

NATURAL GAS AND PIPELINE SAFETY

Gina Meehan-Taylor



Pipeline Inspection for Safety and Reliability

Pipeline Safety Act of 2002

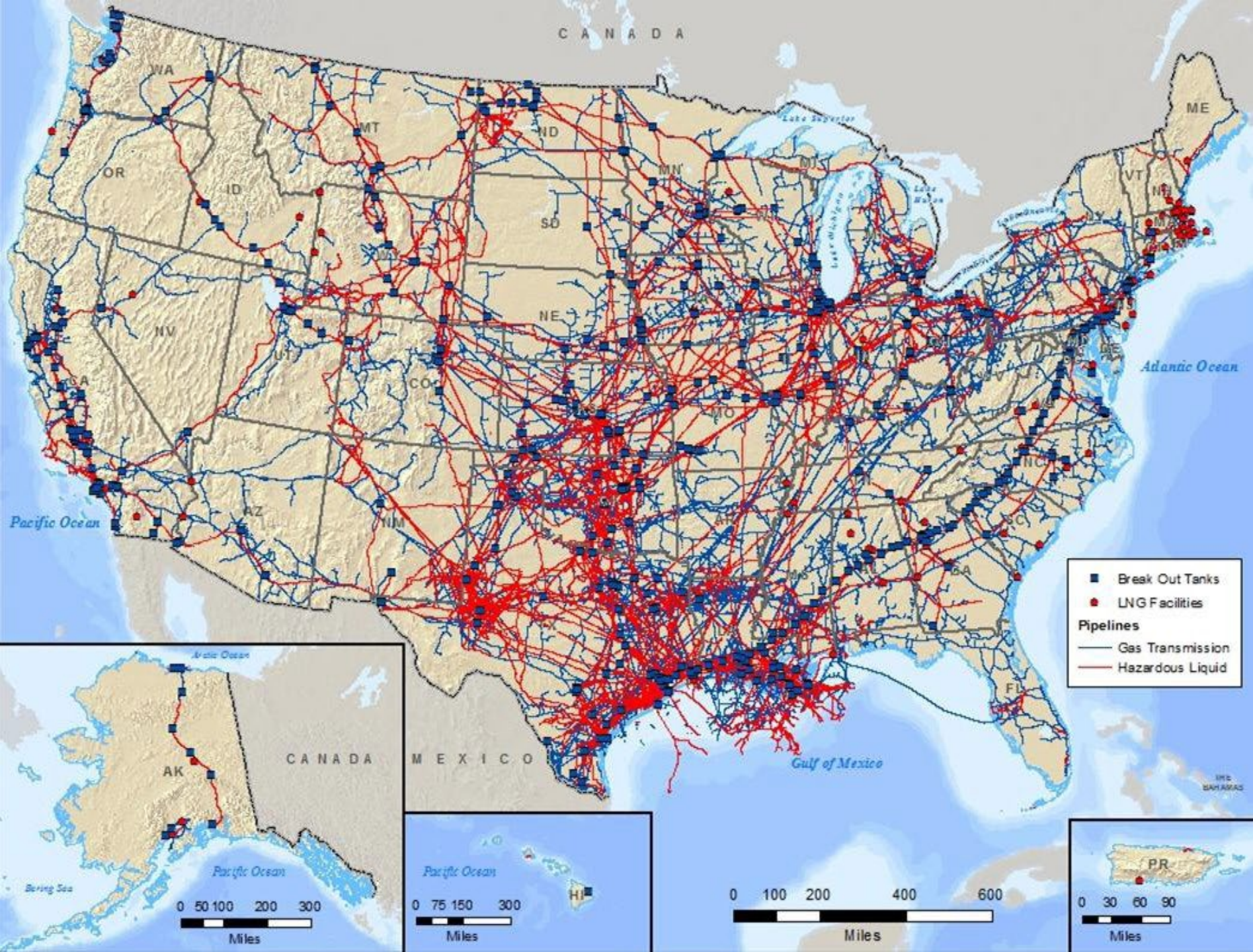
1. Pipeline Integrity
2. Operator Qualification
3. **811 Nationwide**
4. Public Awareness RP1162
5. **National Pipeline Mapping System**
6. Distribution Integrity

Pipeline Regulations



Pipelines are regulated by a combination of Federal and State government agencies

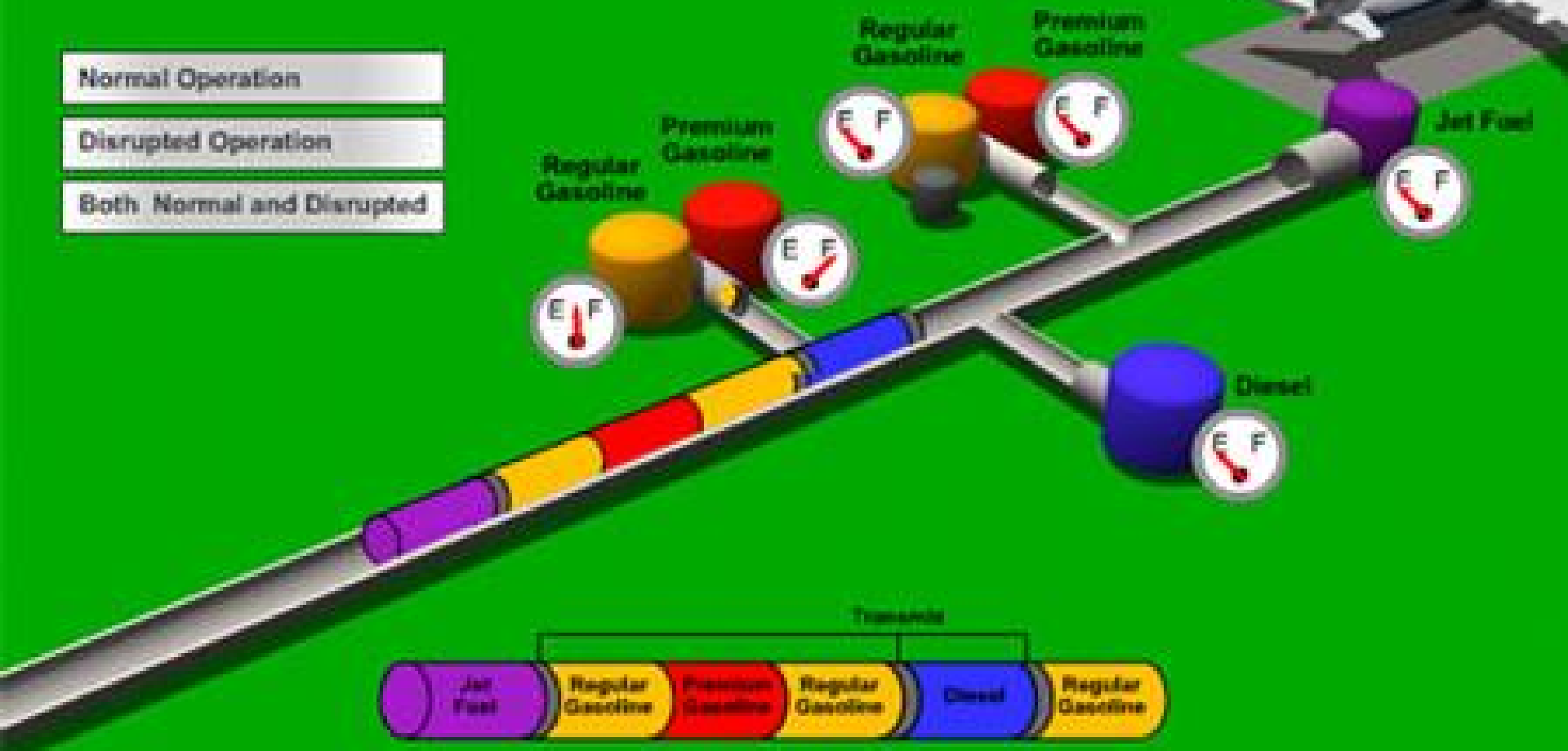
- Department of Transportation (DOT) – Office of Pipeline Safety - Pipeline and Hazardous Materials Safety Administration (PHMSA)
- Environmental Protection Agency (EPA)
- Federal Energy Regulatory Commission (FERC)
- Illinois Commerce Commission (ICC)



PRODUCTS TRANSPORTED IN ILLINOIS

- **ANHYDROUS AMMONIA**
 - Fertilizer
- **NATURAL GAS**
 - Home heating & electrical power plants.
- **PROPANE**
 - Home heating
- **CRUDE OIL**
 - Provides the foundation for many products including plastics and petrochemicals, in addition to fuel for our cars and heating oil for homes.
- **REFINED PETROLEUM PRODUCTS**
 - Oil is turned into dozens of useful products such as gasoline, home heating oil, jet fuel, diesel, lubricants and raw materials for chemicals and pharmaceuticals.

Petroleum Products Batching



Many refined product pipelines batch different products.
A release that initially involves diesel may soon involve gasoline.

PARADIGM PIPELINE MEMBERS

- Ameren Illinois
- BP Pipelines (North America), Inc.
- Buckeye Partners, LP
- Chicap Pipelines
- CountryMark Refining and Logistics, LLC
- DAPL
- EMS Energy Solutions, LLC
- Enable Midstream Partners, LP
- Enbridge (US), Inc.
- Enbridge Energy Company, Inc
- Energy Transfer Crude Oil Pipeline
- Enterprise Products Company
- Explorer Pipeline Company
- ExxonMobil Pipeline Company
- Kinder Morgan
- Liberty Utilities
- Magellan Midstream Partners, L.P.
- Marathon Pipe Line LLC
- MoGas Pipeline LLC
- Natural Gas Pipeline Company of America - Kinder Morgan
- Northern Border Pipeline Company
- NuStar Pipeline Operating Partnership, L.P.
- ONEOK North System L.L.C.
- Panhandle Eastern Pipe Line Company
- Permian Express Partners
- Plains All American Pipeline, L.P.
- Platte Pipe Line Company, LLC
- Shell Pipeline Company LP
- Tallgrass Energy Partners, LP
- Texas Eastern Transmission, LP
- Texas Gas Transmission, LLC
- TransCanada - ANR Pipeline Company
- TransCanada - Keystone Pipeline
- Trunkline Gas Company
- Valero Terminals and Distribution Company
- Vector Pipeline
- West Shore Pipe Line Company
- Wolverine Pipe Line Company



Olympic Pipe Line accident in Bellingham, WA kills three youths on June 10, 1999.

On Thursday afternoon, June 10, 1999, a 16-inch fuel line owned by the Olympic Pipe Line Company ruptures in Bellingham, spilling 277,200 gallons of gasoline into Hanna and Whatcom creeks. The volatile fuel explodes, killing three youths: Liam Wood, 18, and Wade King and Stephen Tsiorvas, both age 10. The massive fireball sends a plume of smoke 30,000 feet into the air, visible from Anacortes to Vancouver, B.C., Canada.





Third Party Damage





NATIONAL PIPELINE MAPPING SYSTEM



**GOVERNMENT
OFFICIAL**



**PIPELINE
OPERATOR**



**GENERAL
PUBLIC**

PIMMA USER LOGIN
PASSWORD PROTECTED
VIEWER RESTRICTED TO
GOVERNMENT OFFICIALS AND
PIPELINE OPERATORS

LOGIN

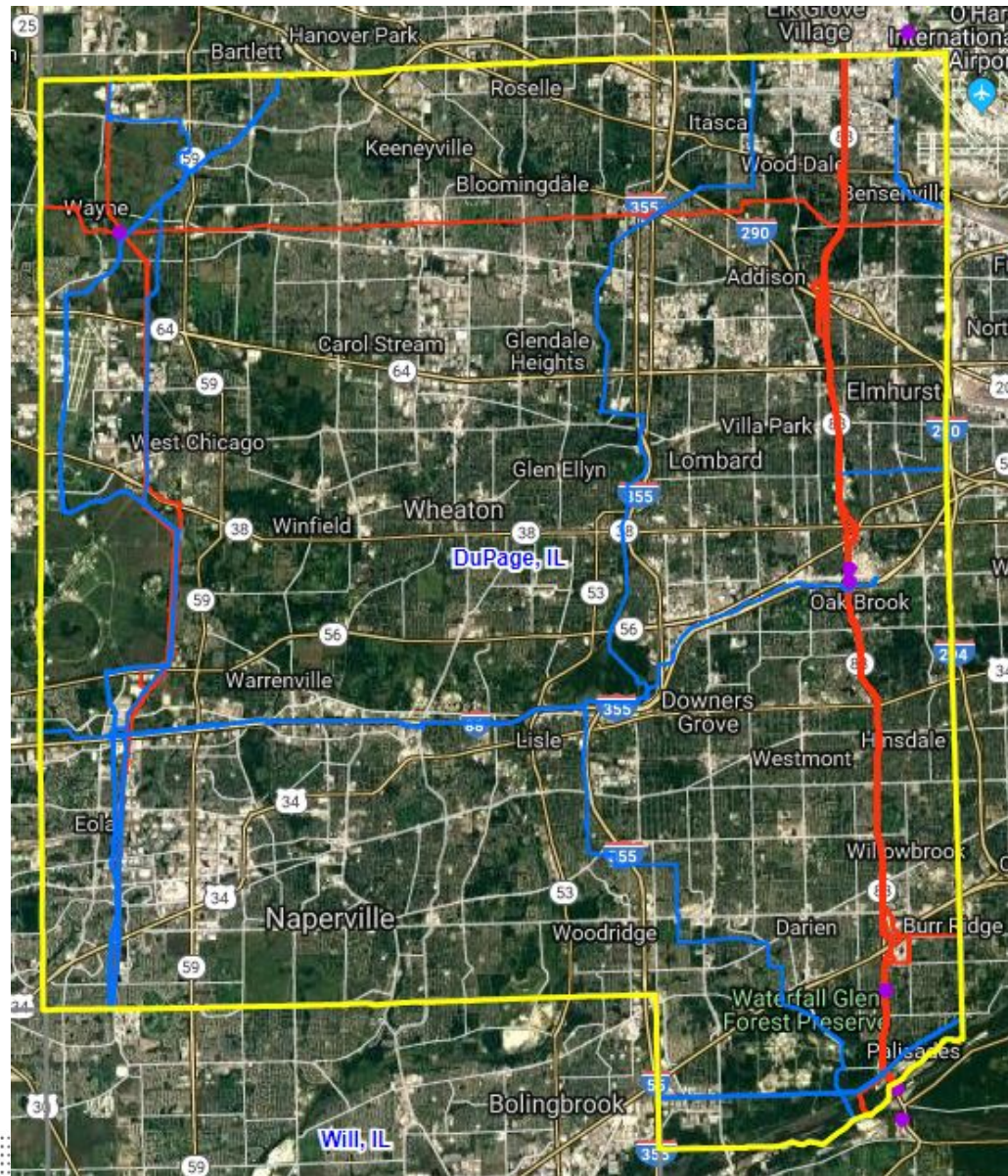
**APPLY FOR
PIMMA ACCESS**

PUBLIC MAP VIEWER
PIPELINE MAPS FOR THE
GENERAL PUBLIC – NO
PASSWORD REQUIRED

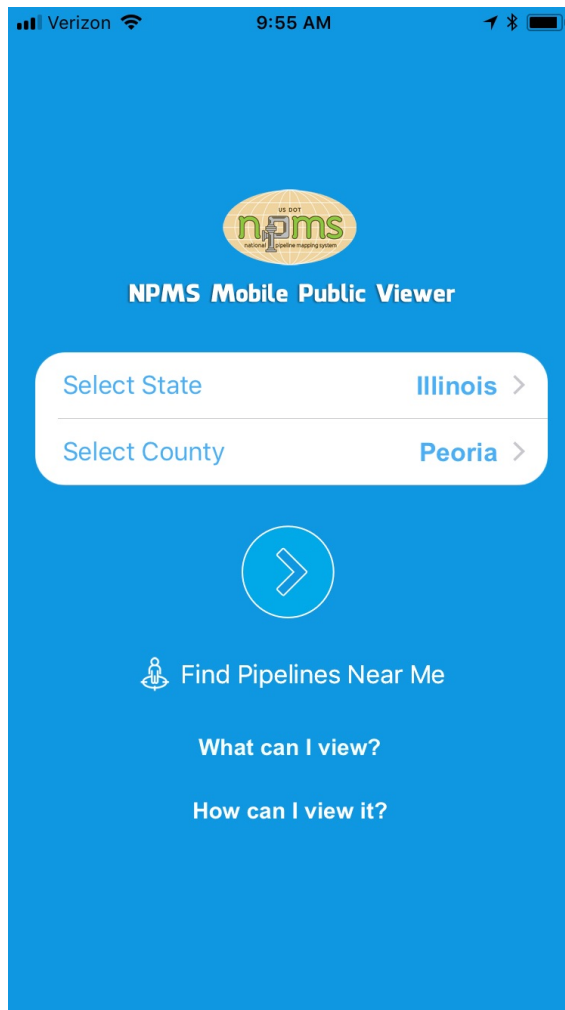
**ABOUT PUBLIC
MAP VIEWER**

**USE PUBLIC
MAP VIEWER**

DUPAGE COUNTY



Mobile APP for NPMS Transmission Pipelines in Peoria Co.



Our World Without Pipelines?!

Over 29 million
more trucks on
the roads!



**Transporting product by pipelines
is safer and cleaner**





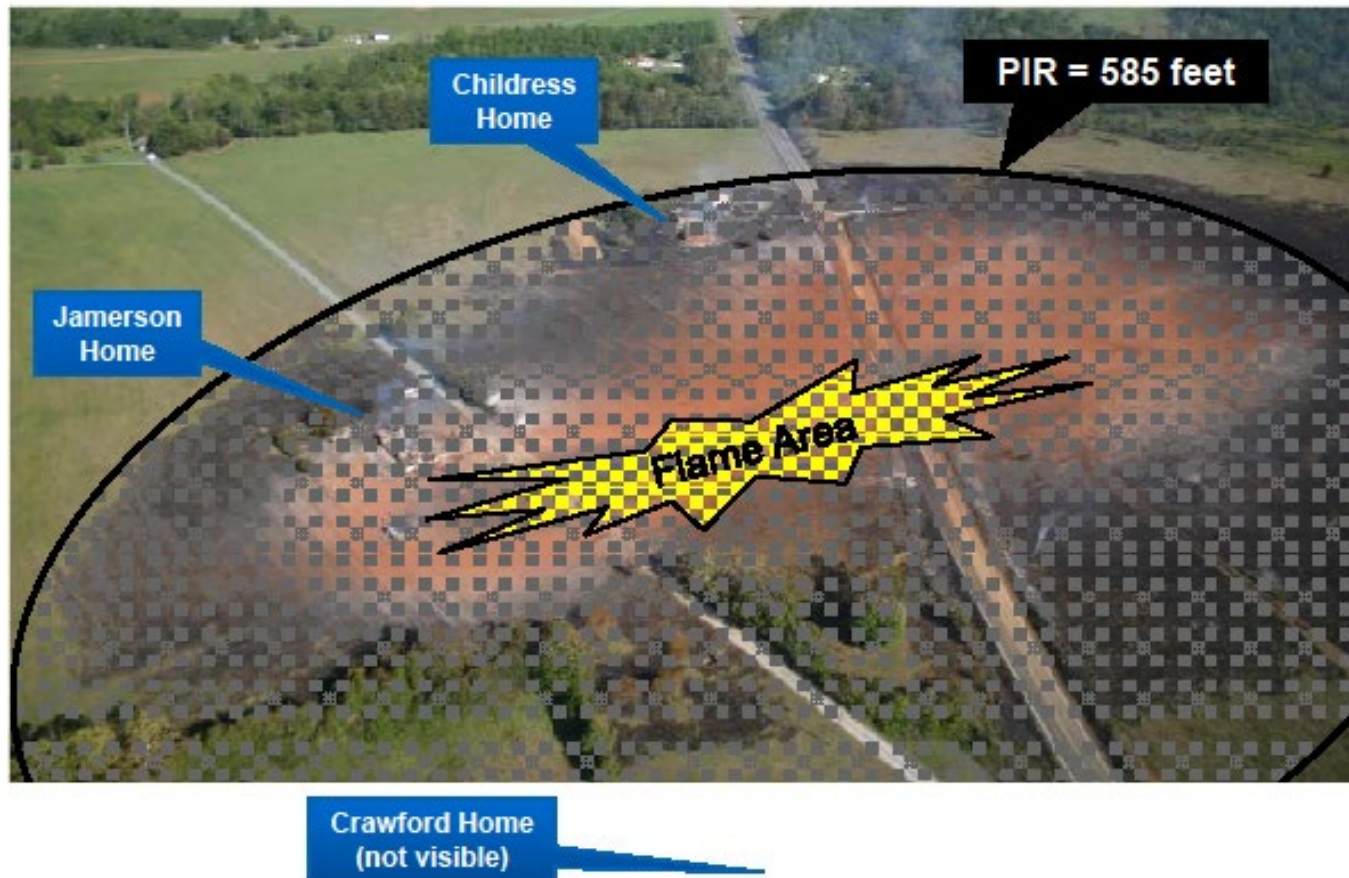


Appomattox, Virginia, September 14, 2008

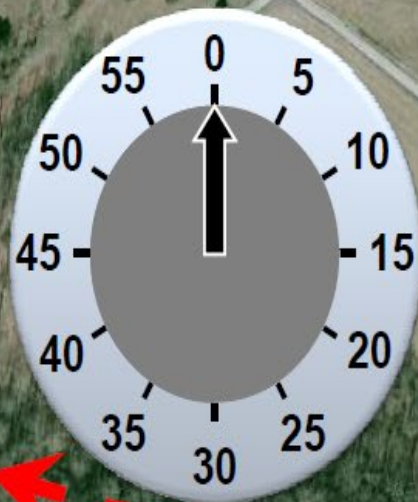
Potential Impact Radius (PIR)



Based on pressure and diameter and *approximates* the area of damage



Emergency Responders arrived at about **8-10 minutes** to see 2 homes consumed in flames.



Crawford, Childress and Jamerson families escaped at about **two to five minutes** after rupture.

Childress Home

Jamerson Home

Crawford Home

Junior Bryant

Emergency Responders waited until Williams shut valves at **36 minutes**.

They entered the impact area at **50-70 minutes** as the gas dissipated.

Junior Bryant fled home and turned to watch. He witnessed ignition about **two minutes** after rupture.

Flame

State Route 677



LATEST NEWS

Gas line explosion badly burns construction worker, Illinois 162 Maryville shut down



ILLINOIS





MEXICO, MO – SUNDAY 3-3-2019

A natural gas pipeline ruptured along Missouri Highway 15 about one mile north of Mexico, Mo., according to the Audrain County Sheriff's Office. After Panhandle Eastern Pipeline cut off the flow of gas, it took 40 minutes for the remaining gas to burn out.

Steve Gentry, chief of the Little Dixie Fire Protection District, said the first call came in at 3:27 a.m., but it was hardly needed. The fire "woke up everybody ... in Mexico," he said.

Ameren crews are on the scene replacing the utility poles and scorched lines.



AUDRAIN CO.
SHERIFF'S OFFICE

COVERING AMERICA



GAS PIPELINE EXPLOSION ROCKS COMMUNITY
MISSOURI



11:17 73°





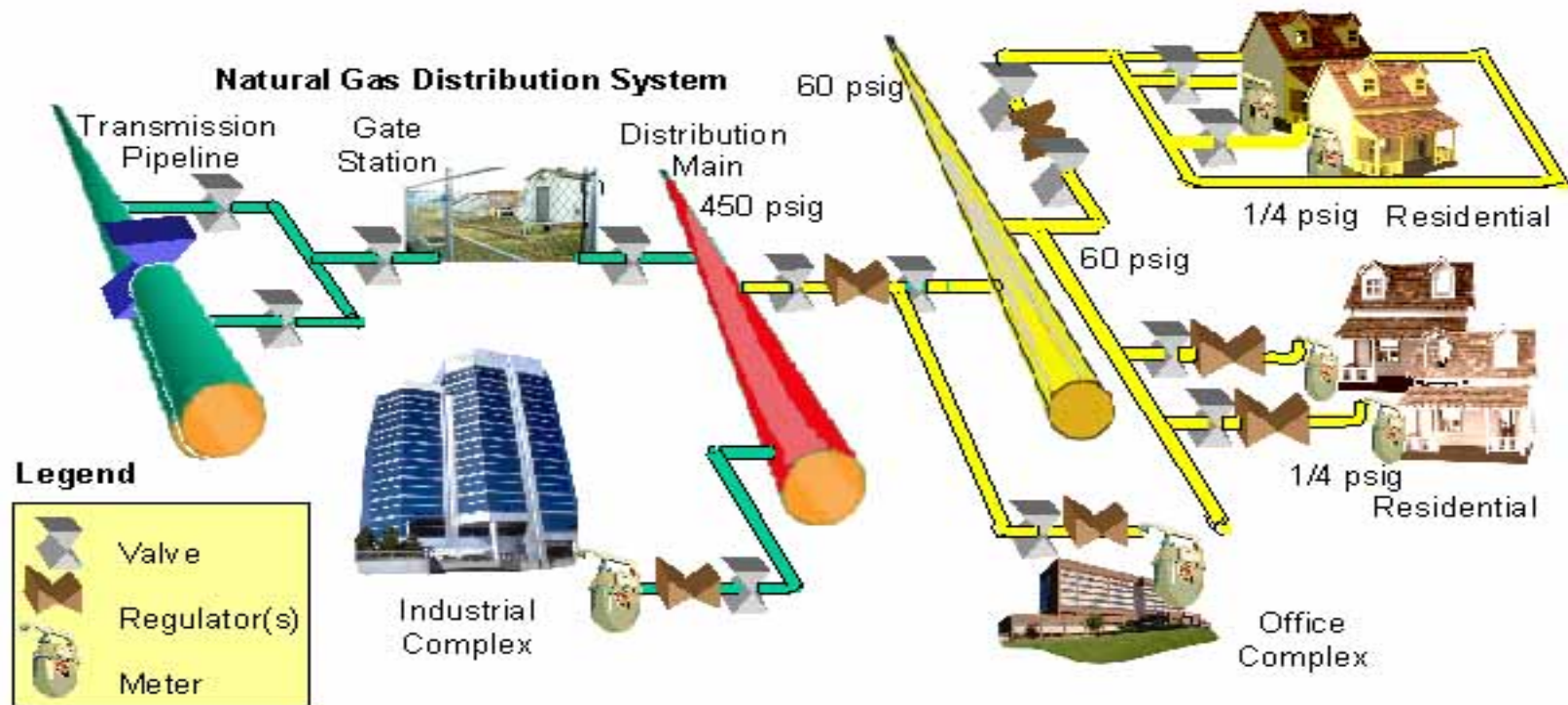
ILLINOIS

What is Natural Gas?

- Combustible hydrocarbon gasses
- Primarily methane (CH_4)
- Found in underground reservoirs
- Comes from bacterial decomposition of plant and animal matter



NATURAL GAS DISTRIBUTION SYSTEM - SAFE AND RELIABLE



PHYSICAL PROPERTIES OF NATURAL GAS

- Tasteless
- Odorless
- Non Toxic
- Non Poisonous



However, Natural Gas WILL Replace Oxygen

- Human life can survive in an atmosphere of 25% or less
- Above 25% sufficient oxygen is not available

GAS AND CARBON MONOXIDE DETECTOR



Apparently mice were tried as well, but it was stated that miners preferred the canaries because they had a tendency to “sway” on the perch for a while before keeling over.

They were used as an indication of build up of methane gas as well as protection from carbon monoxide and other toxic gases.

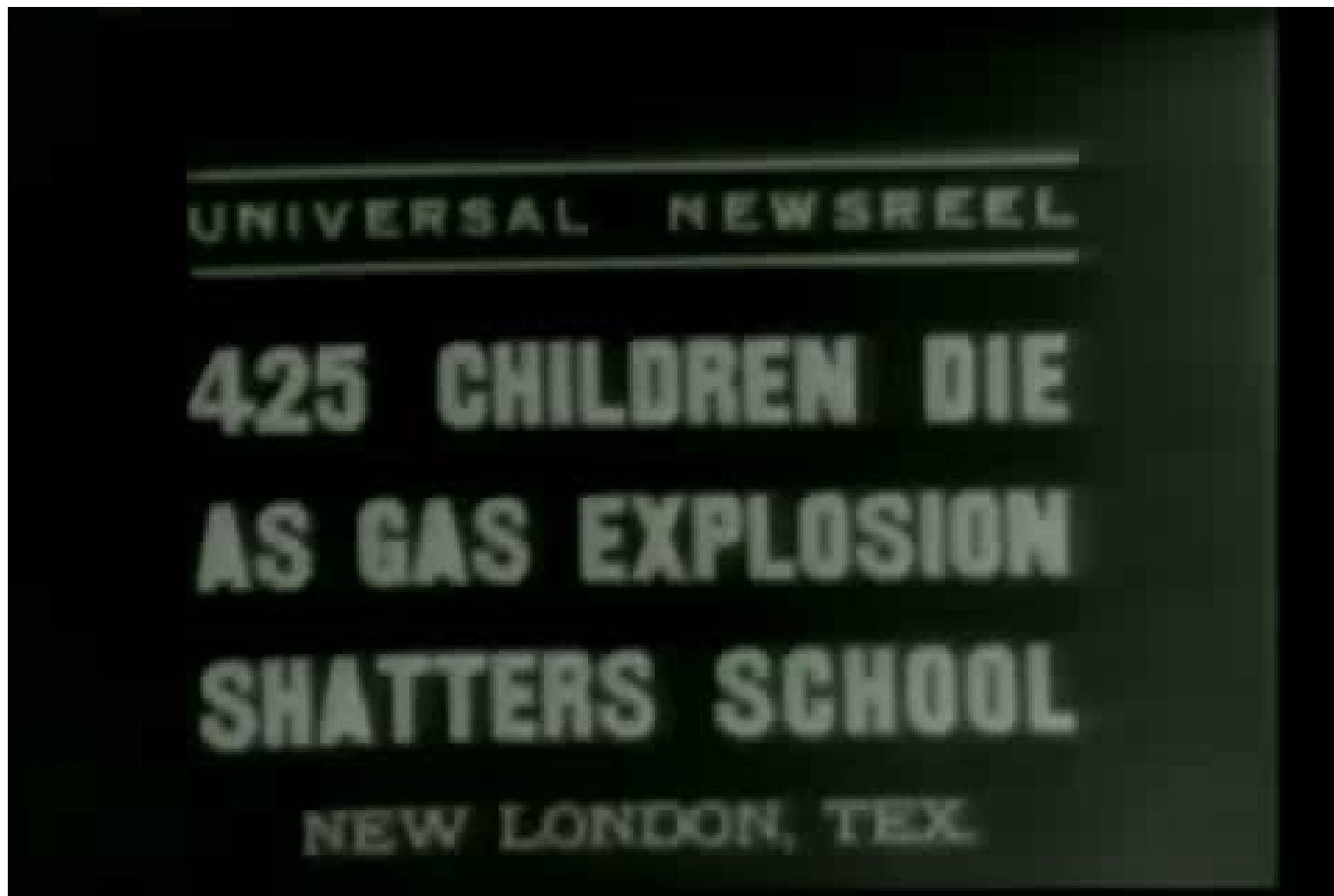
It's interesting how effective a low tech devise can be!



New London, Texas 1937



NEW LONDON TEXAS - 1937





We inject
1 pound of
Odorant per
Million Cubic
Feet of
Natural Gas



1 Gallon
Of Liquid
Odorant
Weighs
Approx.
6.75lbs





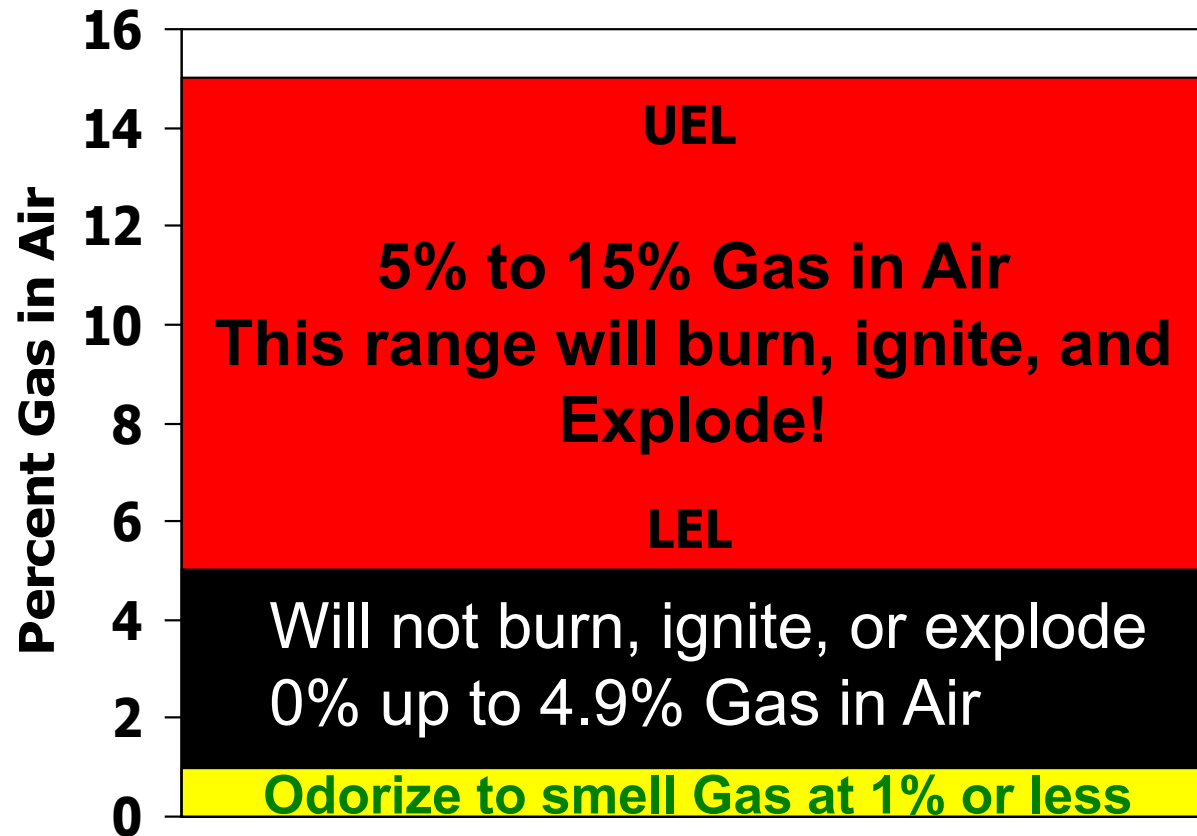
PHYSICAL PROPERTIES OF NATURAL GAS

- Lighter than air (specific gravity 0.60)
 - Unconfined natural gas will rise into the atmosphere or to the highest point within a building


Propane
(specific gravity 1.56)



ODORIZATION AND EXPLOSIVE RANGE

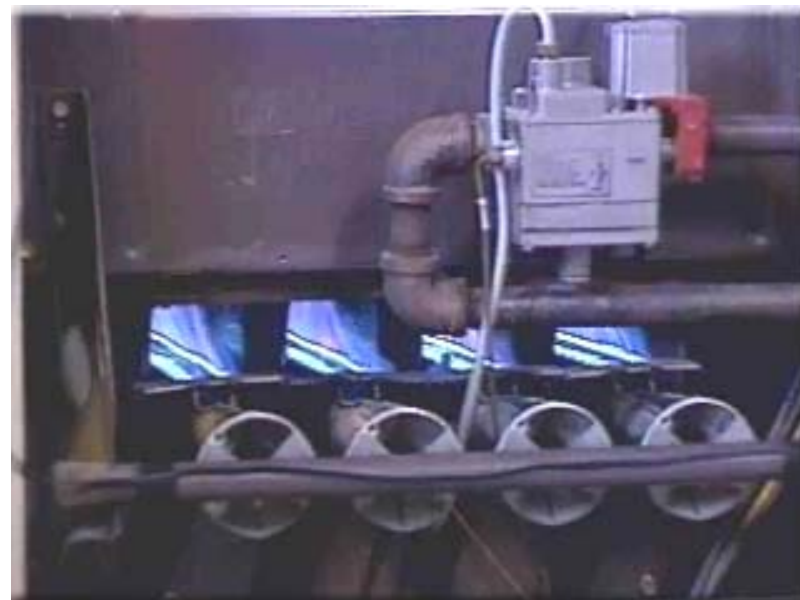


FLAMMABILITY RANGES

<u>Liquid/Gas</u>	<u>LEL</u>		<u>UEL</u>	<u>Ignition Temp.</u>
Natural Gas	5%		15%	1200 F
Propane	2.2%		9.5%	1000 F
Gasoline	1.4%		7.5%	630 F

COMBUSTION

- **Controlled combustion is:**
 - The complete burning of natural gas in a steady flame controlled by the proper pressure, air mixture, and the proper venting of equipment
 - Ideal combustion takes place at approximately 10% gas in air



Carbon Monoxide

- Complete burning of natural gas produces carbon dioxide and water vapor
- Incomplete combustion produces carbon monoxide
- **Colorless and odorless gas that is absorbed into the blood 200 times faster than oxygen**

CARBON MONOXIDE

- **Definition**

- a toxic flammable gas that is produced when a fuel is burned without proper air for complete combustion

- **Causes**

- Insufficient air supply
- Improper venting of equipment
- Lack of ventilation



DANGERS SIGNS OF CARBON MONOXIDE

- Streaks of carbon or soot around the service door of your fuel-burning appliances
- **The absence of a draft in your chimney**
- Excessive rusting on flue pipes or appliance jackets
- **Moisture collecting on the windows and walls**
- Fallen soot from the fireplace
- Small amounts of water leaking from the base of the chimney, vent or flue pipe
- Damaged or discolored bricks at the top of your chimney and rust on the portion of the vent pipe visible from outside your home.
- **A yellow, large and unsteady burner flame (with the exception of decorative gas log appliances).**
- **flu-like symptoms**
- An unusual pungent odor when the appliance is operating.

Know what's below.

Call **811** before you dig.



BURIED
TELEPHONE
CABLE

BURIED
SEWER

BURIED
GAS
LINE

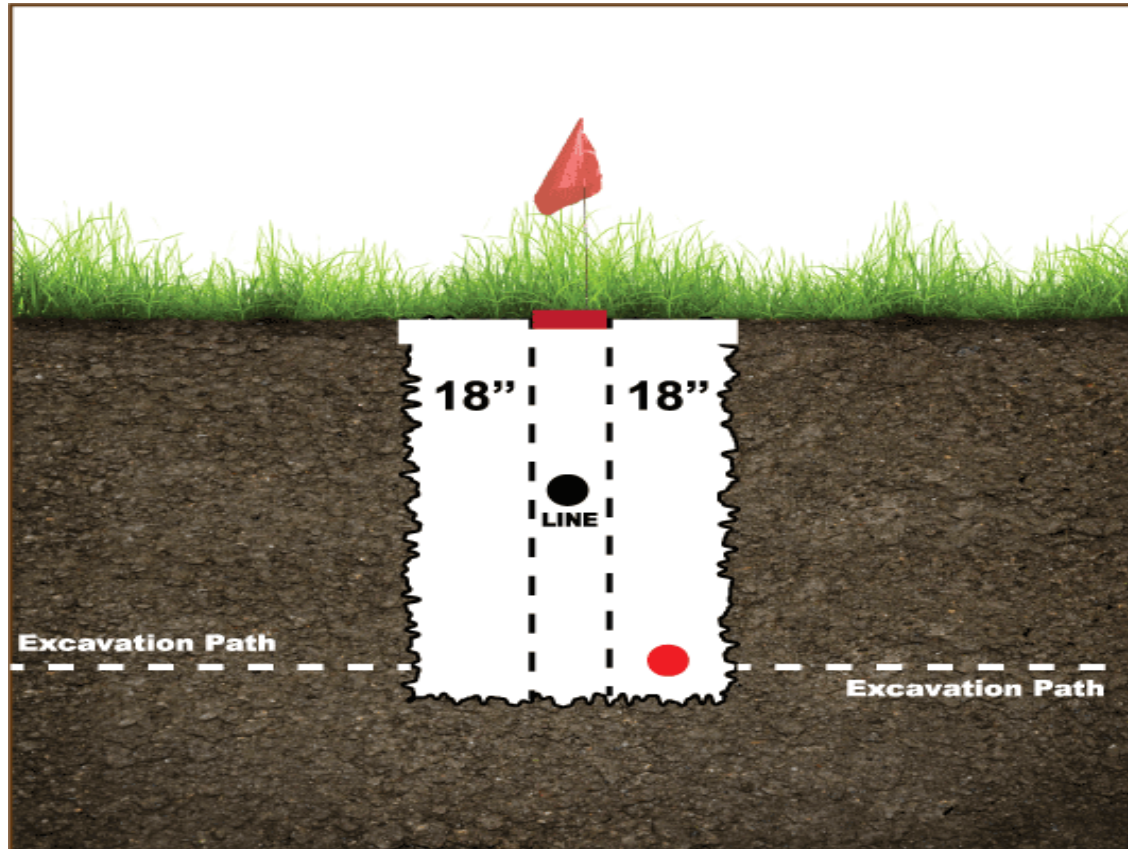
BURIED
WATER

BURIED
ELECTRIC
CABLE

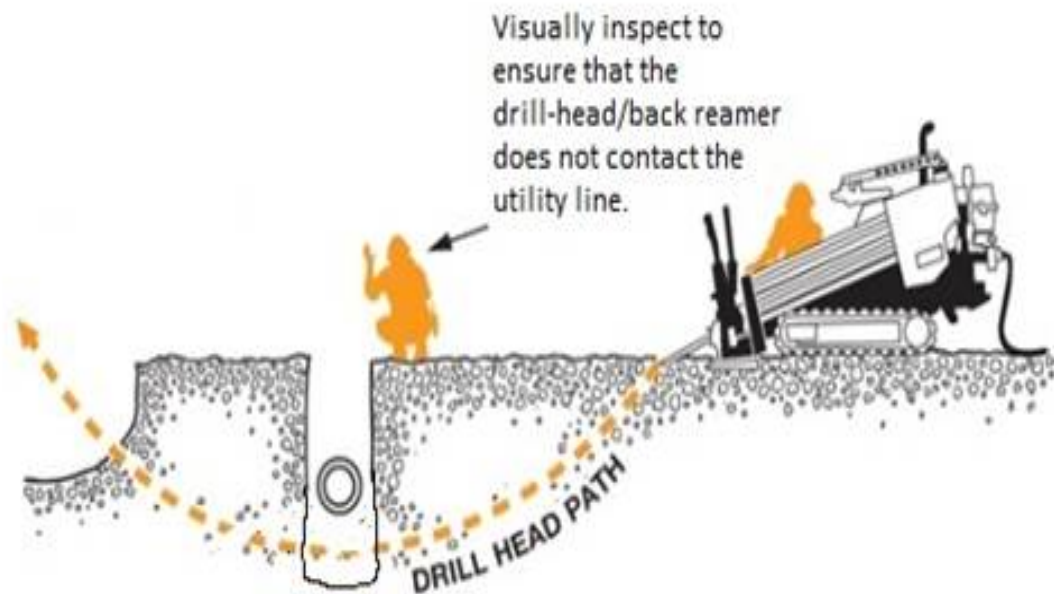


www.illinois1call.com

TOLERANCE ZONE & DEPTH



TOLERANCE ZONE



www.illinois1call.com





Do they pothole properly?



INGERSOLL MIDDLE SCHOOL AND EASTVIEW GRADE SCHOOL – CANTON, IL





Do you pothole properly? Hospital Tunnel



Migrating leaking natural gas





Emergency responders were evacuating people in Durham, N.C., when a gas explosion killed 1

Emergency responders were evacuating the area when the blast erupted, Durham Fire Chief Robert Zoldos said.

The blast occurred just after 10 a.m. in the busy area of Brightleaf Square, where people grab a morning coffee and visit other shops. A contractor boring under the sidewalk hit a 2-inch gas line, said Durham police spokesman Wil Glenn.



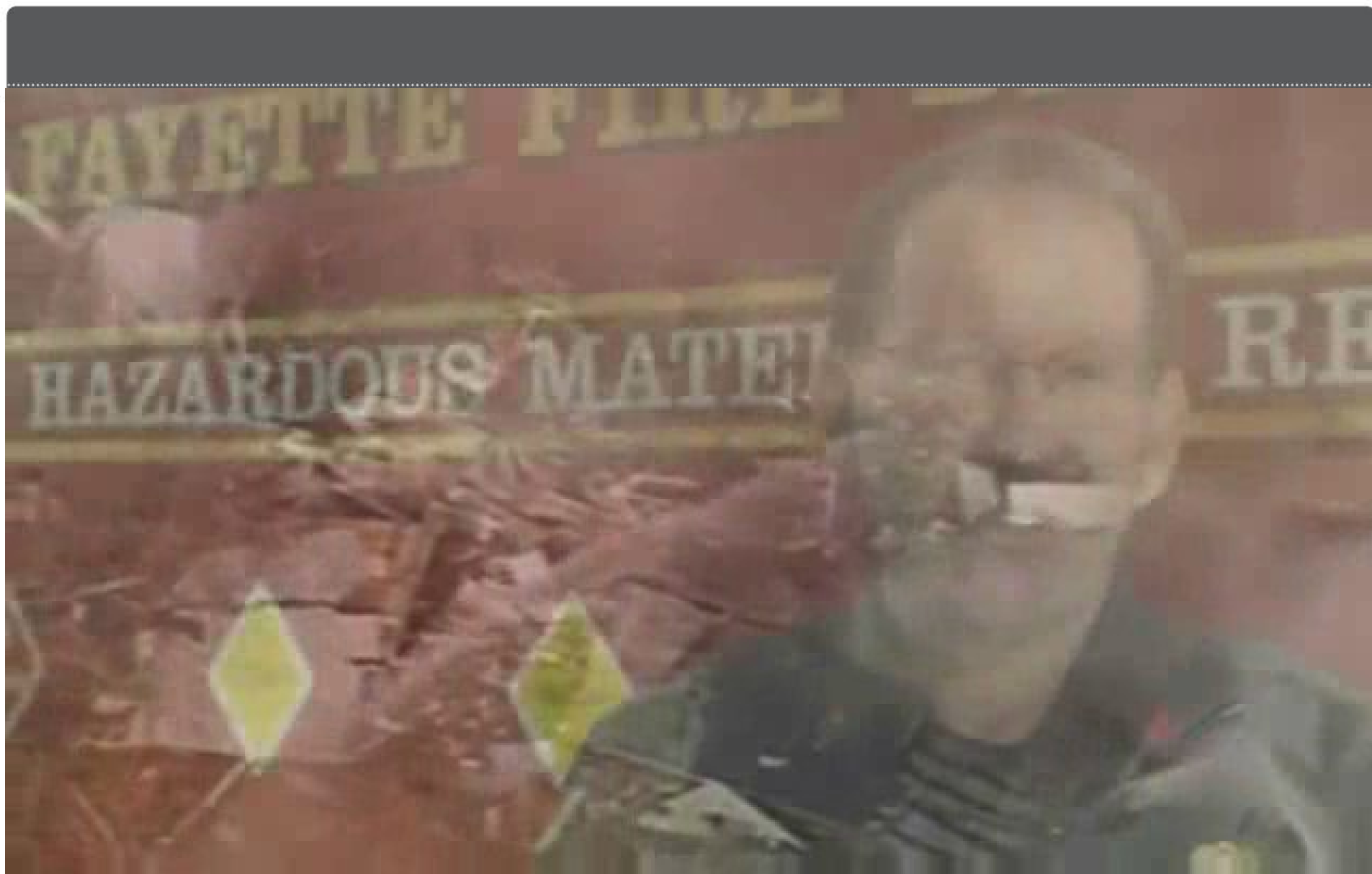
BREAKING NEWS

**GAS LEAK AT NEAR MAIN AND
DUKE STREETS IN DOWNTOWN DURHAM**





Approximately 1:00pm
An unexpected fourth home explodes





National Transportation Safety Board

Pipeline Accident Brief

Third-party Damage by Sure Shot Communications to Ameren Natural Gas Distribution System Canton, Illinois

The Accident

On November 16, 2016, about 5:44 p.m. central standard time, a natural gas-fueled explosion occurred at a two-level commercial building located at 45 East Side Square in Canton, Illinois. One Ameren employee was killed and 11 people were injured, including two Ameren employees.

Prior to the accident, Sure Shot Communications LLC (Sure Shot), a contractor for Mid Century Communications (Mid Century), a telephone and fiber optics cooperative, was performing directional drilling adjacent to the building to install conduit for fiber optic cable.¹ About 9:00 a.m., the Sure Shot crew began performing multiple drills at various locations on the block. At 3:58 p.m., the contractor reported to the Joint Utility Locating Information for Excavators (JULIE), the one-call message handling and delivery service for identifying underground utilities, that a marked gas line had been damaged. The damage occurred while crews were pulling the drill rod back to the drilling rig after a directional drilling operation under the sidewalk along North First Street.

At 4:06 p.m., Ameren Illinois (Ameren), the owner and operator of the gas line, received a damage report from Sure Shot and dispatched field technicians to evaluate the situation. About 7 minutes later, the first Ameren responder arrived at the scene; three other Ameren technicians arrived shortly thereafter. The lead Ameren responder contacted his supervisor to confirm the pipeline had been struck and to request excavation equipment to uncover the service line. A backhoe excavator arrived at 4:41 p.m. and Ameren technicians began to isolate the leak.

At 4:48 p.m., nearby customers called the Ameren Customer Contact Center to report natural gas odors both indoors and outdoors. According to Ameren, these customers were given safety instructions and told to leave their buildings if an odor was detected.² By 5:37 p.m., Ameren technicians shut off the natural gas flow to the service line by squeezing off the pipeline. At 5:44 p.m., the Opera House Annex behind the Opera House Professional Center exploded, killing one and injuring 11 who were impacted by debris from the blast. (See figures 1 and 2.)

¹ *Directional drilling* is a trenchless pipe or conduit installation technique that involves drilling into the soil to create a horizontal bore or pathway for the pipe or conduit.

² Ameren provided verbal instructions as written in their Customer Contact Center Emergency Plan Procedures, subsection 4.G and 4.H.

LINE MARKERS



WHERE ARE PIPELINES LOCATED?



CLEARED RIGHT-OF-

- Enhance public safety
- Help protect the integrity of pipeline facilities
- Prevent unauthorized Excavation
- Enhance aerial patrol





Plymouth County Sheriff, Mike Van Otterloo, says it all started around 1:45 Wednesday afternoon. Two men were doing drainage work in a farm field near Hinton, Iowa. They were digging a trench with a Caterpillar and struck a 24 inch gas pipeline beneath the dirt. April 25, 2012.

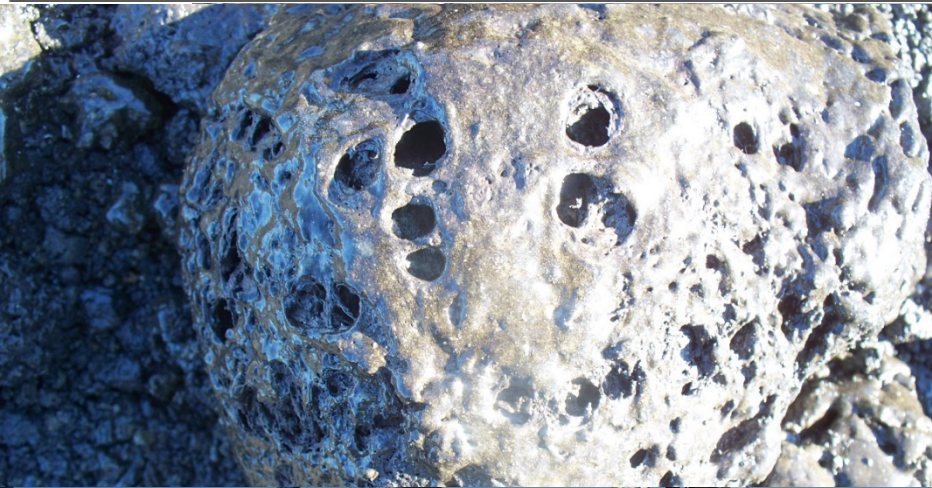


ICER TODAY: MOSTLY SUNNY, HI: 65° STORM LAKE TODAY: MOSTLY SUNNY, HI: 65° TEKAMAH TODA

Friday afternoon around 2:30, a farmer near LaMotte, IA was installing 4 inch drain tile into his field when, according to police, his tractor hit a 14 inch natural gas pipeline. May 10, 2012



Dixon Line Strike



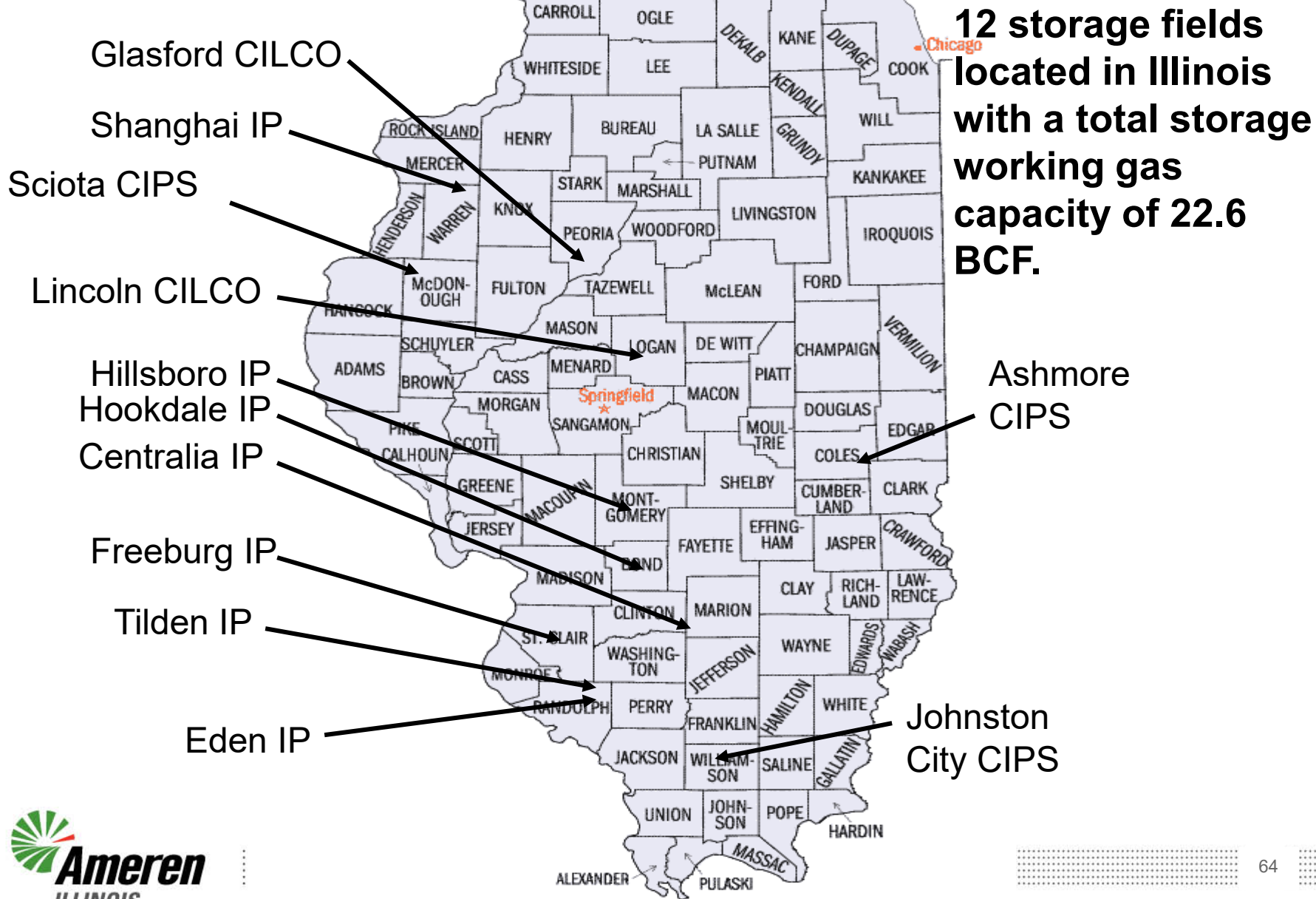
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Questions?



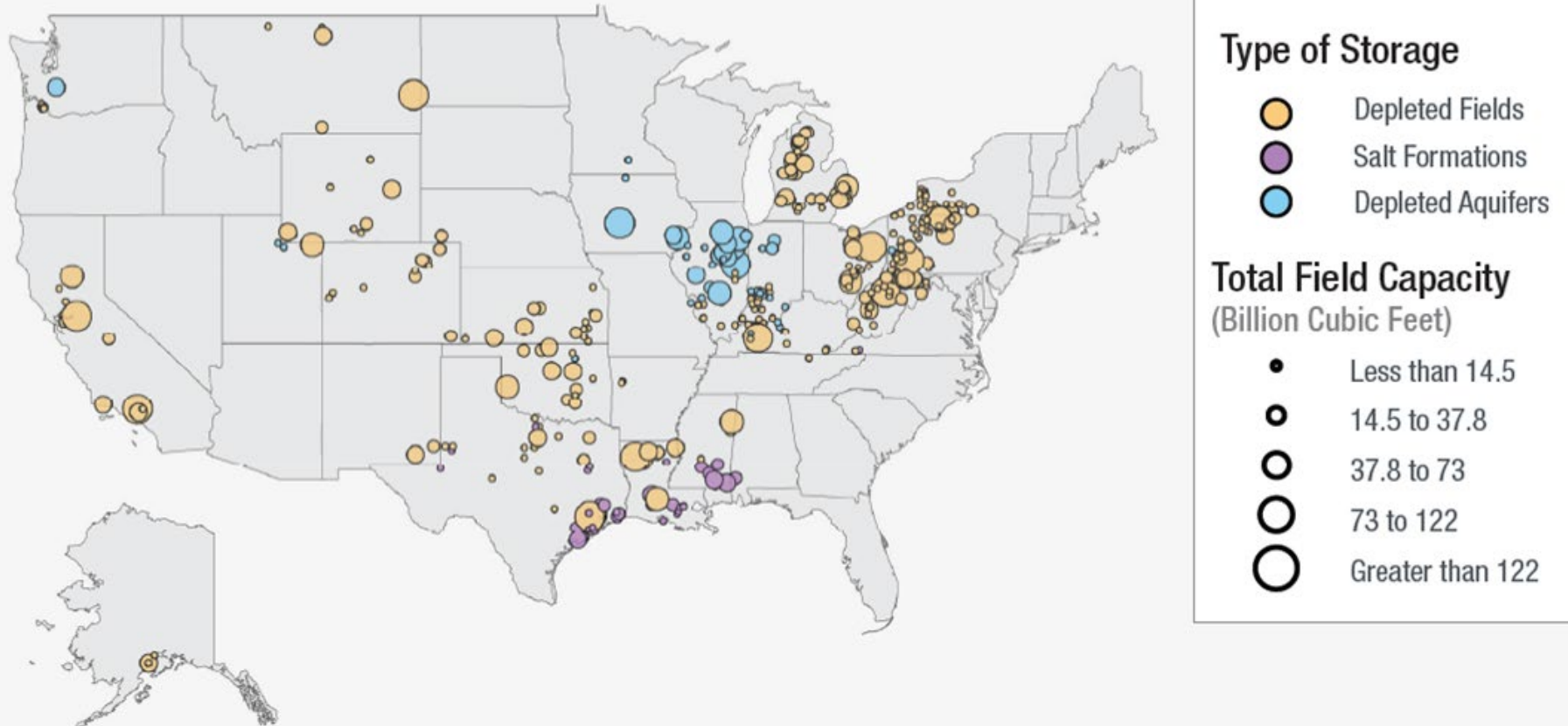
STORAGE LOCATIONS



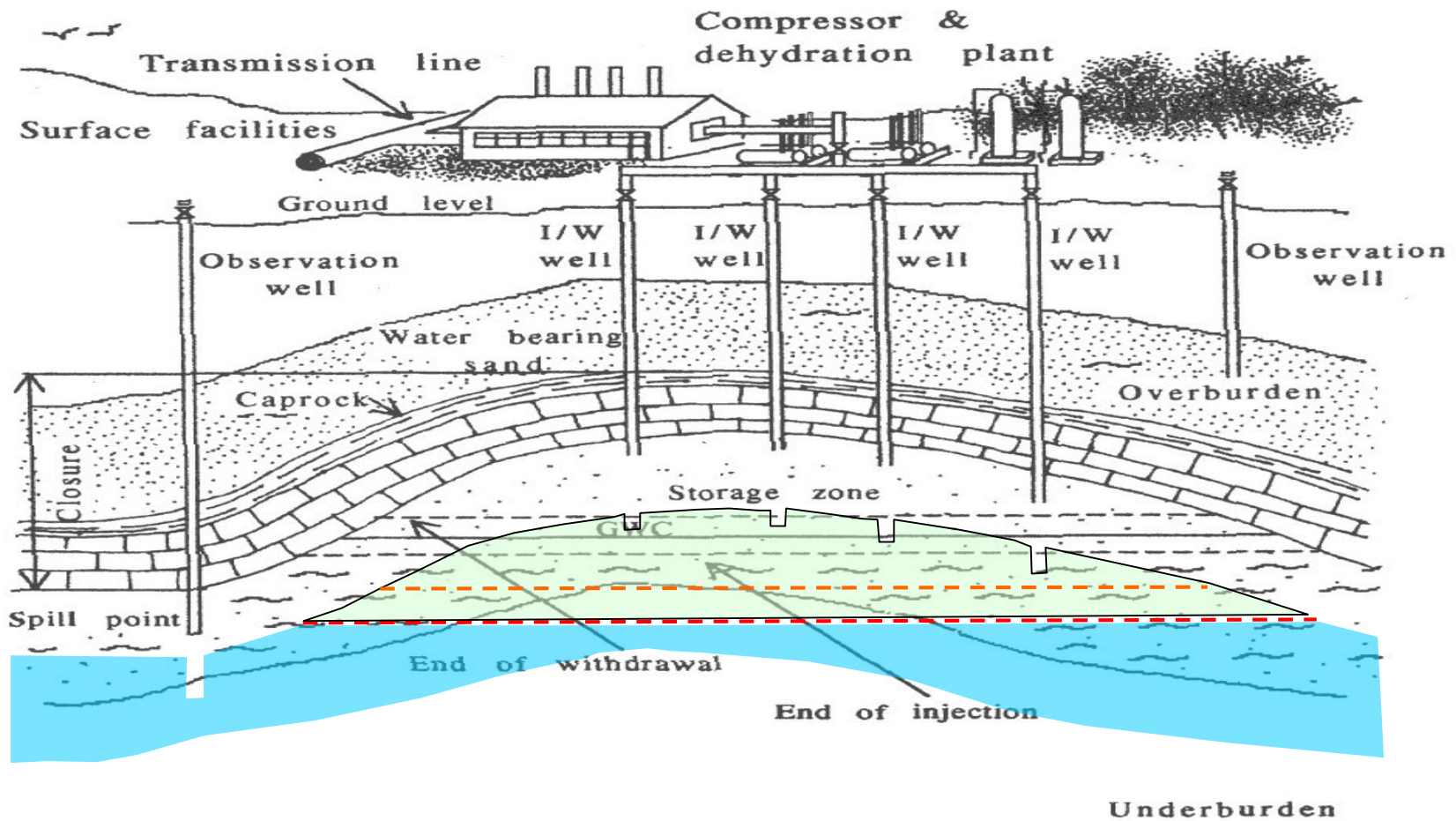
US STORAGE FIELDS

Where Natural Gas Underground Storage Fields are Located

Type of Storage and Total Field Capacity, July 2014



STORAGE FIELD



INJECT/WITHDRAW WELL



SAN BRUNO HOMES DESTROYED

A devastated neighborhood

Based on aerial photographs taken the day after Thursday's explosion and fire in San Bruno, the homes highlighted in red below were destroyed or severely damaged.

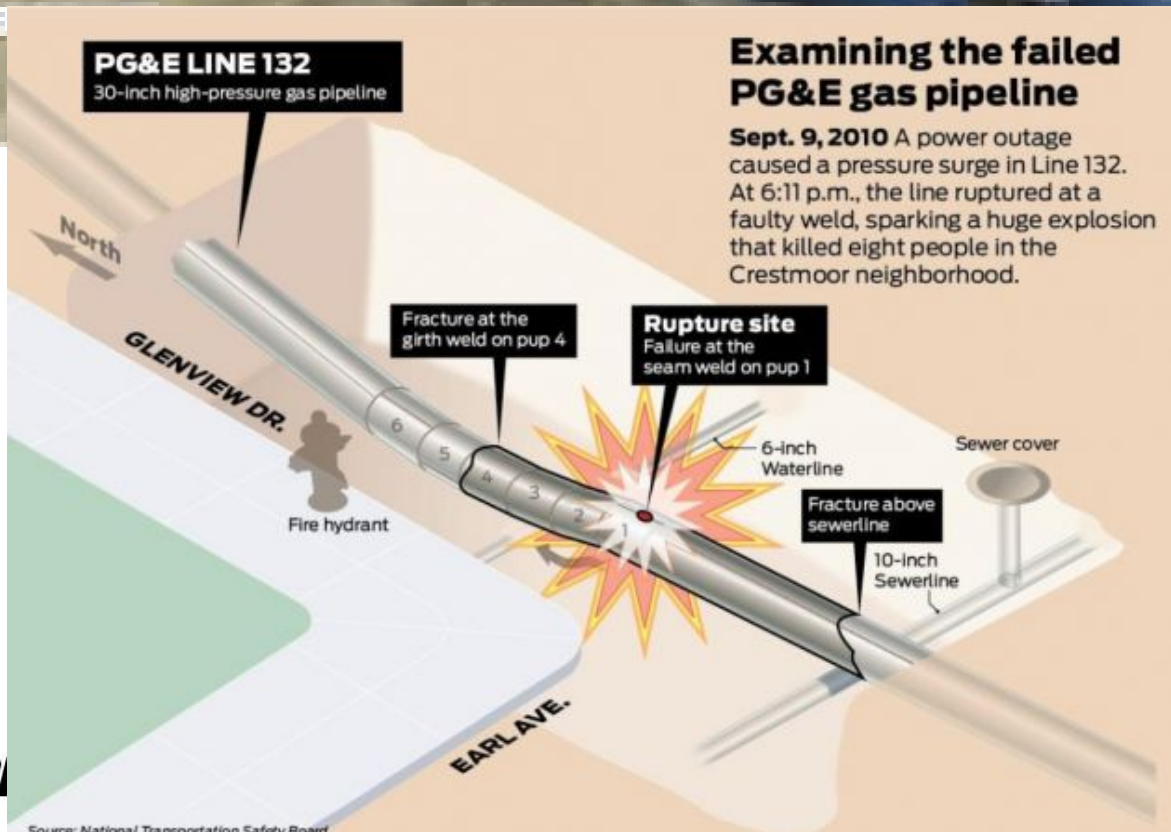


Pictometry International

Note: The aerial image showing the neighborhood before the explosion was taken on May 30, 2010.

Sources: Getty Images, Times reporting





Questions?



