is added to the system.
- There will be no residual odor in plastic as there is in steel, and very quickly the whole plastic distribution system will have inadequate odorization.

ODOR FADE: INTERNAL FACTORS

Other internal factors that can mask, adsorb, contaminate, or otherwise neutralize odorants include:

- Rust
- Dirt
- Moisture
- Hydrocarbon liquids and methanol that may collect in regulators & lines



ODOR FADE: EXTERNAL FACTORS

Outside the natural gas system piping, external factors can affect people's ability to detect odorant in the gas stream.



ODOR FADE: OPERATING ENVIRONMENT

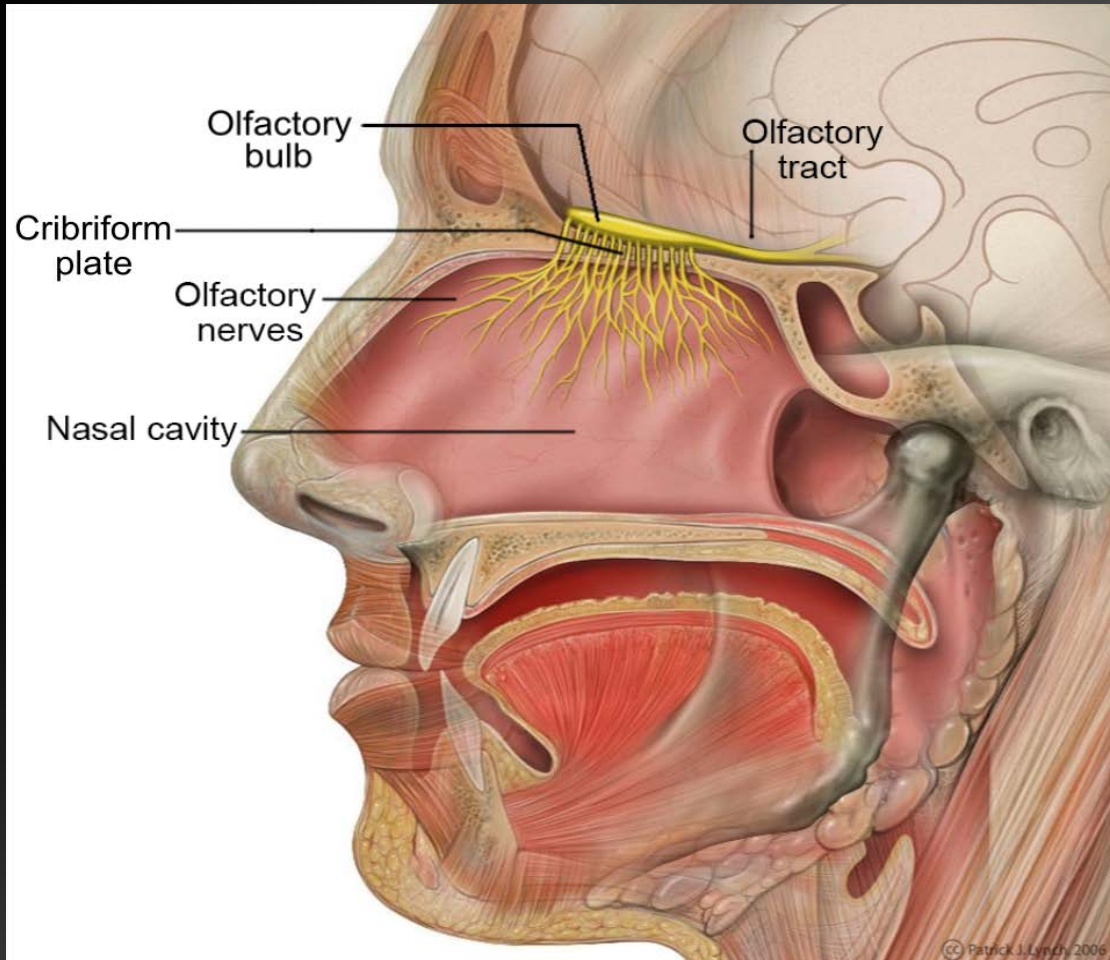
Environmental factors can include odors produced by:

- Industrial operations
- Farm operations, such as barnyard odors

****These daily atmospheric odors may mask the odorant in some geographic areas.**



PHYSIOLOGY OF OLFACTION



- In olfactory reception, a generator potential develops and triggers one or more nerve impulses.
- The olfactory sense of smell prompts the mental connection to be made; that if the odor is left unchecked; it may possibly escalate into a dangerous life-threatening situation.

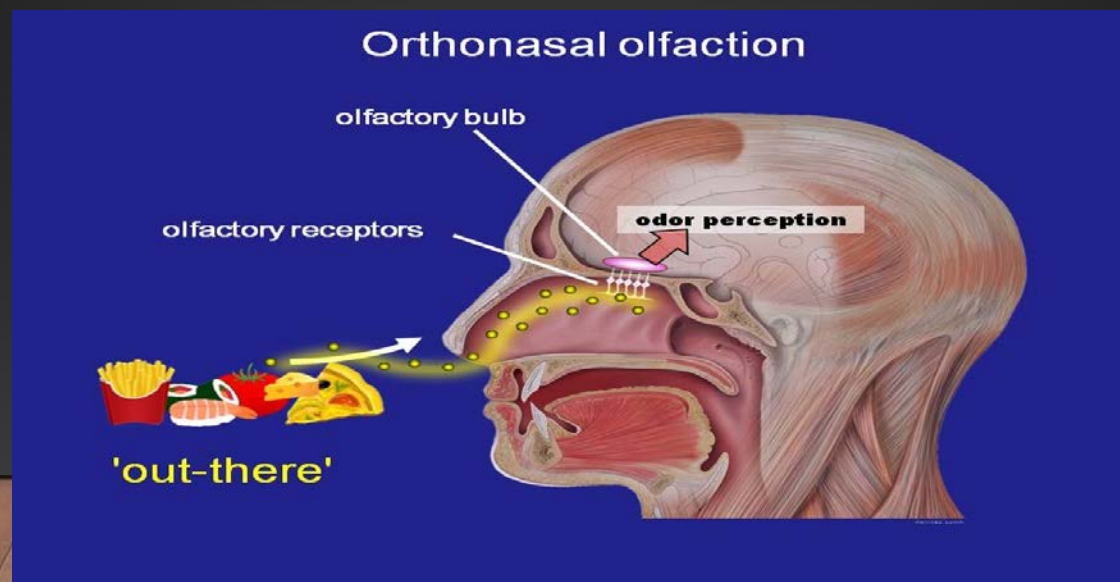
HUMAN FACTORS

- Some people do not detect odors as well as others.
- **Human factors** that affect the sense of smell include:
 - Age
 - Exposure
 - Temporary illness



HUMAN FACTORS

- **Adaptation** to odors occurs quickly, and the threshold of smell is low – only a few molecules of certain substances need to be present in air to be smelled.
- **Hyposmia**, a reduced ability to smell, affects half of those over age 65 and 75% of those over 80. It can be caused by neurological changes, drugs, or the effects of smoking.



OCTOBER 22, 2019 MINNEAPOLIS

An elderly man was feeding his two cats in the basement of his home, when an explosion blew apart the house. He and the two cats were unharmed, but his house was destroyed. He said he never smelled even the slightest hint of gas, but investigators say a natural gas leak is suspected of causing the blast.



House Explosion
Bill Hudson Reporting

FACTORS WHICH AFFECT ODOR INTENSITY OR PERCEPTION

- Anosmia -odor blindness
- Smoking
- Colds and Allergies
- Physical condition –age, gender, exposure
- Psychological effects



DIMINISHED SENSE OF SMELL

Once these conditions are identified, gas customers should be made aware of the availability of gas detectors:

- Gas detectors emit a loud, shrill sound when gas is present and do not depend on sense of smell.
- This will provide adequate coverage to detect gas leaks in persons with diminished sense of smell



ODORIZAZATION METHODS

ODORIZATION

- All distribution systems must be odorized so that the presence of gas is readily detectable at concentrations of approximately 1% gas in air (0.9% to be precise) and higher.
- This level is 20% of the lower explosive limit.
- An odorized system is an integrated system of gas piping served by one or more odorizers.
- They may range from a small town serving several customers to large cities with thousands of customers.

ODORIZATIION OF GAS PROCEDURES

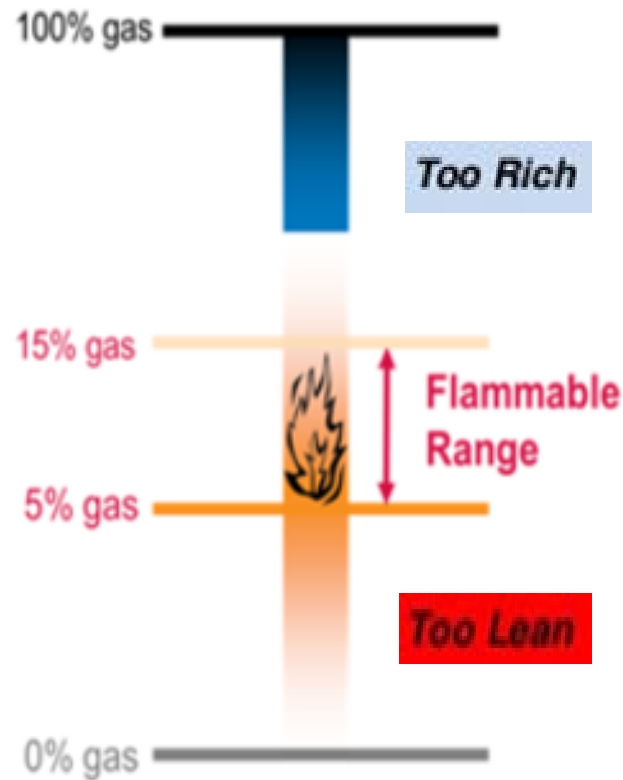
- 192.625(a) Distribution lines must contain odorized gas.
- Must be readily detectable by a person with a normal sense of smell at 1/5 of the Lower Explosive Level (LEL).

- Natural Gas LEL = 4.5 - 5%

1%

Propane LEL = 2.5%

1/2 %



- 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.

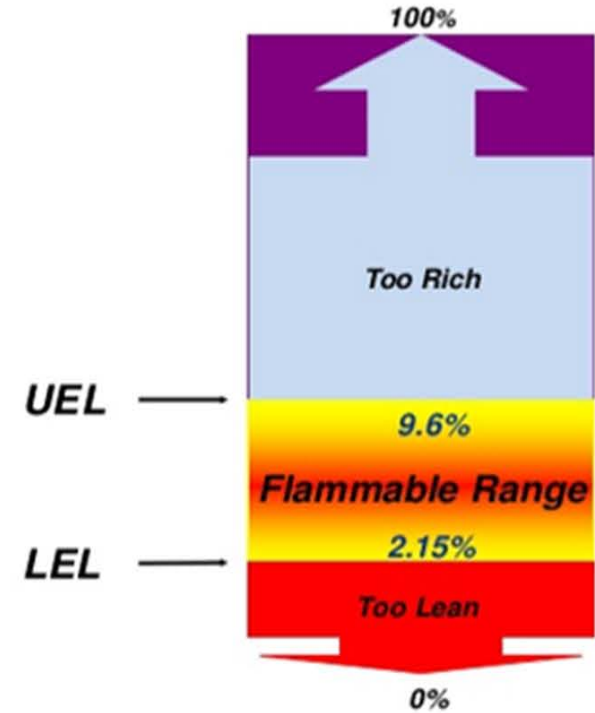
Flammability Of Natural Gas

ODORANT
RECOGNIZED
AT 1/5TH OF
THE LEL

Properties of LP Gas

- Most violet at 2.5%
- 1-Part LP gas to 40 parts air
- Flame temperature of LP gas is 3,596 °F
- The LEL 2.1% & UEL is 9.6%
- *At concentrations below 2.1% and above 9.6% propane gas will not burn*
- Be observant to the differences of the gas properties and characteristics

Flammable Limits Propane



Flammability of LP Gas

READILY DETECTABLE

The odor of gas should be one that a spouse, family, or member of the general public would quickly recognize, prompting them to take appropriate action.



ADDING ODORANTS

- The gas odorant is the chemical injected into the gas to cause it to smell. Most odorants today consist of an assortment of various chemicals (*which include tertiary butyl mercaptan, tetrahydrothiophene, isopropyl mercaptan, dimethyl sulfide, and methyl ethyl sulfide*).
- Chemical manufacturers create custom odorant blends with different compounds so that they are suitable for particular applications. When selecting the odorant, it is essential to understand the odorant's vapor pressure, oxidation resistance, soil penetrability, and odor.

ODORANT INJECTION UNIT



PERIODIC SAMPLING CFR192.625(F)

(f) To assure the proper concentration of odorant in accordance with this section, each operator must conduct periodic sampling of combustible gases using an instrument capable of determining the percentage of gas in air at which the odor becomes readily detectable. Operators of master meter systems may comply with this requirement by:

- (1) Receiving written verification from their gas source that the gas has the proper concentration of odorant; and
- (2) Conducting periodic "sniff" tests at the extremities of the system to confirm that the gas contains odorant.

TESTING FOR ODORANT



- An **odorometer** is used to confirm the gas-air volume at which the odorant smell is readily detectable.
- Employees are tested periodically to ensure their sense of smell and their ability to operate the testing equipment.

FEDERAL COMPLIANCE FORM 8 (PSC AUDIT)

192.625/25-12.055: ODORIZATION OF GAS		
1.	Any operator receiving gas directly from a transmission supplier and distributes in any system that serves 25 or more customers must odorize all gas transported.	✓
2.	As a minimum, odorant when tested must be at a concentration readily detectable at a gas and air mixture of one-fifth the lower explosive limit.	✓
3.	At least twelve times per calendar year, at intervals not to exceed 45 days, each operator shall sample gas distributed at sufficient number of places on each system to assure the presence of odorant in a concentration detectable at one-fifth of the lower explosive limit.	✓
4.	The sample testing must be conducted using equipment manufactured specifically for odorant testing.	✓
5.	The odorant injected into the gas supply may not be: (1) deleterious to persons, material or pipe, (2) The products of combustion from the odorant must not be toxic or corrosive, and (3) The odorant may not be soluble in water greater than 2.5 parts per 100.	✓
6.	Natural gas in a transmission line in Class 3 or Class 4 location must be odorized to be detectable at one-fifth of the lower explosive limit. Unless:	
	<ul style="list-style-type: none"> • At least 50 percent of the length of line downstream from that location is in a Class 1 or Class 2 location. 	N.A.
	<ul style="list-style-type: none"> • The line transports gas to underground storage, gas processing plant, or an industrial plant using gas in a process where the odorant would be harmful to the end product. 	N.A.
	<ul style="list-style-type: none"> • In the case of a lateral line which transports gas to a distribution center, at least 50 percent of the length is in a Class 1 or Class 2 location. 	N.A.
7.	The odorant must be introduced without wide variation in the level of odorant.	✓
8.	Operators of a master meter system may comply with odorization requirements by:	
	<ul style="list-style-type: none"> • Receiving a written statement from their supplier stating proper concentrations of odorant are present, and 	N.A.
	<ul style="list-style-type: none"> • Conducting periodic "sniff" tests at the extremities of the system to confirm the odorant is present. 	N.A.

OQ: OPERATOR QUALIFICATION

- Qualification required by October 28, 2002
 - Perform assigned covered tasks; and
 - Recognize and react to abnormal operating conditions.
- Odorization must meet 49 CFR 192.625
- Odorization includes two different functions
 - Operation and maintenance of odorizers
 - Testing to verify odor levels

BENEFITS OF OQ QUALIFICATION

- Qualification of personnel needed for compliance
- Helps ensure public safety
- Training, testing and review are critical in developing and maintaining a qualified work force.

REQUIRED KNOWLEDGE, SKILLS AND ABILITIES

- Knowledge of regulations and compliance parameters.
- Understanding operation and maintenance of odorization equipment.
- Ability to conduct odor concentration tests
- Recognizing abnormal conditions
- Documentation.

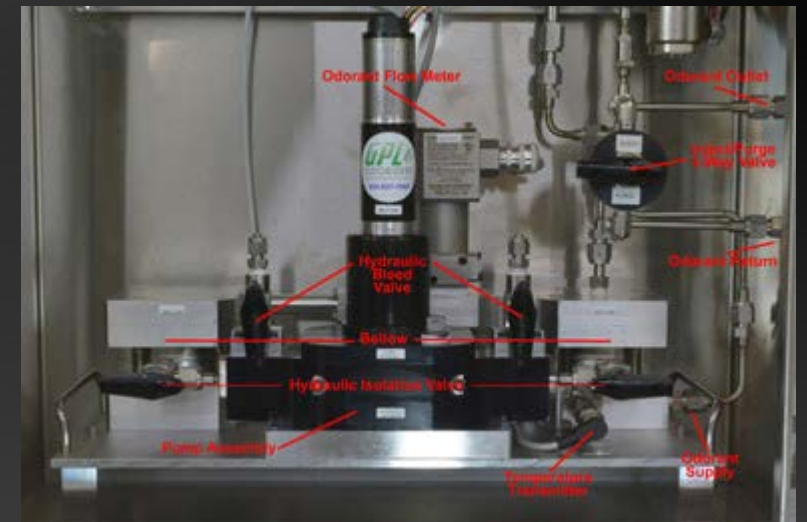
ABNORMAL OPERATING CONDITIONS: AOC'S

***Some AOC's our employees may encounter:**

- No odor detected.
- Odor levels above or below required limits.
- Change in gas odor.
- Odorizer failure.
- Unexpected change in odor/leak call complaints.

TYPES OF ODORIZERS

- Wick
- Wick By-pass
- Drip
- Meter driven pump (Peerless MP)
- Bourdon Tube (Williams)
- Injection



**AN UNCONTROLLED
RELEASE OF
ODORANT**









AN UNCONTROLLED RELEASE OF ODORANT CAN OCCUR:

- During transfer from a cylinder or bulk delivery trailer to the odorant storage tank
- If there is a failure of the odorizer mechanical system
- If there is deliberate vandalism or sabotage

PHYSICAL/CHEMICAL PROPERTIES



FLAMMABILITY

Product Name	Hazard Class	UN Number	Placard	Guide No.
Scentinel A	3 - Flammable Liquid	UN 2363		 130
Scentinel E	3 - Flammable Liquid	UN 3336		130 
Scentinel F Series	3 - Flammable Liquid	UN 3336		 130
Scentinel S Series	3 - Flammable Liquid	UN 3336		130 

IMPACTS OF AN ODORANT RELEASE

Evacuation of surrounding area

- Consider initial evacuations:
 - Incidental release
 - .up to 50 gallons - 150' radius from spill
 - > 50 gallons – 150' radius from the spill – 1000' downwind
- PPE requirements – Self Contained Breathing Apparatus(SCBA) or airline respirators for readings ≥ 25 ppm
- CRFR coveralls, Rubber boots, Nitrile gloves, Hard hat



IMPACTS OF AN ODORANT RELEASE

- **Evacuation of surrounding area**
- Initial evacuations:
 - >.25 pints to 50 gallons – 150' radius from spill
 - > 50 gallons – 150' radius from the spill – 1000' downwind
 - Greater than incipient stage fire – ½ mile radius

IMPACTS OF AN ODORANT RELEASE

- Significant increase in odor complaint calls
- Up to 6 miles from the spill
- Up to several days after the spill is cleaned





RESPONDING TO NATURAL GAS EMERGENCIES- OVERVIEW

INDOOR NATURAL GAS LEAKS

One of the least respected but potentially the deadliest call types responded to by fire departments are indoor natural gas leaks.

You run these with a frequency that causes the fire responder to become complacent and forget that natural gas leak calls and gas explosions can kill.

VIDEO: Dash Cam Explosion

<https://youtu.be/2Cr50nNx7h8>

Natural Gas Distribution Delivery System

The system that delivers gas service

A MAINLINE

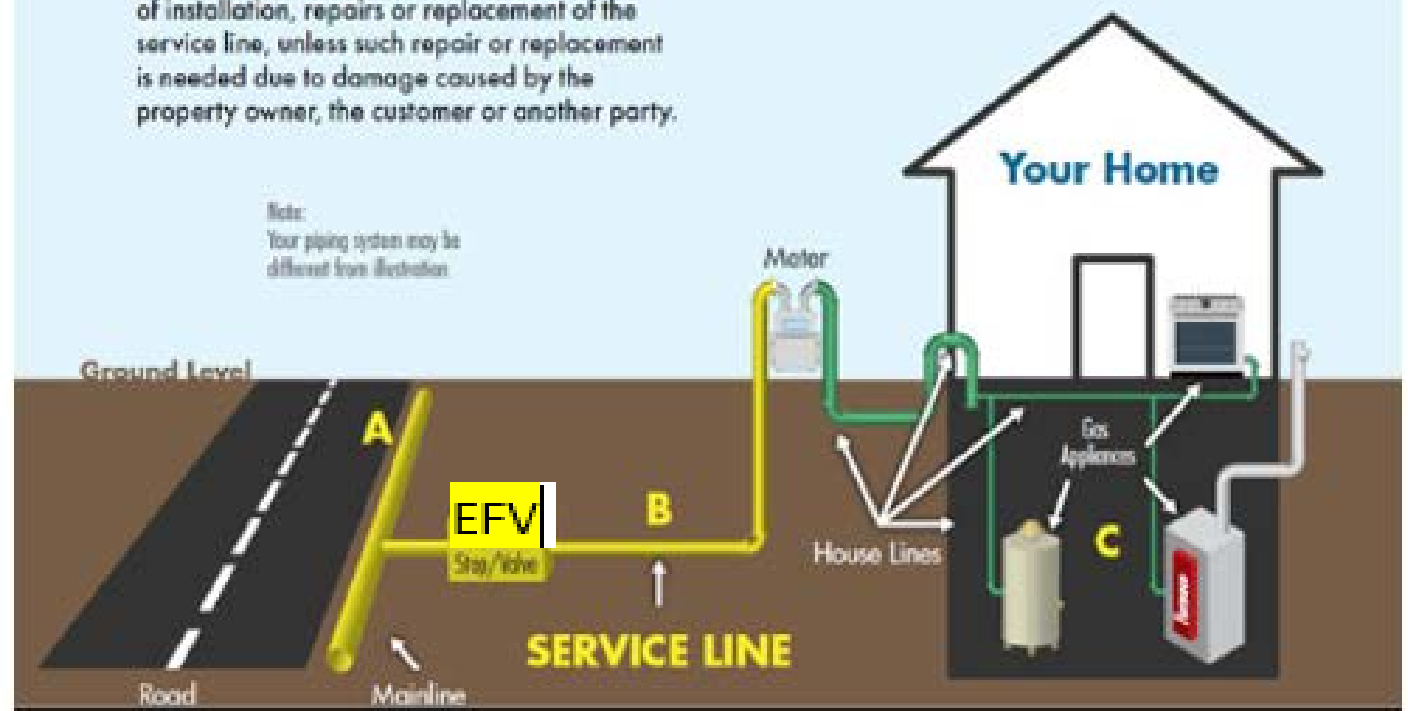
The mainline is usually located under the street or in the tree lawn area and transports gas to the service line.

B SERVICE LINE

The service line runs from the mainline to the meter. The company will cover the cost of installation, repairs or replacement of the service line, unless such repair or replacement is needed due to damage caused by the property owner, the customer or another party.

C HOUSE LINE

The house line runs from your meter into the building and branches off to other pipes that are connected to gas appliances or equipment. Customers or property owners are responsible for the installation, maintenance and any repairs of gas piping and appliances after the meter.



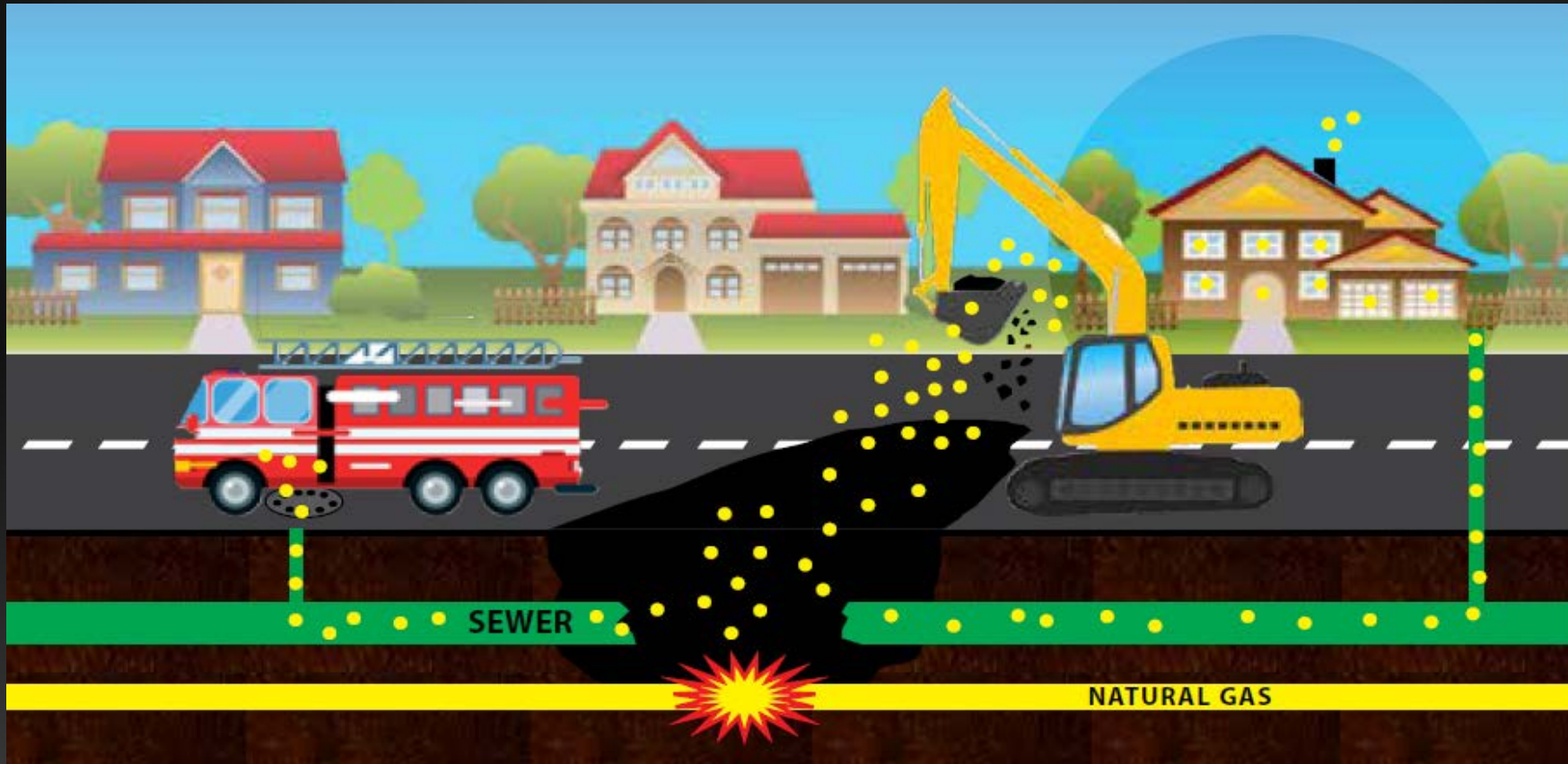
THE CHALLENGE



- Gas pipelines are out of sight, out of mind
- “Odor of gas” calls may be common, but major pipeline incidents are relatively rare
- Distribution gas incidents are frequent since they are localized in communities where we live
- Gas companies shall respond timely to ***all*** reported odor of gas complaints 24/7 within 1 hour or less
- **25-12.042 Investigation of Gas Leak Reports.**
- Gas leaks reported by customers or the general public shall be considered emergencies requiring prompt response with the first priority of protecting life then property. A device capable of detecting the presence of gas shall be used to test the area of the reported leak to determine if a leak actually exists.

VEHICLE POSITIONING

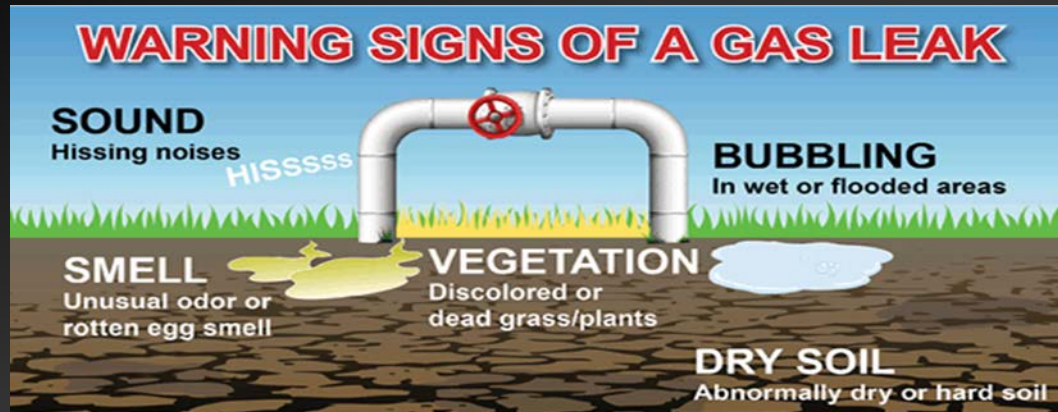
<https://youtu.be/2Cr50nNx7h8>



WHEN RESPONDING

While approaching the area of a suspected outside gas leak, observe the area for obvious signs of a gas leak in the vicinity:

- Dead or dying grass, shrubs, or trees
- Absence of growth in paving cracks
- Absence of grass overhanging on curbing or walkway
- Odor of gas or sound of escaping gas



WHERE IS THE GAS?

Where is the gas?

How much is there?

Extent of the spread

Relation to other structures?

Evaluate/evacuate?



EXAMPLES OF GAS LEAKS GONE WRONG

- Gas utility workers in Manor Township, Pennsylvania, were investigating an odor of gas/gas leak outside a home and excavating a potentially leaking gas line near the home when an explosion occurred, *killing one gas worker*, injuring three other workers, the migrating gas leveled one home, and damaged several other homes.



EXAMPLES OF GAS LEAKS GONE WRONG

A gas leak in a basement gas meter room in a Silver Spring, Maryland apartment building caused an explosion and ensuing fire that killed seven people.

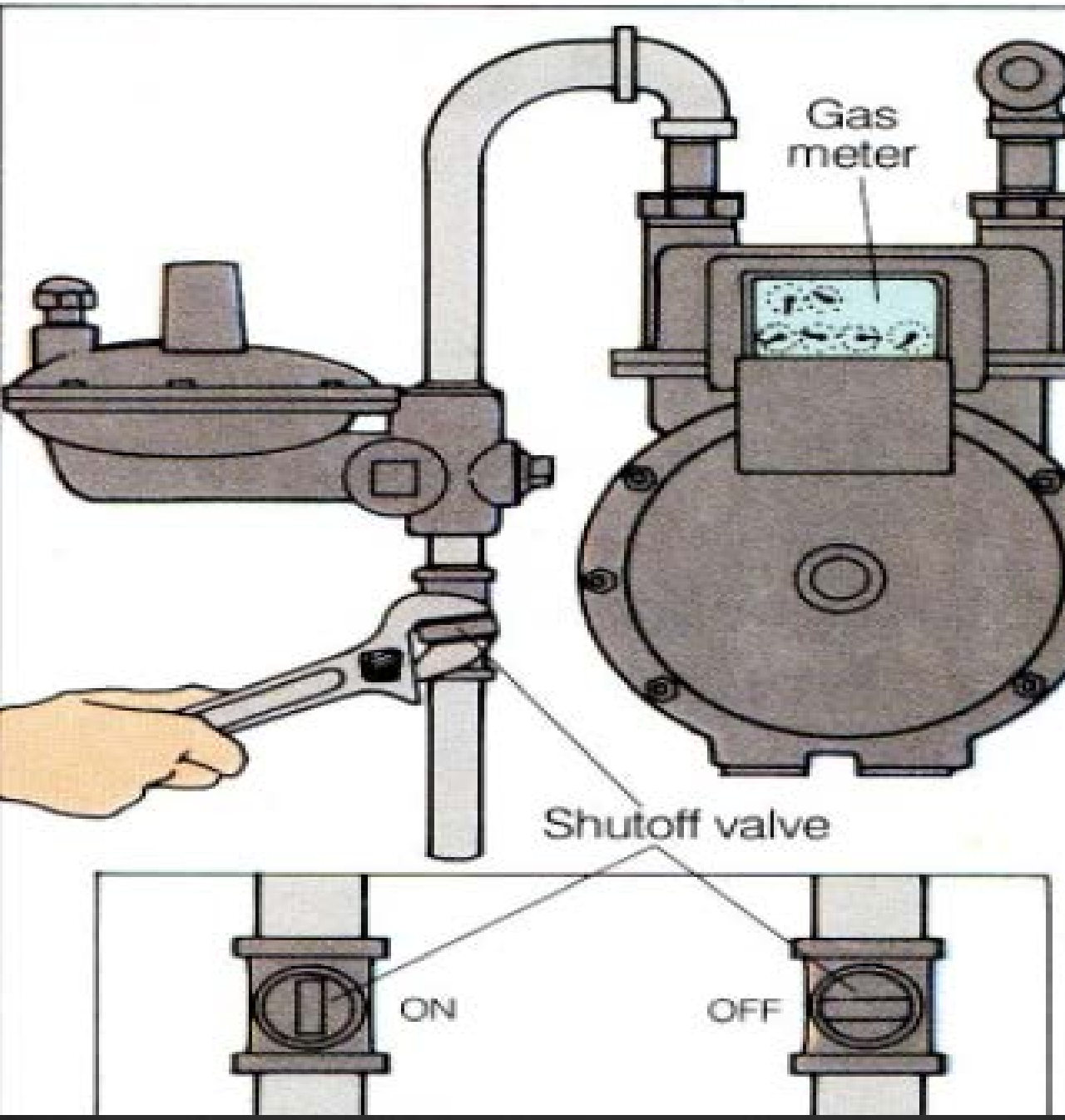


EXAMPLES OF GAS LEAKS GONE WRONG

Workers directional drilling in Ewing, New Jersey, struck a natural gas service line, causing a leak and resultant explosion that *killed a resident*, injured seven workers, leveled 11 homes, and caused at least some damage to all 130 homes in the development



GAS SHUTOFF VALVE



CONTROLLING
THE FLOW OF
GAS

**ADDITIONAL
INFORMATION OR
QUESTIONS**



My Contact Information:

Jessica Caballero-Ashmeade

Training & Safety Manager

Clearwater Gas System

(727) 423-9266 cell

(727) 562-4900 ext. 7408

jessica.ashmeade@clearwatergas.com