PIPELINE EMERGENCY RESPONSE GUIDELINES

2026 Edition

GRANT OPPORTUNITY

INTERACTIVE QUIZ: Test your pipeline emergency response knowledge for a chance to win one of two $1,250 grants!

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INCIDENT RESPONSE CHECKLIST

Pipeline operators will concentrate on shutting down pipeline facilities. Responders should focus on protecting the public and isolating or removing ignition sources.

1) APPROACH CAUTIOUSLY FROM UPWIND, UPHILL OR UPSTREAM

- [ ] Stay clear of vapors, fumes, smoke and spills
- [ ] Do NOT park over a manhole or storm drain
- [ ] Do NOT assume that gases or vapors are harmless because of lack of a smell

2) SECURE THE SCENE

- [ ] Establish isolation zones and set up barricades

3) IDENTIFY HAZARDS

- [ ] Obtain information from persons at the scene
- [ ] Locate pipeline markers to identify: product, operator name and emergency phone number
- [ ] Refer to DOT Emergency Response Guidebook

4) ASSESS THE SITUATION

- [ ] Is there a fire, spill or leak?
- [ ] What are the weather conditions?
- [ ] What is the terrain like?
- [ ] Who and what is at risk?
- [ ] What resources (human and equipment) are required?

5) OBTAIN ASSISTANCE FROM TRAINED PERSONNEL

- [ ] Contact your organization
- [ ] Contact the pipeline operator

6) RESPOND TO PROTECT PEOPLE, PROPERTY & THE ENVIRONMENT

- [ ] Consider the safety of people first
- [ ] Eliminate ignition sources
- [ ] Rescue and evacuate people
- [ ] Employ the Incident Command System
- [ ] Control fire, vapor and/or leak

7) WORK TOGETHER WITH THE PIPELINE OPERATOR

- [ ] Coordinate valve closures with all affected parties
- [ ] Establish a Unified Command
- [ ] Cooperate with responding organizations

SCAN FOR A PDF COPY

PIPELINE EMERGENCY RESPONSE FIELD GUIDE

Protect Life. / Secure the Scene. / Eliminate Ignition.

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REMEMBER PIPELINE OPERATORS CONTROL THE PRODUCT AND SHUT DOWN.
RESPONDERS CONTROL THE SCENE AND PROTECT THE PEOPLE .

DO

BE EQUIPPED
Wear appropriate PPE to include bunker gear, SCBA and deploy atmospheric meters.

REFERENCE THE DOT EMERGENCY RESPONSE GUIDEBOOK
Consult the ERG before deploying tactics: pages 22–27 for pipeline ID and contacts, Guide 115 for flammable gases, Guide 128 for flammable liquids.

APPROACH CAUTIOUSLY
Stay clear of vapors, fumes, smoke and spills. Approach from upwind, uphill or upstream.

SECURE THE SCENE
Establish isolation zones and control access. Keep the public and responders out.

IDENTIFY THE HAZARDS
Use pipeline markers for product, operator and 24-hour emergency phone number.

CALL THE PIPELINE OPERATOR
Immediately report the incident and coordinate response.

ELIMINATE IGNITION SOURCES
Shut down vehicles, equipment and electronics. Avoid flames, sparks and smoking.

PROTECT PEOPLE
Evacuate or shelter in place based on risk to people.

LET FIRES BURN
Unless life is at risk and the fuel supply can be safely isolated.

USE INCIDENT COMMAND SYSTEM (ICS)
Establish unified command and work together with all responding agencies.

CONTINUOUSLY ASSESS CONDITIONS
Monitor weather, terrain, threats, and gas migration into adjacent confined spaces. Reevaluate actions and adapt as conditions change.

DO NOT

ENTER VAPOR CLOUDS OR LIQUID SPILLS
Do not go into areas where you cannot see or where vapors may be present. Vapors can/ will be present regardless of a visible cloud.

ASSUME A PRODUCT IS SAFE
Do not assume that gases or vapors are harmless because of lack of odor.

PARK NEAR THE RELEASE
Do not park over manholes, storm drains or near the release area.

OPERATE PIPELINE VALVES OR EQUIPMENT
Do not operate any pipeline valves or equipment—except customer meter or service valves, if trained, properly equipped and coordinating with the pipeline operator.

USE RADIOS, PHONES OR ELECTRONICS NEAR RELEASE
Do not use devices that could create a spark if ignition risk exists.

EXTINGUISH GAS FIRES BEFORE SHUTDOWN
Do not extinguish a natural gas fire unless directed by the operator.

ATTEMPT TO STOP THE LEAK
Do not attempt to stop, patch or control the leak yourself.

VENTILATE CONFINED SPACES WITHOUT GUIDANCE
Do not approach a confined space unless trained in hazardous materials or under guidance of trained hazardous materials personnel.

TAKE ACTION THAT INCREASES RISK
Do not take actions that put responders or the public in greater danger.

CONTACT THE PIPELINE OPERATOR
Use the pipeline marker to locate the operator's 24-hour emergency number and report the incident.

Scan QR code for the full Pipeline Emergency Response Guidelines or visit pipelineawareness.org

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01 SECTION

INTRODUCTION

Pipelines are the safest and most reliable way to transport natural gas, crude oil, liquid petroleum, and other chemicals. They transport large volumes of energy safely and efficiently, supporting communities and critical infrastructure.

To maintain safe, reliable operations, pipeline operators invest significant resources in routine inspection and maintenance, corrosion protection, continuous monitoring and control technologies, integrity management, public awareness programs, and emergency response planning—aligned with industry standards.

Incidents are rare. But when they do occur we want to do our part to ensure responders have the information they need. A coordinated and informed response improves safety, reduces impact, and protects lives.

PURPOSE OF THIS GUIDE

This guide provides a set of **general, interoperable emergency response procedures** for emergency managers, firefighters, 9-1-1 professionals, law enforcement officers, emergency medical personnel and other public safety and emergency response agencies.

It is designed to support those who may be first on scene with the **critical information needed to respond safely and effectively**. This guide does not replace training, experience, or professional judgment. It serves as a **practical framework** for decision-making in the field.

PREPAREDNESS MATTERS

Effective response begins before an incident occurs. Responders should be familiar with pipeline locations within their community, products transported in those pipelines, pipeline markers and right-of-way indicators, operator emergency contact information, available mapping tools (e.g., NPMS). Download our companion preparedness checklist at pipelineawareness.org/prepared.

TRAINING, CERTIFICATION & GRANT OPPORTUNITY

Win one of two $1,250 Grants

1. Review this guide and response procedures
2. Scan the QR code or visit: **https://qrco.de/perg25quiz**
3. Complete the short, interactive quiz

Deadline: April 1, 2027

TRAINING, RESOURCES AND FEEDBACK

Additional materials, videos, response scenarios, and copies of this guide are available free of charge.

training.pipelineawareness.org • pipelineawareness.org

Feedback or questions? Email us: **pipeline.association@pipelineawareness.info.**

02
SECTION

https://vimeo.com/428844961

PIPELINE BASICS

Before we discuss how to respond to a pipeline incident, let's quickly review the basics about pipelines:

- What are pipelines and what purpose do they serve?
- Where are pipelines located?
- How will you identify a pipeline right-of-way and use pipeline markers?
- How does the operator monitor pipeline performance and ensure reliability?

Pipelines in Your Community

People across the nation expect to have the energy they need to drive their cars, heat their homes and cook dinner, never really considering how they get the petroleum, natural gas, and other chemical products necessary to power their daily activities.

The pipeline industry has installed more than 2.7 million miles of pipeline to transport a variety of gases and liquids from gathering points to storage areas, and from refineries and processing plants to customers' homes and places of business. The U.S. Department of Transportation (DOT) defines a pipeline system as all parts of a pipeline facility through which a hazardous liquid or gas moves in transportation, including piping, valves, and other appurtenances connected to the pipeline, pumping units, fabricated assemblies associated with pumping units, metering and delivery stations, and breakout tanks. To ensure these pipeline systems remain safe, a body of local, state and federal laws, regulations and standards govern pipeline design, construction, operation, and public awareness and damage prevention programs.

Specifically, pipeline operators use a series of gathering, transmission and distribution pipelines to transport many different gas and liquid products.

- **Gathering** pipelines transport crude oil and natural gas from the wellheads and production facility to processing facilities where the oil, gas and water are separated and processed.
- **Transmission** pipelines move refined liquid products, crude oil, and natural gas from refineries to marketing and distribution terminals typically using larger diameter, high-pressure lines.
- **Distribution** systems for liquid and gas products vary. Liquid products are stored and transported by tanker trucks to their final destination, while gases, such as natural gas, butane, propane, ethane, etc., are transported from a storage location directly to residential and industrial customers through lower pressure distribution pipelines.

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Pipeline Right-of-Way

Although typically buried underground, pipelines may also be found aboveground in extremely cold and harsh environments, and at pump and compressor stations, some valve stations and terminals. Whether aboveground or belowground, pipelines are constructed along a clear corridor of land called the right-of-way (ROW). The ROW may contain one or more pipelines, may vary in width, and will cross through public and private property. The ROW should be free of permanent structures and trees and be identified with a marker sign.

Pipeline Marker Signs

Aboveground signs and markers identify the approximate location of underground pipelines. Markers are required to be present wherever a pipeline crosses under roads, railroads or waterways. They may also be found at other intervals and locations along the pipeline right-of-way, such as near buildings and pipeline facilities. Markers do NOT tell you the exact location, depth or direction of the pipeline; the pipeline may curve or angle around natural and manmade features. If there are multiple pipelines in the ROW, a marker sign should be posted for each pipeline.

Pipeline Markers may look different, but every sign tells you the same information:

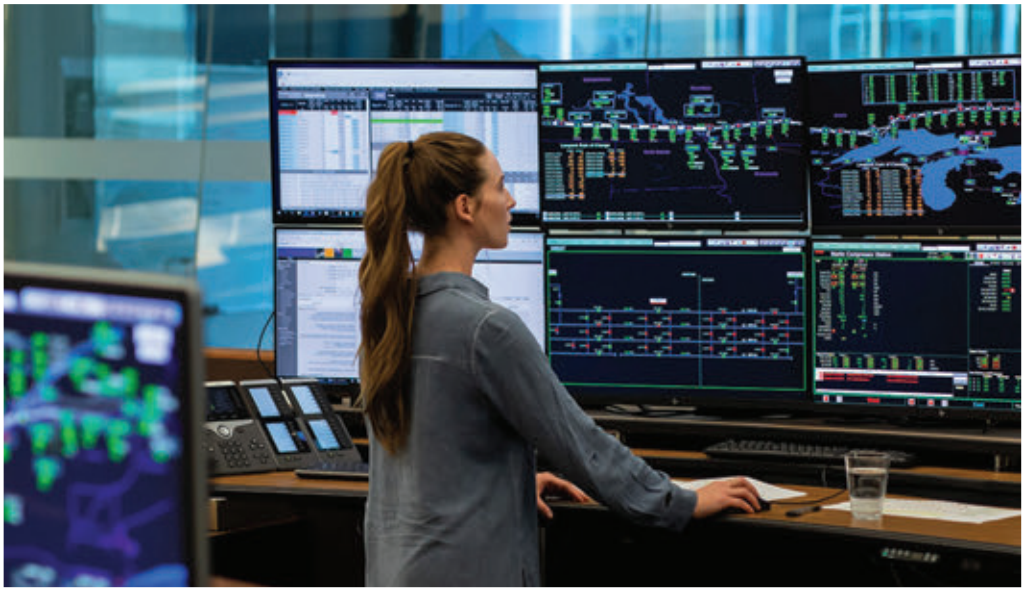
- **Pipeline product**
- **Pipeline operator**
- **24-hour emergency phone number**

RESPONSE TIP

If you are responding to a 9-1-1 call about a strange odor or leak and see a pipeline marker, call the emergency number to report the incident and obtain additional information.

RESPONSE TIP

Pipeline Operators are required to notify Public Safety Answering Points when they become aware of conditions that may indicate a potential pipeline rupture has occurred (i.e. sudden loss of pipeline pressure outside of normal operating parameters).



(Source: TC Energy)

Pipeline Control Center

When you call the 24-hour emergency phone number on a marker sign, you will speak with someone at the pipeline operator's control center. The control center is the heart of pipeline operations. Information about the pipeline'sop-erating equipment and parameters is constantly communicated to the control center where personnel use computers to monitor pipeline pressure, temperature, flow, alarms, and other conditions in the pipeline. While pipeline operators work hard to achieve reliable incident-free operation, accidents do occur. In the event of an emergency, the control center may be able to immediately shutdown the pipeline and begin to isolate the source of the leak. The pipeline operator's control center may also have the capability to remotely open and close valves and transfer products both to and from the main pipeline at marketing and distribution facilities.

RESPONSE TIP

As an emergency responder, you can help control the incident by being prepared to communicate as much information as possible to the pipeline operator about the current incident situation.

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Pipeline Maps

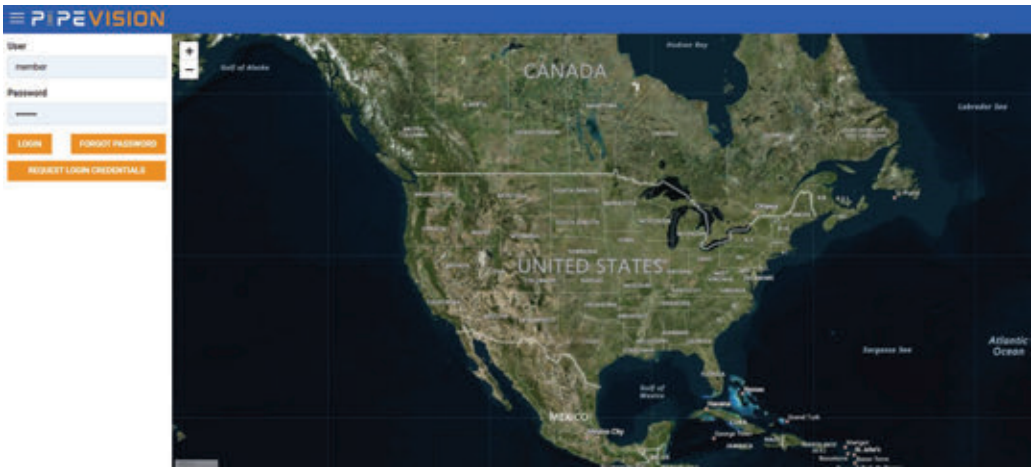
National Pipeline Mapping System (NPMS)

Maps of transmission pipelines and contact information for pipeline operators in your area can be found in the National Pipeline Mapping System (NPMS) at: **www.npms.phmsa.dot.gov**. The directory can be searched by zip code or state and county. More detailed pipeline maps are also available to Emergency Responders who have obtained a logon ID and password through the Pipeline Integrity Management Mapping Application (PIMMA) access link.

PipeVision Emergency Planning Application

This mapping application was recently updated by this Association for disseminating detailed pipeline information and collecting information about populated areas near pipelines (identified sites). It is intended to be a resource for agencies involved in emergency planning. It contains the following information:

- Product transported in the pipeline
- Pipeline size in inches (if provided by the member company)
- Recommended initial evacuation distance
- Pipeline company emergency phone number
- Company name, non-emergency contact, phone, and email address
- Link to document containing additional company information (if available)



The mapping application can be accessed at **https://pipelineawareness.org/resources/pipevision-mapping-application/**. If you are visiting the site for the first time, you must request access. Please click on **"Request Login Credentials"** and submit your information. Users are cautioned that the application DOES NOT INCLUDE ALL PIPELINES.

03
SECTION

https://vimeo.com/428841393

PRODUCTS AND FACILITIES

Pipeline Natural Gas (DOTERG115)

Natural gas is the predominant product found in gas distribution pipelines, and with few exceptions, is transported via pipelines in its gaseous form. Like crude oil, it is a naturally occurring resource formed millions of years ago as a result of heat and pressure acting on decayed organic material. It is extracted from wells and transported through gathering pipelines to processing facilities. From these facilities it is transported through transmission pipelines to distribution centers (or distribution pipeline systems). The main ingredient in natural gas is methane (94 percent). Natural gas is odorless, colorless, tasteless and nontoxic in its natural state. When transported via transmission pipelines, natural gas typically does not have odorant added. An odorant is added when it is delivered to a distribution system. At ambient temperatures it remains a lighter than air gas; however, it can be compressed (CNG) under high pressure to make it convenient for use in other applications or liquefied (LNG) under extremely cold temperatures (-260 °F) to facilitate transportation.

Indications of a Leak

- An odor like rotten eggs or a burnt match (odorized natural gas only)
- A loud roaring sound like a jet engine
- A hissing or whistling noise
- Fire coming out of or on top of the ground
- Dirt blowing from a hole in the ground
- An area of frozen ground in the summer
- An unusual area of melted snow in the winter
- An area of dead vegetation
- Bubbling in pools of water

Hazards of a Release

- Highly flammable and easily ignited by heat or sparks
- Will displace oxygen and can cause asphyxiation
- Fire may produce irritating and/or toxic gases
- Vapors may form an explosive mixture with air
- Vapors may cause dizziness or asphyxiation without warning
- Is lighter than air—can migrate underground and into enclosed spaces

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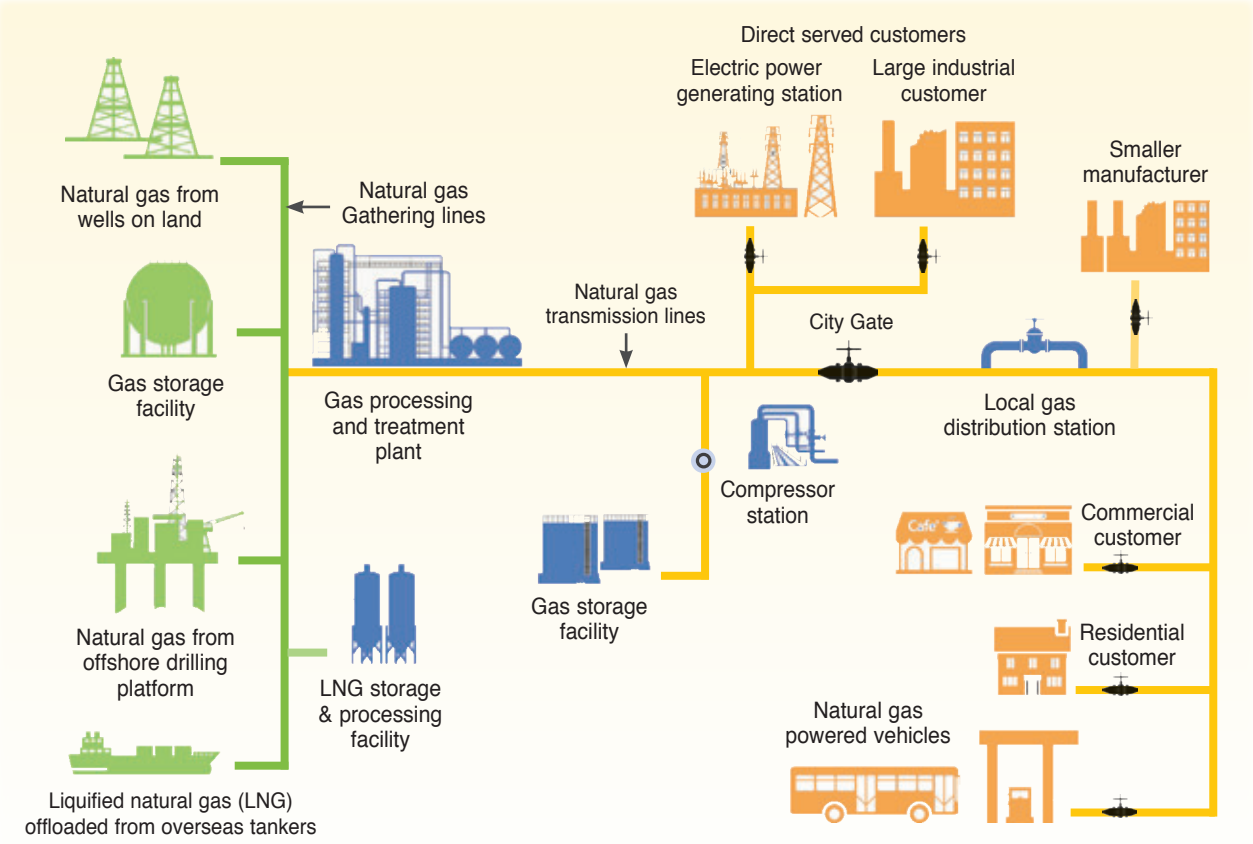
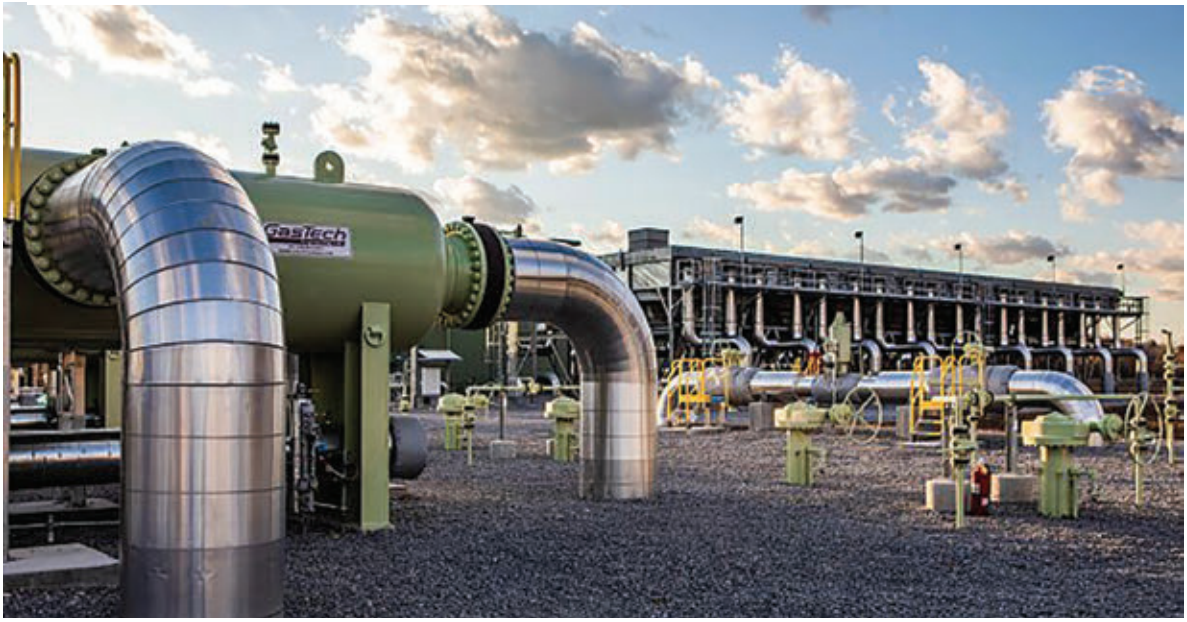


Natural gas pipeline system from production to end user.



Gas transmission compressor station.
(Source: TC Energy)

Natural Gas Facilities

Natural gas wellhead.

Natural gas processing facility.

Natural gas compressor station.

City gate meter station.

Customer meter.

Montana-Dakota Utilities CO.

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Petroleum Gas (DOT ERG 115)

Petroleum gas is a mixture of gaseous hydrocarbons, primarily propane, butane and ethane. These products are commonly used for cooking, heating and other industrial applications. They are easily liquefied under pressure and are often stored and transported in portable containers labeled as Liquified Petroleum Gas (LPG). When transported in transmission pipelines they may also be identified as Highly Volatile Liquids (HVLs) or Natural Gas Liquids (NGLs). Vaporized LPG may also be found in smaller gas distribution systems. Typically, LPG is a tasteless, colorless and odorless gas. When transported via transmission pipelines it normally will not have odorant added. Odorant is added when LPG is offloaded to a distribution pipeline system or transport tanks to facilitate leak detection. Ethylene and propylene do have a faint natural odor like petroleum.

https://vimeo.com/430807720

Indications of a Leak

- A white vapor cloud that may look like smoke
- A hissing or whistling noise
- An odor like rotten eggs or a burnt match (if odorized)
- A faint odor like petroleum liquids or gasoline (Ethylene and Propylene)
- Fire coming out of or on top of the ground
- Dirt blowing from a hole in the ground
- A sheen on the surface of water
- An area of frozen ground in the summer
- An unusual area of melted snow in the winter
- An area of dead vegetation
- Bubbling in pools of water

Hazards of a Release

- Highly flammable and easily ignited by heat or sparks
- Will displace oxygen and can cause asphyxiation
- Vapors are heavier than air and will collect in low areas
- Contact with skin may cause burns, injury, or frostbite
- Fire may produce irritating and/or toxic gases
- Vapors may form an explosive mixture with air

Petroleum Liquids (DOT ERG 128)

https://vimeo.com/428843055

Petroleum liquids is a broad term covering many products, including: crude oil, gasoline, diesel fuel, aviation gasoline, jet fuel, fuel oil, kerosene, naphtha, xylene and other refined products. Crude oil is unrefined petroleum that is extracted from beneath the earth's surface through wells. As it comes from the well, crude oil contains a mixture of oil, gas, water and other impurities, such as metallic compounds and sulfur. Refinement of crude oil produces petroleum products that we use every day, such as motor oils and gasoline. Crude oil is normally transported from wells to refineries through gathering pipelines. Refined petroleum products are normally transported in transmission pipelines to rail or truck terminals for distribution to consumers. Odorant is not added to these products because they have a natural odor.

Indications of a Leak

- The pooling of liquid on the ground
- An odor like petroleum liquids or gasoline
- A sheen on the surface of water
- An area of dead vegetation

Hazards of a Release

- Highly flammable and easily ignited by heat or sparks
- Vapors are heavier than air and will collect in low areas
- Contact with skin may cause burns, injury, or frostbite
- Fire may produce irritating and/or toxic gases
- Runoff may cause pollution
- Vapors may form an explosive mixture with air

Petroleum Refinery.

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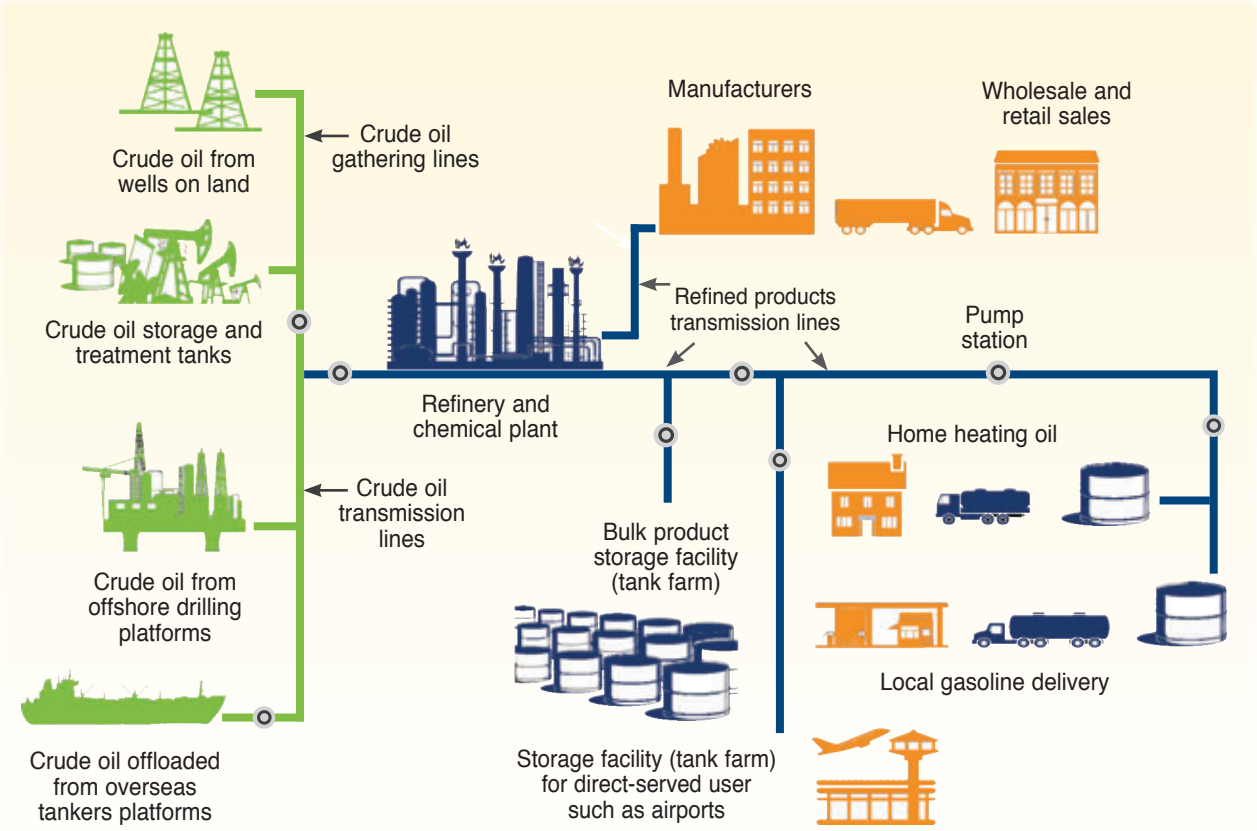
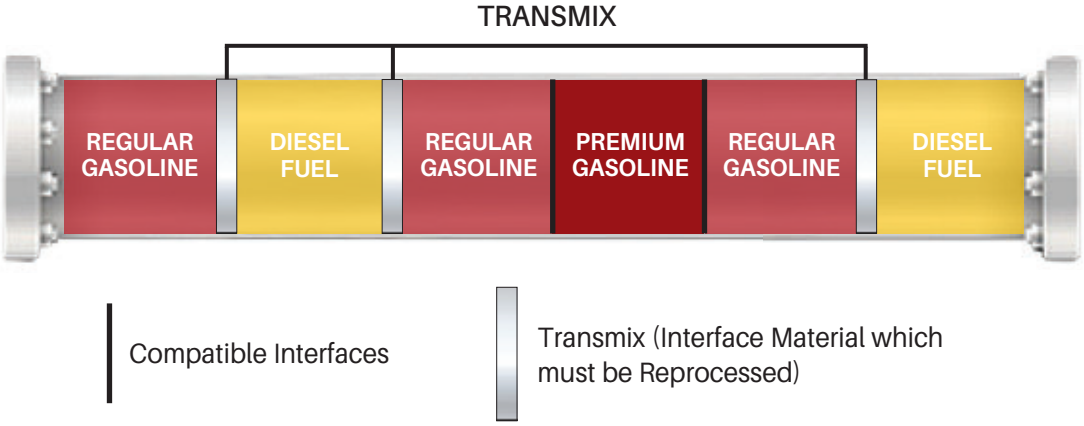


Liquid refined petroleum products move through a network of transmission pipelines from refineries to marketing and distribution terminals, and ultimately the consumer.

Typical Sequence of Petroleum Products Flow through a Pipeline



Petroleum Liquids Facilities

Oil well.

Block valve.

Pumping station.

Storage tanks.

Truck loading facility.

Rail loading facility.

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Anhydrous Ammonia (DOT ERG 125)

Anhydrous ammonia is the liquefied form of pure ammonia gas. It is a colorless gas or liquid with an extremely pungent odor. It is normally transported through transmission pipelines located in the Midwest and is used primarily as an agricultural fertilizer or industrial refrigerant.

https://vimeo.com/430808876

Indications of a Leak

- A white vapor cloud that may look like smoke
- A hissing or whistling noise
- Dirt blowing from a hole in the ground
- An irritating and pungent odor

Hazards of a Release

- Will displace oxygen and can cause asphyxiation
- Vapors are heavier than air and will collect in low areas
- Contact with skin may cause burns, injury, or frostbite
- Toxic and may be fatal if inhaled or absorbed through skin
- Vapors are extremely irritating and corrosive
- Fire may produce irritating and/or toxic gases
- Runoff may cause pollution

Carbon Dioxide (DOT ERG 120)

Carbon dioxide is a heavy gas that is normally transported in transmission pipelines as a compressed fluid. It is a naturally occurring colorless, odorless and tasteless gas used in the petroleum industry. Under normal conditions carbon dioxide is stable, inert and nontoxic.

https://vimeo.com/428844256

https://www.api.org/-/media/files/policy/carbon-capture/co2-tactical-guidance

Indications of a Leak

- A hissing or whistling noise
- Dirt blowing from a hole in the ground
- An area of frozen ground in the summer
- An unusual area of melted snow in the winter
- Bubbling in pools of water

Hazards of a Release

- Will displace oxygen and can cause asphyxiation
- Vapors are heavier than air and will collect in low areas
- Contact with skin may cause burns, injury, or frostbite
- Vapors may cause dizziness or asphyxiation without warning

https://vimeo.com/429247018

Ethanol (DOT ERG 127)

Ethanol, also called ethyl alcohol, is a colorless liquid that is widely used as an additive to automotive gasoline. It may be transported in buried transmission pipelines.

Indications of a Leak

- The pooling of liquid on the ground
- An odor like petroleum liquids or gasoline
- An area of dead vegetation

Hazards of a Release

- Highly flammable and easily ignited by heat or sparks
- Vapors are heavier than air and will collect in low areas
- Contact with skin may cause burns, injury, or frostbite
- Fire may produce irritating and/or toxic gases
- Runoff may cause pollution
- Vapors may form an explosive mixture with air

https://vimeo.com/430827187

Hydrogen Gas (DOT ERG 115)

Hydrogen gas is commonly produced from the steam reforming of natural gas. It is frequently used near its production site, with the two main uses being petrochemical processing and ammonia production. It is a flammable gas that is colorless, odorless and lighter than air. It is nontoxic, but can act as a simple asphyxiant in confined spaces. Hydrogen is normally transported between industrial facilities as a gas.

Indications of a Leak

- A hissing or whistling noise
- An unusual area of melted snow in the winter
- An area of dead vegetation
- Bubbling in pools of water

Hazards of a Release

- Highly flammable and easily ignited by heat or sparks
- Will displace oxygen and can cause asphyxiation
- Fire may produce irritating and/or toxic gases
- Vapors may form an explosive mixture with air
- Vapors may cause dizziness or asphyxiation without warning
- Is lighter than air—can migrate underground and into enclosed spaces

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Sour Crude Oil (DOT ERG 131), Sour Gas (DOT ERG 117)

https://vimeo.com/436591302

Products containing little or no sulfur are often referred to as "sweet", whereas, products containing high concentrations of sulfur and hydrogen sulfide (H_2S) are commonly referred to as "sour". Hydrogen sulfide is a colorless, flammable, corrosive and extremely toxic gas with an offensive rotten egg odor. It is created naturally by the bacterial breakdown of sulfur-containing organic materials. Industrial activities that can produce hydrogen sulfide include petroleum/natural gas drilling and refining, wastewater treatment, coke ovens, tanneries, and paper mills. In natural gas and crude oil, it is a contaminant that must be removed before products are sent to commercial markets.

Hydrogen sulfide can be dissolved in liquids and may be released by agitation, depressurization, or heating. Since hydrogen sulfide is heavier than air, it will collect in low places. Refer to Appendix A for additional leak and hazard information.

Hydrogen sulfide's offensive odor is readily detectable at very low concentrations. However, smell cannot be relied upon to forewarn of dangerous concentrations because it rapidly degrades the sense of smell due to paralysis of the olfactory nerve. A longer exposure to lower concentrations has a similar desensitizing effect on the sense of smell. Exposure to relatively low levels of hydrogen sulfide can be fatal. The physical effects of various concentration levels are shown below.

ppm	Physical Effects
1	**Can be smelled** (rotten egg odor)
10	**Obvious and unpleasant odor** (Permissible 8 hour exposure level — OSHA)
50	**Loss of sense of smell in 15 minutes** (10 minute exposure level once only if no other measurable exposure occurs — OSHA)
100	**Loss of smell in 3–15 minutes, stinging in eyes and throat, altered breathing** (Immediately Dangerous to Life and Health — OSHA)
500	**Unconscious quickly, death will result if not rescued promptly**

RESPONSE TIP

The range of flammable limits for H2S (4 percent to 44 percent in air by volume) is much greater than the range of flammable limits for natural gas (4 percent to 16 percent).

04
SECTION

https://vimeo.com/432927580

EMERGENCY PREPAREDNESS

Pipeline incidents present some of the most dangerous situations an emergency responder may encounter. Pipelines contain flammable, hazardous and even deadly petroleum gases, liquids, and other chemical products that present emergency responders with a myriad of hazards and risks that vary depending on the topography, weather, and properties of the material involved. For the majority of pipeline incidents, there are a limited number of options to actually stop the leak. In almost all cases, the pipeline operator must be involved to manage the incident safely. Consequently, your goal is to minimize the level of risk to other responders, the community and the environment.

Advance knowledge of where pipelines are located in your community, the products transported in them, and how to contact and work together with the pipeline operator in the event of an incident are key factors to an effective and safe response.

What you should know before an incident

- ☐ The names of companies operating pipelines in your community along with their emergency and non emergency contact information
- ☐ The approximate location of the pipelines and the products they carry
- ☐ The physical indications of a leak and the possible hazards associated with a release
- ☐ The potential impact on the community and what steps should be taken to protect the public
- ☐ The response capabilities of the pipeline companies and how to engage in mutual assistance with operators

Scan for a PDF checklist

Following standardized procedures will bring consistency to each response and will help minimize the risk of exposure to all responders. The information in this guide provides a framework to discuss safety issues as they relate to the hazards and risks presented by pipeline emergencies.

Establishing and maintaining a mutual understanding concerning joint cooperation and coordination of response efforts with local pipeline operators will help minimize the hazards to life and property.

RESPONSE TIP

Refer to the Emergency Response Capabilities Section on page 47 to find out more about sharing capability information with operators.

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INCIDENT RESPONSE STEPS

05 SECTION

To effectively respond to a pipeline leak, spill or fire, emergency responders need to understand the hazards and risks associated with the incident. You should seek additional information about the pipeline in question as soon as possible. Calling the 24-hour emergency phone number on a nearby pipeline marker sign, contacting the appropriate emergency response agency, and consulting the information in the DOT *Emergency Response Guidebook* may provide more detailed, situation-specific information.Pipeline operators hope you never have to respond to a pipeline incident, but if you do, **remember**:

- Every incident is different—each will have special problems and concerns.
- Continue to gather information and monitor the situation until the threat is removed.

STEP 1. Approach Cautiously from Upwind, Uphill or Upstream

https://vimeo.com/435309357

To protect yourself and other responders from any hazards associated with the incident it is critical you approach cautiously from an upwind and/or crosswind location.

- Stay clear of vapors, fumes, smoke and spills
- Do not walk or drive into a vapor cloud or puddle of liquid.
- Do not park over manholes or storm drains.
- Do not approach the scene with vehicles or mechanized equipment until the isolation zones have been established. Vehicle engines are a potential ignition source.
- Use appropriate air-monitoring equipment to establish the extent of vapor travel.

Approaching the scene with caution is critical when responding to a pipeline incident.

Because any number of fire and health hazards may be involved, it is important you resist the urge to rush in until you know more about the product and hazards involved in the incident.

RESPONSE TIP

Do not assume that gases or vapors are harmless due to lack of smell — odorant can fade or be scrubbed out when leaking products migrate through soil.

https://vimeo.com/435310599

STEP 2. Secure the Scene

Without entering the immediate hazard area, you want to isolate the area and deny entry to unauthorized persons, including other responders. It may be necessary to evacuate everyone in the danger area to a safe location upwind of the incident area.

Establish Isolation Zones and Set Up Barricades

Isolation zones and barricades prevent unauthorized people and unprotected emergency responders from entering the hazard area and becoming injured. The size of the containment area will be dictated by the location and size of the release. You also want to consider atmospheric conditions, as isolation distances change from daytime to nighttime due to different mixing and dispersion conditions in the air. Remember, gas odor or the lack of gas odor is not a sufficient measurement to establish safe isolation zones.

Securing the scene is an important part of site safety.

- Based on the type of incident, use any or all of the following to calculate and establish isolation zones:
  - DOT Emergency Response Guidebook
  - Information from the pipeline operator's representative
  - Heat intensity levels
  - Measurements from air-monitoring equipment
- Use visible landmarks, barricade tape and traffic cones to identify hot/warm/cold zones.
- Define entry and exit routes. Plan an escape route in case conditions deteriorate.
- Be certain to allow enough room to move and remove your own equipment. The more time, distance and shielding between you and the material the lower the risk.

https://vimeo.com/435310765

STEP 3. Identify the Hazards

A product's physical and chemical properties determine how the product will behave and how it can harm. Emergency responders need to analyze the problem and assess potential outcomes based on the hazardous materials involved.

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Understanding the hazards will enable you to understand what risk you will be taking and help you select the best course of action with the least risk.

- Locate a pipeline marker sign to identify the pipeline product, operator and 24-hour emergency phone number.
- Call the emergency phone number to report the incident to the pipeline operator's control center. Control center personnel may provide addi tional information about the pipeline product and its hazards.
- Use the DOT Emergency Response Guidebook to identify potential hazards, establish initial isolation distances, and determine response tactics. Additional information is contained in Appendix A, B, C and E of this guide.
- Use air-monitoring equipment appropriate to the materials in the pipeline. Do NOT assume gases or vapors are harmless because of a lack of smell. Odorant can fade or be scrubbed out when leaking products migrate through soil and exposure to H_2S can cause desensitization of smell.
- Use the highest level of precaution and protection until you know the area is safe of flammable, toxic, mechanized and electrical hazards.

Use CAUTION as you may encounter:

- Flammable atmospheres
- Hydrogen sulfide (H_2S) in crude oil/natural gas pipelines
- Anhydrous ammonia pipelines
- Oxygen deficient/enriched atmospheres
- Natural gas migrating underground into adjacent buildings

STEP 4. Assess the Situation

- Is there a fire, spill or leak?
- Is there a vapor cloud?
- What are the weather conditions?
- What direction is the wind blowing?
- What is the terrain like?
- Who and what is at risk: people, property or environment?
- What actions should be taken: evacuation, shelter in-place or diking?
- What human/equipment resources are required?

https://vimeo.com/435311249

STEP 5. Obtain Assistance from Trained Personnel

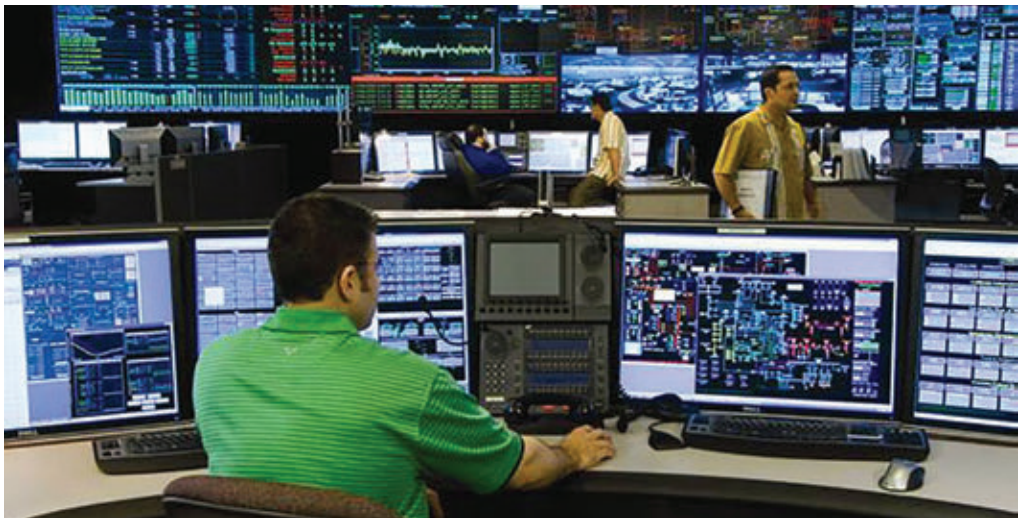
Contact Your Organization

As soon as possible, contact your organization. This will set in motion a series of events ranging from dispatching additional trained personnel to the scene to activating the local emergency response plan. Ensure that other local emergency response departments have been notified.

https://vimeo.com/435311422

Contact the Pipeline Operator

Immediately call the 24-hour emergency phone number of the pipeline operator, which is listed on a marker sign located at a nearby road crossing, railroad or other point along the pipeline right-of-way. During the call, pipeline control center personnel will dispatch a representative to the scene. The control center will immediately act to isolate the emergency. The pipeline control center may also have the capability to remotely open and close manifold valves and to transfer products both to and from the main pipeline at marketing and distribution facilities.



(Source, PG&E)

Be prepared to provide pipeline control center personnel with the following information:

- Call-back number, contact name (usually the Incident Commander)
- Detailed location, including state, county, town, street or road
- Type of emergency: fire, leak, vapor
- When incident was reported locally
- Any known injuries
- Other officials on site: police, fire, medical, LEPCs, etc.
- Surrounding exposures/sensitive areas
- Any special conditions: nearby school, hospital, prison, railroad, etc.
- Local conditions: weather, terrain

RESPONSE TIP

Contacting pipeline operators as soon as possible is critical to controlling the incident.

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STEP 6. Respond to Protect People, Property and the Environment

https://vimeo.com/436583741

The protection of people is always the highest priority. Protective actions are those steps taken to preserve the health and safety of emergency responders and the public during a pipeline incident. While the pipeline operator concentrates on isolating the pipeline, responders should concentrate on isolating and removing ignition sources and moving the public out of harms way. Several response procedures can and should be pursued simultaneously. You will also need to continually reassess and modify your response accordingly.

Eliminate Ignition Sources

Ignition sources include: electrical motors, firearms, vehicles, telephones, cell phones, emergency radios, cigarettes, construction equipment, personal electronic devices, static electricity, open flames or sparks.

- Eliminate ignition sources, if possible without additional exposure or great risk. This may include having the utility company cut the power.
- Park all emergency vehicles at a safe distance beyond the isolation zone (upwind).
- Do NOT light a match, start an engine, use a telephone or radio, switch lights on or off, or use anything that may create a spark.

The DOT *Emergency Response Guidebook* (ERG) contains extensive information on hazardous materials.

Rescue and Evacuate People

Any efforts made to rescue persons and protect property or the environment must be weighed against the possibility that you could become part of the problem.

- Do not walk or drive into a vapor cloud or puddle of liquid.
- Evacuate or shelter-in-place as necessary, providing instruction and frequent updates to the public while evacuated or sheltered-in-place.
- Administer first aid and medical treatment, as needed.
- Enter the area only when wearing appropriate protective gear, such as Structural Fire Fighters' Protective Clothing (SFPC) (helmet, coat, pants, boots, gloves and hood) and a Positive Pressure Self-Contained Breathing

Apparatus (SCBA). Because no single protective clothing material will protect you from all dangerous pipeline materials, always use the highest level of caution.

RESPONSE TIP

If Natural Gas is escaping in a building, refer to Appendix D for additional precautions.

Establish a Command Post and Lines of Communication

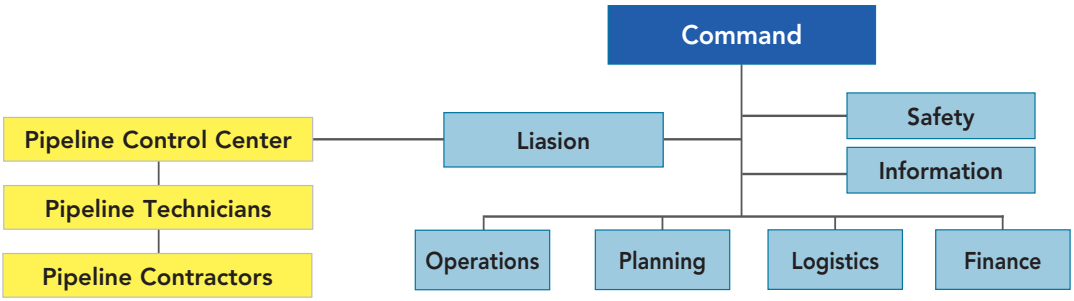
Pipeline incidents require coordination of information and resources among all responders. Employing the Incident Command System (ICS) is one of the most important actions to take. ICS provides common terminology, organizational structure, duties, and operational procedures among operator personnel and various federal, state and local agencies that may be involved in response operations.

Identify an Incident Commander. The Incident Commander is the person responsible for the management of on-scene emergency response operations. In cooperation with the pipeline operator's point of contact, the Incident Commander determines when it is safe for the response teams to enter the area and access the pipeline.

Establish a command post, lines of communication and a staging area for additional responding equipment and personnel.

Pipeline operators will dispatch personnel to the scene and may initiate other actions to isolate and close off affected pipeline segments.

When operator personnel arrive at the scene, they will check in with the Incident Commander. If they are trained in ICS and have the proper authority with the pipeline company, they can participate in a Unified Command.



Initial command structure before operator personnel arrive at the scene

When operator personnel arrive at the scene, they will check in with the Incident Commander. If they are trained in ICS and have the proper authority with the pipeline company, they can participate in a Unified Command.

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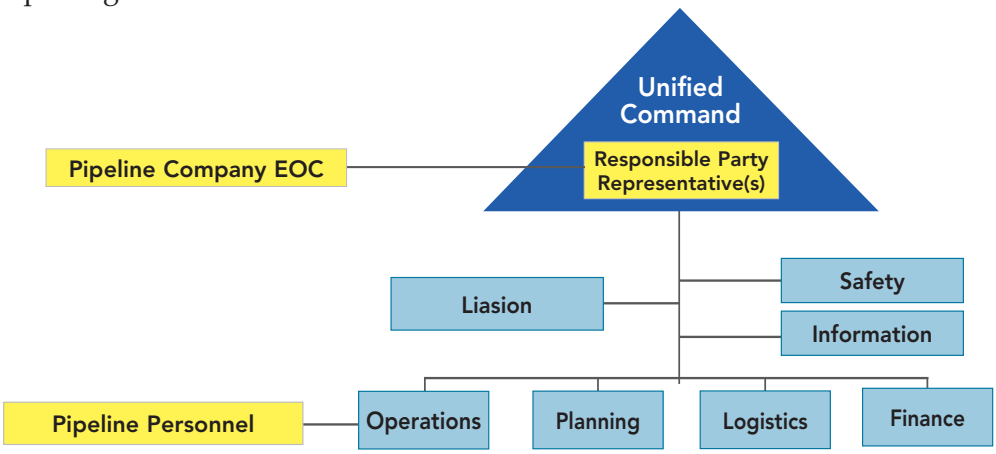
This is common practice for larger incidents and those involving liquid spills impacting the environment.



Unified command incorporating authorized operator personnel

Control Fires, Vapor and Leaks

Because there are many variables to consider, the decision to use water on fires or spills involving water-reactive materials should be based on information from an authoritative source, such as the pipeline operator, who can be contacted by calling the 24-hour emergency phone number listed on a nearby pipeline marker sign.

WARNING Some products, such as anhydrous ammonia, can react violently or even explosively with water. Water getting inside a ruptured or leaking container may cause an explosion or the product's reaction with water may be more toxic, corrosive, or otherwise more undesirable than the product of a fire without water applied. Consequently, it is best to leave a fire or leak alone except to prevent its spreading.

Fire Control

Extinguishing a primary fire can result in explosive re-ignition. Unless it is necessary to save human life, flammable gas fires should NOT be extinguished on flammable gas pipelines unless the fuel source has been isolated and the pipeline operator advises you to take this action! If the fuel source is not shut off and the fire is extinguished, leaking gas can migrate away from the pipeline and find an ignition source.

- Let the primary fire burn. Eliminate potential ignition sources.
- Cool surrounding structures, equipment and vessels. Because water is an inefficient and even dangerous way to fight fuel fires, use a fog pattern, NOT a straight stream of water. Please note some products are not compatible with water; refer to the DOT *Emergency Response Guidebook*.

- Do not inhale fumes, smoke or vapors.
- Once the primary fire is out, beware of hot spot re-ignition.
- Do not operate pipeline valves unless these actions are coordinated with the pipeline operator.

It is important to wear proper protection and use appropriate chemical agents and equipment when containing the vapor release until the pipeline operator arrives on scene.

Vapor Control

Limiting the amount of vapor released from a pool of flammable or corrosive liquids requires the use of proper protective clothing, specialized equipment, appropriate chemical agents, and skilled personnel. For these reasons, it is best to contain the hazards and wait for the pipeline operator's representative to handle the pipeline and its product.

- Do not inhale fumes, smoke or vapors.
- Eliminate ignition sources! Flammable gases may escape under pressure from a pipeline, form a vapor cloud, and be ignited by an ignition source in the area. Explosions of unconfined vapor clouds can cause major structural damage and quickly escalate the emergency beyond responder capabilities.
- Do not ignite a vapor cloud! Pipeline operators will perform this dangerous task.
- Avoid forced ventilation of structures and excavations. Forced ventilation can actually increase the possibility of a flammable atmosphere.
- Limited fog misting can be of some benefit if knocking down a vapor cloud, especially if such a cloud appears to be spreading beyond the

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containment site. Fog misting must be used carefully to prevent incompatible product/water mixing or the spread of product to other areas, as containment dikes may become overfilled.

- Product-compatible foam can be used to suppress vapors or for rescue situations, however, be extremely cautious if fuel discharge is not yet stopped.

CAUTION Before using water spray or foam to control vapor emissions or suppress ignition, obtain technical advice based on chemical name identification. Refer to the pipeline operator and DOT Emergency Response Guidebook.

Leak Control

In addition to hazards such as flammability, toxicity and oxygen deficiency, liquid pipeline leaks and ruptures can create major problems with spill confinement and containment. What seems like a minor spill may evolve into a major spill as liquid inside the pipeline continues to drain out of the line.

- Ask yourself where the spill will be in a few hours, how close the incident is to exposures or sensitive areas, and what can be done to confine the spill or divert it away from exposures.
- Establish barriers to prevent leaks from spreading to water sources, storm drains or other sensitive areas. There are several basic containment devices that can be used to prevent the migration of petroleum products on land or on small streams.
    - Storm sewer or manhole dam
    - Small stream containment boom
    - Pipe skimming underflow dam
    - Wire fence or straw filter dam

If a leak is accidentally ignited, firefighting should focus on limiting the spread of fire damage, but in NO circumstances should efforts be made to extinguish the fire until the source of supply has been cut off or controlled.

- Do not walk into or touch spilled material.
- Do not operate pipeline equipment.

https://vimeo.com/435313416

STEP 7. Working Together with the Pipeline Operator

Operators periodically conduct liaison activities with emergency response organizations to establish and maintain a mutual understanding regarding cooperation and coordination of response efforts. The essential roles and responsibilities of pipeline operators and emergency responders include:

911 Centers and Pipeline Control Centers

- Receive initial notifications and collect critical information.
- Dispatch personnel and equipment to the scene.
- Disseminate information to other agencies or organizations.
- Establish a point of contact for ongoing communications.

NOTE: As of 2022, federal regulations require pipeline operators to notify 911/PSAP centers immediately when alerted to a possible pipeline rupture—even before visual confirmation. This may increase notifications, ensuring responders receive the earliest possible alert of potential emergencies. For further clarification, reach out to your local pipeline operator. Contact information is available at https://pipelineawareness.org/resources/pipeline-member-directory/

Pipeline Operators

- Investigate all abnormal or unsafe conditions involving pipeline facilities.
- Shut off the supply of product and isolate pipeline segments.
- Determine the extent of a product release and potential impact on the surrounding area.
- Establish contact with the Incident Commander before and upon arrival on scene to avoid accidental entry into isolation zones or ignition of the release.
- Provide information regarding additional potential hazards that may be present at the location and Safety Data Sheets as necessary.
- Recommend actions to take related to containment and control of leaking pipeline products.
- Help evaluate possible complications that may result from response activities.
- Fight small fires with hand-held extinguishers.
- Assist with evacuations or traffic control.
- Administer basic first aid and possibly CPR.

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Emergency Responders

- Maintain site control and act as Incident Commander.
- Eliminate ignition sources. Provide standby fire-watch personnel.
- Suppress vapor generation.
- Provide standby rescue personnel to pipeline operator personnel entering the incident area to stop the release.
- Help maintain containment dams and install more as needed.
- Monitor the atmosphere in the repair and containment areas.

Together incident Commander and Pipeline Operators Representative

- Identify public health action levels regarding petroleum-related hazards during a release/discharge, as well as the protective actions to be taken for the public.
- Establish unified command as soon as practicable. As the responsible party, operators will take an active role in the incident command structure.
- Review whether it is safe for the operator's emergency response team and/or their equipment to enter the incident area.
- Determine whether the zone of influence needs additional barricading and diking.
- Coordinate public information needs for the affected area to ensure relevant information is disseminated to the public/media.
- Decide when the area is safe for the public to re-enter.
- Share any "after action" reports and cooperate on improvements to response procedures.

RESPONSE TIP

Please provide your comments about these expectations; email: pipeline.association@pipelineawareness.info or use the on line feedback form at: https://pipelineawareness.org/resources/

05
SECTION

https://vimeo.com 435313891

SECURITY AND DAMAGE PREVENTION

Security and Damage Reporting

In our nation's time of heightened security, it is more important than ever to protect pipelines against damage or attack. Homeland security and infrastructure protection is a shared responsibility. Always report any unusual condition or suspicious activity along a pipeline right-of-way to the pipeline operator. They will immediately investigate and repair any damages.

The Transportation Security Administration (TSA) also wants operators of critical infrastructure to notify them of incidents that are indicative of deliberate attempts to disrupt pipeline operations or activities that could be precursors to such an event, including:

- Explosions or fires of a suspicious nature affecting pipeline systems, facilities or assets
- Actual or suspected attacks on pipeline systems, facilities or assets
- Bomb threats or weapons of mass destruction (WMD) threats to pipeline facilities
- Theft of pipeline company vehicles, uniforms, or employee credentials
- Suspicious personnel or vehicles around pipeline facilities, assets or rights-of-way
- Suspicious photography or possible surveillance of pipeline facilities
- Suspicious inquiries about facilities, operations, or security practices
- Suspicious individuals applying for security sensitive positions at the company
- Theft of sensitive security information (detailed maps or security plans)
- Actual or suspected cyber-attack impacting SCADA or IT systems

Local authorities may also be notified of these kinds of events and be asked to participate in follow up investigations.

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Pipeline Integrity

The industry uses a wide range of tools and technologies to maintain safe operations. In-line inspection tools known as "smart pigs," hydrostatic testing, electro-magnetic testing, and other techniques are employed to identify defects that could threaten pipeline integrity. They visually inspect aboveground pipes and related equipment for corrosion and damage. Operator personnel walk, drive and fly over pipeline rights-of-way inspecting them for unauthorized activities, leaks, and other conditions that might endanger the pipeline or the public. Pipeline control center personnel continuously monitor pipeline operations and will initiate corrective actions if any problems are identified.

Emergencies Affecting Pipelines

Many types of emergency situations can affect buried pipelines. These include train derailments, floods, earthquakes, wildland fires, structure collapses, and other similar events where earth has been disturbed or will be moved as part of the response efforts. In these situations, pipeline companies should be notified as soon as possible so they can monitor and verify the integrity of nearby pipelines.

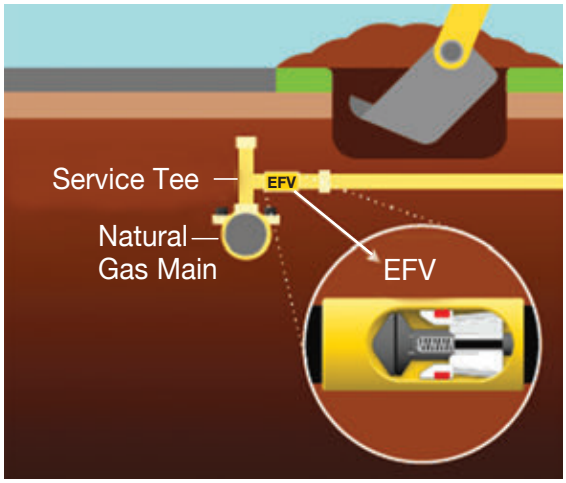
811 Know what's below. Call before you dig.

In certain states, responders may be able to notify pipeline operators of the emergency by calling 811 and informing the One Call Center of the situation. If the call center procedures allow these types of notifications, all operators with buried facilities in the area will be notified and will respond. Coordination with pipeline operators during these types of emergency situations will ensure the safety of the response team and the surrounding community.

Excess Flow Valves (EFV) and Curb Valves

Excess Flow Valves will automatically restrict the flow of gas in service lines that have been cut or damaged. They are now required in new and replaced service lines that supply gas to single-family residences. For larger commercial and industrial users, gas distribution companies are required to install curb valves, manually operated shutoff valves near the service main, or Excess Flow Valves in all new or replaced service lines with meter capacities exceeding 1,000 standard cubic feet per hour.

Policies regarding the operation of curb valves by response personnel should be coordinated with local gas companies so all parties have a clear understanding about what might be expected in an emergency.



Excess Flow Valves (EFVs) restrict the flow of gas as an additional safety measure when service lines are cut or damaged. Source Xcel Energy

A
APPENDIX

Pipeline Integrity

The industry uses a wide range of tools and technologies to maintain safe [illegible] known as "smart pigs," hydrostatic test-

LEAK HAZARD & EMERGENCY RESPONSE INFORMATION

	NATURAL GAS	PETROLEUM GAS	PETROLEUM LIQUIDS	ANHYDROUS AMMONIA	CARBON DIOXIDE	ETHANOL	HYDROGEN GAS	SOUR CRUDE OIL (H_2S)	SOUR GAS (H_2S)
INDICATIONS OF A LEAK									
SEE – liquid pooling on the ground			●			●		●	
SEE – a white vapor cloud that may look like smoke		●		●					
SEE – fire coming out of or on top of the ground	●	●					●		●
SEE – dirt blowing from a hole in the ground	●	●		●	●		●		●
SEE – a sheen on the surface of water		●	●					●	
SEE – an area of frozen ground in the summer	●	●			●		●		●
SEE – an unusual area of melted snow in the winter	●	●			●		●		●
SEE – an area of dead vegetation	●	●	●			●	●	●	●
SEE – bubbling in pools of water	●	●			●		●		●
HEAR – a loud roaring sound like a jet engine	●	●							●
HEAR – a hissing or whistling noise	●	●		●	●		●		●
SMELL – an odor like rotten eggs or a burnt match	1	1						●	●
SMELL – an odor like petroleum liquids or gasoline		●	●			●		●	
SMELL – an irritating and pungent odor				●				●	●
HAZARDS OF A RELEASE									
Highly flammable and easily ignited by heat or sparks	●	●	●			●	●	●	●
Will displace oxygen and can cause asphyxiation	●	●		●	●		●		●
Vapors are heavier than air and will collect in low areas		●	●	●	●	●		●	●
Contact with skin may cause burns, injury or frostbite		●	●	●	●	●	●		●
Initial odor may be irritating and deaden the sense of smell								●	●
Toxic and may be fatal if inhaled or absorbed through skin				●				●	●
Vapors are extremely irritating and corrosive				●				●	●
Fire may produce irritating and/or toxic gases	●	●	●	●		●	●	●	●
Runoff may cause pollution			●	●		●		●	
Vapors may form an explosive mixture with air	●	●	●			●	●	●	●
Vapors may cause dizziness or asphyxiation without warning	1	1			●		●		
Is lighter than air and can migrate into enclosed spaces	●						●		
EMERGENCY RESPONSE									
Avoid any action that may create a spark	●	●	●			●	●	●	●
Do NOT start vehicles, switch lights or hang up phones	●	●	●			●	●	●	●
Evacuate the area on foot in an upwind and/or uphill direction	●	●	●	2	2	●	●	2	2
Alert others to evacuate the area and keep people away	●	●	●	2	2	●	●	2	2
From a safe location, call 911 to report the emergency	●	●	●	●	●	●	●	●	●
Call the pipeline operator and report the event	●	●	●	●	●	●	●	●	●
Wait for emergency responders to arrive	●	●	●	●	●	●	●	●	●
Do NOT attempt to close any pipeline valves	●	●	●	●	●	●	●	●	●
Take shelter inside a building and close all windows				2	2			2	2

1 The majority of these products are naturally odorless and only certain pipeline systems may be odorized. Odorant can also fade or be scrubbed out when leaking products migrate through soil.

2 Sheltering in place is an alternative to evacuation when the products are toxic or the risk of fire is very low. Refer to "Shelter-In-Place or Evacuate Guidance Document" provided online at **https://qrco.de/Evacuation.**

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GENERAL PRODUCT CHARACTERISTICS

Products (1)	**Flash Point** (deg. F)	**Flammable Limits** (% in air by volume)	**Auto Ignition** (deg. F)	**Vapor Density** (air = 1)
Natural Gas (2)	**-300**	**4.0 – 16.0**	**1000**	**0.6**
Methane	-306	5.0 – 15.0	1076	0.55
Ethane	-211	3.0 – 12.5	882	1.04
Petroleum Gas (3)	**-170**	**2.0 – 12.0**	**800**	**>1**
Propane	-156	2.1 – 9.5	842	1.56
Butane	-76	1.9 – 8.5	550	2.07
Ethane	-211	3.0 – 12.5	882	1.04
Ethylene	-76	2.7 – 36.0	842	0.98
Propylene	-162	2.4 – 10.3	851	1.49
Petroleum Liquids	**-45 - 240**	**0.5 – 15.0**	**410**	**>1**
Crude Oil	-40 - 200	0.6 – 8.0	492	4.5
Gasoline	-45	1.2 – 7.8	536	3.5
Diesel Fuel	100 - 130	0.6 – 7.5	494	4.5
Aviation Gasoline	-50	1.2 – 7.1	824	3.5
Jet Fuel	100 - 140	0.6 – 19.0	410	4.5
Fuel Oil	100 - 240	0.6 – 7.5	410	4.5
Kerosene	100 - 162	0.7 – 5.0	410	4.5
Naphtha	-3	1.1 – 5.9	550	2.5
Xylene	63	1.0 – 7.0	867	3.7
Anhydrous Ammonia	**NA**	**16.0 – 25.0**	**1204**	**0.6**
Carbon Dioxide	**NA**	**NA**	**NA**	**>1**
Ethanol	**55**	**3.3 – 19.0**	**685**	**1.6**
Hydrogen Gas	**-423**	**4.0 – 75.0**	**932**	**0.07**
Hydrogen Sulfide Gas (H2S)	**-115**	**4.0 – 44.0**	**500**	**1.19**

Notes:

1. The bolded entries represent broad product categories. The corresponding information has been generalized and may vary depending on the specific product or combination of products transported. Information shown for specific products may also vary by grade or individual manufacturer.
2. Natural gas that is stored or transported in the liquid state is commonly referred to as LNG.
3. Petroleum gasses may be transported as a gas or a liquid. When transported as a liquid, they are commonly referred to as Liquefied Petroleum Gas (LPG), Natural Gas Liquids (NGL) or Highly Volatile Liquids (HVL). These products will be in the form a liquid when under pressure but will take the form of a gas when released to the atmosphere.
4. This information was compiled from multiple sources: WISER, Wikipedia, and various SDS sheets. It is intended to provide general guidance and is not inclusive of all products. Manufacturers SDS sheets should be referred to when specific information is needed.

C
APPENDIX

Recommended Minimum Evacuation Distances for Natural Gas Pipeline Leaks and Ruptures

Not applicable for butane, propane, or other hazardous liquids.

During an emergency, please consult with the pipeline operator for pipeline size and pressure.

Pipeline Size (Inches)

Pressure (psig)	4	6	8	10	12	16	20	22	24	30	36	42
100	91	137	182	228	274	365	456	502	547	684	821	958
200	129	193	258	322	387	516	645	709	774	967	1161	1354
300	158	237	316	395	474	632	790	869	948	1185	1422	1659
400	182	274	365	456	547	730	912	1003	1094	1368	1642	1915
500	204	306	408	510	612	816	1020	1122	1224	1529	1835	2141
600	223	335	447	558	670	894	1117	1229	1340	1675	2011	2346
700	241	362	483	603	724	965	1206	1327	1448	1810	2172	2534
800	258	387	516	645	774	1032	1290	1419	1548	1935	2322	2709
900	274	410	547	684	821	1094	1368	1505	1642	2052	2462	2873
1000	288	433	577	721	865	1154	1442	1586	1730	2163	2596	3028
1100	302	454	605	756	907	1210	1512	1664	1815	2269	2722	3176
1200	316	474	632	790	948	1264	1580	1738	1896	2369	2843	3317
1300	329	493	658	822	986	1315	1644	1809	1973	2466	2959	3453
1400	341	512	682	853	1024	1365	1706	1877	2047	2559	3071	3583
1500	353	530	706	883	1060	1413	1766	1943	2119	2649	3179	3709
1600	365	547	730	912	1094	1459	1824	2006	2189	2736	3283	3830
1700	376	564	752	940	1128	1504	1880	2068	2256	2820	3384	3948
1800	387	580	774	967	1161	1548	1935	2128	2322	2902	3482	4063
1900	398	596	795	994	1193	1590	1988	2186	2385	2981	3578	4174
2000	408	612	816	1020	1224	1631	2039	2243	2447	3059	3671	4283
2100	418	627	836	1045	1254	1672	2090	2299	2508	3134	3761	4388
2200	428	642	856	1069	1283	1711	2139	2353	2567	3208	3850	4492

Table 1 – Evacuation Distance in Feet

The applicable leak or rupture condition is that of a sustained trench fire fueled by non-toxic natural gas escaping from two full bore pipe ends. Blast overpressure is not addressed. The distances shown in Table 1 are intended to provide protection from burn injury and correspond to a thermal heat flux exposure level of 450 Btu/hr ft2. This is the accepted limit of heat exposure for unprotected outdoor areas where people congregate; as established by the US Department of Housing & Urban Development Code 24CFR51, Subpart C, Siting of HUD Assisted Projects Near Hazardous Operations Handling Conventional Fuels or Chemicals of an Explosive or Flammable Nature. The formula used to calculate distance was taken from the Gas Research Institute Report GRI-00/0189, A Model for Sizing High Consequence Areas Associated with Natural Gas Pipelines, 2001, prepared by C-FER Technologies. The formula is: square root of pressure x nominal pipe size x 2.28. That model does not take into account wind or other factors which may greatly influence specific conditions. Users are advised that the distances shown in Table 1 are considered to be "general information" only and are not intended to replace a site specific risk analysis. The Pipeline Association for Public Awareness makes no warranty with respect to the usefulness of this information and assumes no liability for any and all damages resulting from its use. Anyone using this information does so at their own risk.

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NATURAL GAS ESCAPING INSIDE A BUILDING

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- EXTREMELY FLAMMABLE
- Will be easily ignited by heat, sparks or flames.
- Will form explosive mixtures with air
- Vapors from liquefied gas are initially heavier than air and spread along ground.

CAUTION: Natural Gas / Methane (UN1971) is lighter than air and will rise. Natural Gas/ Methane (UN1971) fires are difficult to detect since they burn with an invisible flame. Use an alternate method of detection (thermal camera, broom, etc.)

- Vapors may travel to source of ignition and flash back
- Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
- Containers may explode when heated
- Ruptured cylinders may rocket

HEALTH

- Vapors may cause dizziness or asphyxiation without warning
- Some may be irritating if inhaled at high concentrations
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire may produce irritating and/or toxic gases.

PUBLIC SAFETY

- Approach cautiously
- Establish an effective and safe perimeter.
- Position apparatus out of danger zone (avoid front of building and over manhole covers and sewers).
- Keep unauthorized personnel away.
- Secure the scene and deny entry.

EVACUATION

- Evacuate the public to a safe distance.
- As soon as possible, contact the gas operator and coordinate large scale evacuations.
  - DOT ERG 115 recommends initial isolation distance of at least 100 meters (330 feet) in all directions.
  - Pipeline operators, however, upon assessment at arrival may recommend a greater evacuation distance.

EMERGENCY RESPONSE

- Wear positive pressure self-contained breathing apparatus (SCBA) as well as full structural firefighter protective clothing.
  - Structural firefighters' protective clothing will only provide limited thermal protection.
- Listen for hissing sound, but use CAUTION as no noise may be heard.
- Monitor the atmosphere, using multiple monitors where possible.
  - Action Criteria: 0 to 10 percent of the LEL — Use Extreme Caution
  - Action Criteria: 10 percent of the LEL or greater — DO NOT ENTER THE BUILDING
- If possible, determine the source of the release without risk to the responders. Multiple locations are possible due to damage or pullout at joints.
- Monitor for natural gas traveling away from source toward exposures.
- Control ignition sources (smoking, open flames, internal combustion engines and motors).
- Do not operate electric devices such as switches, etc. Sparks can cause ignition.
- Be cautious of contacting the piping system; a static spark may occur and result in ignition.
- Whenever possible, adopt a defensive or non-intervention mode and wait for the utility company to arrive.
- Protect exposures from the radiant heat of the fire.
- Never extinguish the fire until the leak can be shut off and controlled, unless there is immediate danger to life.
- With any leak, always anticipate and expect that ignition will occur.

TACTICAL CONSIDERATIONS

- Natural gas released inside buildings presents one of the greatest flammable hazards to emergency responders.
- Building full of natural gas should only be approached when needed with extreme caution and with a minimum number of personnel. CGI readings in excess of 10 percent LEL require evacuation of the building.

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- Stop or control the gas release at the appliance, or service meter valve.
- If possible to do safely, ventilate the area. If the flammable atmosphere is above the upper explosive limit (UEL), keep in mind that during ventilation the atmosphere will pass back through the flammable range of 4 percent to 16 percent gas to air. Also remember that fans are a potential ignition source.
    - Natural gas, depending on the makeup, requires a minimum mixture of 4 percent to 16 percent in air to ignite (40,000 ppm. to 160,000 ppm).
    - NOTE: Odor can be detected as low as 1 ppm. However, if underground migration occurs, odorant may be stripped from the gas.
- NORMALLY, DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED. Extinguish surrounding fires, but not gas fed fire.
- Use protective hose streams to approach if necessary.
- DO NOT CLOSE main valves or any other large transmission or distribution valves. This can lead to serious problems elsewhere in the system.
- Closed valves should remain closed until opened by gas utility personnel.
- Do not squeeze off gas piping — static electricity may cause ignition.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service
- Assess the victim to determine if he/she is breathing normally. The level of treatment provided should be based on your level of individual training.
- Professional Rescuers provide artificial respirations if the victim is in respiratory distress.
- Non-Professional Rescuers begin CPR if the victim is not breathing normally.
- Administer oxygen if breathing is difficult
- Remove and isolate contaminated clothing and shoes.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

OTHER CONSIDERATIONS

- Decontaminate if necessary to remove the odorant.
- Debrief all responders and schedule a critique with all involved.

E
APPENDIX

STORAGE FACILITIES

Storage is an essential component in our nation's energy supply chain. Storage facilities supplement the pipeline system and ensure that sufficient supplies are available throughout the year to meet the public's needs. In addition, storage facilities help stabilize energy costs and can soften the impacts of price volatility in wholesale markets.

Products transported in pipelines are typically stored in tanks or in underground geologic formations that serve as storage reservoirs. Certain types of products are better suited for specific types of facilities. The table below lists the various products and common methods for storing those products:

Product *	Guide	Form	Location	Facility	Pressure
Anhydrous Ammonia	125	Liquid	Aboveground	Tank	Up to 300 psig
Carbon Dioxide	120	Liquid	Aboveground	Tank	Up to 2200 psig
Ethanol	127	Liquid	Aboveground	Tank	Atmospheric
Hydrogen Gas	115	Gas	Aboveground	Tank	Up to 10,000 psig
Natural Gas	115	Gas	Underground	Reservoir	Up to 5000 psig
		Liquid (LNG)	Aboveground	Tank	Atmospheric –260 °F
Petroleum Gas	115	Liquid (LPG)	Aboveground	Tank	150 – 250 psig
			Underground	Reservoir	150 – 250 psig
Petroleum Liquids	128	Liquid	Aboveground	Tank	Atmospheric
			Underground	Reservoir	Atmospheric
				Tank	Atmospheric

* Refer to "Product and Facilities" section for detailed product information

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Knowledge of the facility is essential; operator personnel should be consulted as soon as possible. Always refer to the DOT ERG for general response guidelines. Additional specific considerations for incidents involving storage reservoirs or bulk storage facilities are included below:

FIRE UNDERGROUND STORAGE RESERVOIRS

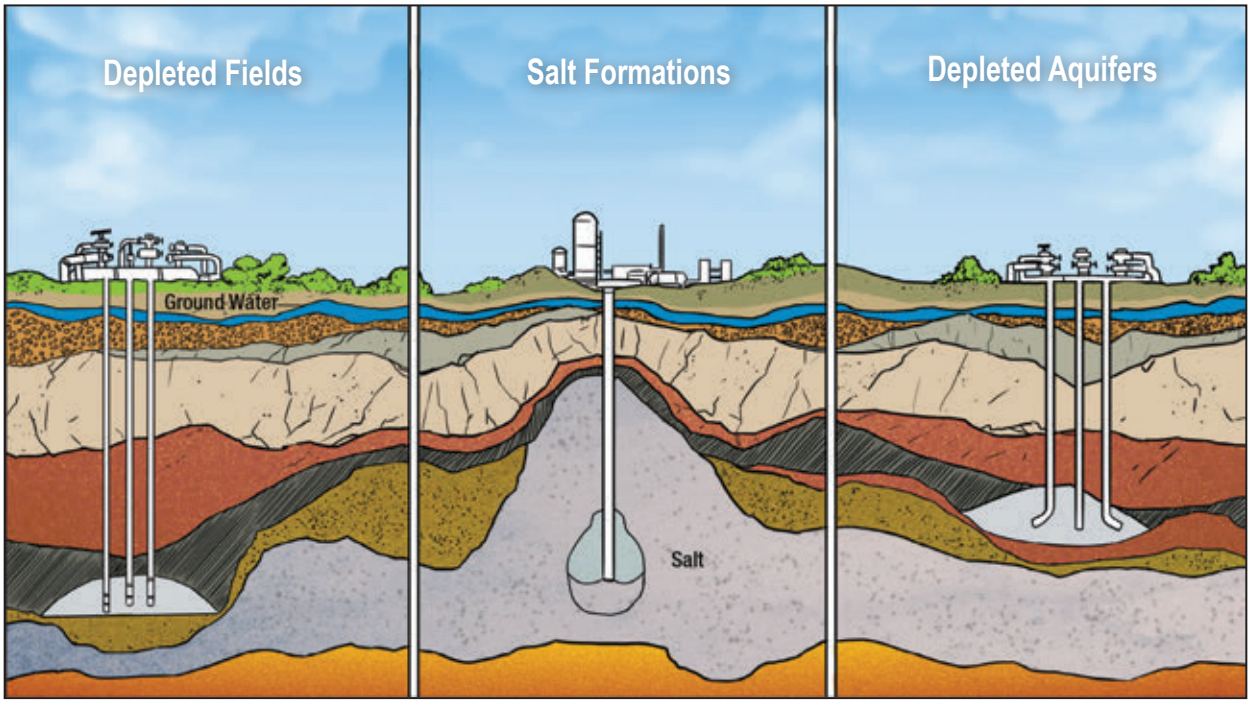
- Large volumes of product may be involved
- Events may impact large areas (one half mile radius or larger) and natural gas can migrate long distances
- Underground leaks may take several weeks to repair
- Large natural gas leaks may necessitate air traffic restrictions or coordination with FAA
- Natural gas can migrate into nearby water wells if leaks are located below the water table

STORAGE TANKS

- Large volumes of product may be involved
- Liquefied Natural Gas expands to 600 times it's volume at ambient temperatures
- Propane expands to 270 times its volume
- Crude oil storage tanks may contain hydrogen sulfide
- Events may impact large areas (one half mile radius or larger)
- Be prepared for a flash fire
- Do not enter an area where gas or vapor cloud may be present — blowing or not
- If tank is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions
- In fires involving Liquefied Petroleum Gases (LPG) (UN1075); Butane, (UN1011); Butylene, (UN1012); Isobutylene, (UN1055); Propylene, (UN1077); Isobutane, (UN1969); and Propane, (UN1978), also refer to Boiling Liquid Expansive Vapor Explosion (BLEVE) — SAFETY PRECAUTIONS (Page 368 in the 2016 edition of the DOT ERG)

STORAGE RESERVOIRS

The types of subsurface geologic formations or reservoirs commonly used for storing products underground include: depleted oil or gas fields, salt caverns and depleted aquifers.



Depleted Oil or Natural Gas Fields

Depleted oil and gas fields are commonly used to store natural gas. Of the approximately 400 active natural gas underground storage facilities in the U.S., about 80 percent are depleted natural gas or oil fields.

Salt Caverns

Salt caverns are commonly used to store crude oil and liquid petroleum gas (LPG). The U.S. Strategic Petroleum Reserve (approximately 700 million barrels of crude oil) is stored in 60 different caverns located in the Gulf Coast states of Texas and Louisiana.

Depleted Aquifers

Depleted aquifers are used to store approximately 10 percent of natural gas that is stored underground. They are found mostly in the Midwestern states. An aquifer is suitable for gas storage if the water-bearing sedimentary rock formation is overlaid with an impermeable cap rock.

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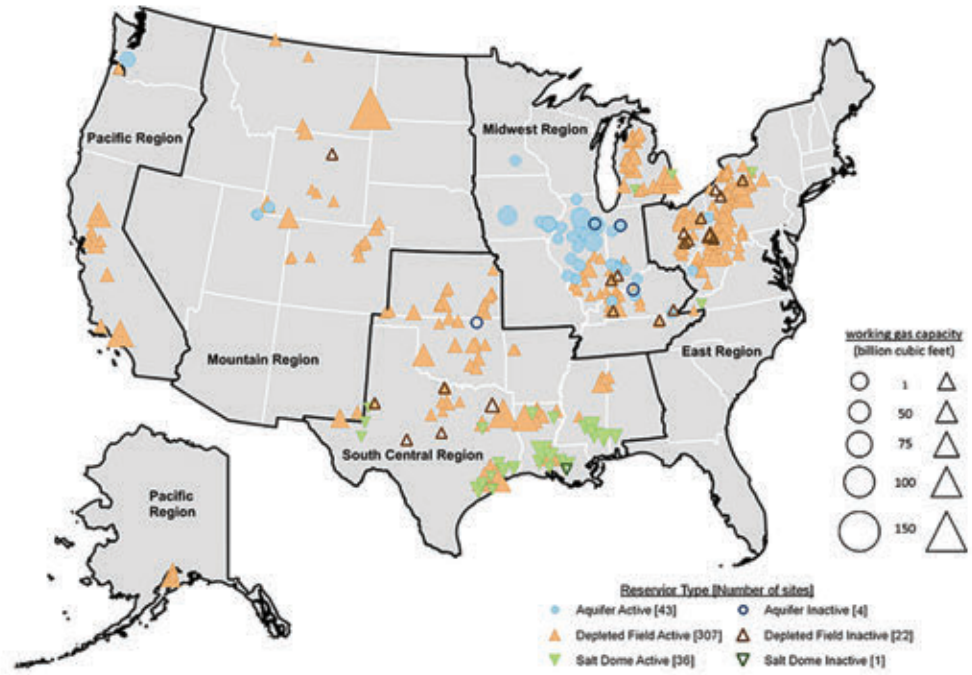
U.S. Underground Natural Gas Storage Facilities



Source: U.S. Energy Information Administration

STORAGE TANKS

There are many types of storage tanks found in pipeline transmission. They include: underground tanks, aboveground tanks, pressure containing or high pressure tanks, and non-pressure containing or atmospheric tanks.

The most common tanks are atmospheric pressure tanks or low-pressure tanks. These tanks have various roofs with the most common being a floating roof. Floating roofs can be covered or open. Another type of covered floating roof is a geodesic dome recognizable by the light-weight dome construction that extends above the tank.

Floating Roof Atmospheric or Low Pressure Storage Tanks

Fixed Roof or Cone Roof Atmospheric Storage Tanks

The third is a fixed roof tank, known as a cone or flat roof. Other type of roofs found in low-pressure tanks are various small containers in tank batteries at the wells, processing and transmission throughout the pipeline system.

Refined Products

National Heating Oil Reserve in the Northeast

Insulated Low Pressure Storage Tanks for LNG

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High Pressure Storage Tanks

Liquefied Petroleum Gas LPG

Compressed Natural Gas

Anhydrous Ammonia

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SHELTER-IN-PLACE OR EVACUATE?

When people are exposed to a hazardous condition like a pipeline leak, the natural response is to get away from the hazard and evacuate the area. However, sheltering in place may be a safer alternative under certain circumstances. So how does a person know which protective action is best? The answer is, "It depends."

Each situation is different and there are many things to consider in evaluating the hazards associated with a pipeline leak. Some of the most significant include: toxicity of the product, potential exposure to fire, wind direction, proximity to the leak, adequacy of the available shelters, and the response capabilities of the affected individuals. Examples of situations where each protective action would be appropriate are shown in the table below.

GENERAL PROTECTIVE ACTIONS FOR VARIOUS PIPELINE LEAKS

Products	Evacuation	Shelter-In-Place
Natural Gas	Any size leak inside a building or enclosed space.	Small leaks in outside areas with no potential for gas migration through soil and a fire would not impact the shelter.
Petroleum Gas Petroleum Liquids Ethanol	Leaks located uphill from available shelter or where a shelter could be adversely impacted by a fire.	Small leaks located downhill (liquids) or downwind (gasses) from a shelter where a fire would not impact the shelter
Anhydrous Ammonia Carbon Dioxide	Leaks located downwind of available shelters.	Large or small leaks upwind of the location.
Products containing Hydrogen Sulfide (e.g. "Sour Gas")	Small leaks downwind and/or downhill of the location.	Large or small leaks upwind and/or uphill of the location.

Before deciding which protective action may be best in your situation, obtain specific pipeline information from the operators and discuss alternatives with your local Hazmat response team. Additional guidelines such as the U.S. DOT Emergency Response Guidebook should also be consulted.

A re-formatted copy of the Evacuation/Shelter-In-Place Decision Guide developed by the Nashua Office of Emergency Management and the Nashua Regional Planning Commission is also available as an additional resource. It addresses the pros and cons of evacuation and shelter-in-place in greater detail. It is available for download here. **evacuationshelterinplacedecisionguide.pdf**.

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Or visit https://qrco.de/bfukwZ

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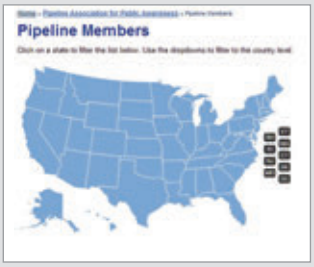
ADDITIONAL RESOURCES

Pipeline Member Contact Directory

The complete Pipeline Member Directory is available online at: **www.pipelineawareness.org**. This listing can be filtered by state and county to show the members in your area. It can also be downloaded in PDF format and includes both emergency and non-emergency contact information. If you need to contact all the pipeline members in a County, just use the Request Information form under Resources.



Pipelines Nearby—Mobile Friendly Web Application

This application is available both on the web and from mobile devices. If you are using a GPS enabled device, it will take the coordinates from your mobile phone and render information for the five participating member pipelines closest to that location (only pipelines provided to us). It can be accessed at: **www.pipelinesnearby.org**

Emergency Response Capabilities Database and Web Application

To enhance our mutual response, the website has a section to capture and display Emergency Response Capabilities for both First Responders and Pipeline Operators. Please log on to register your agency's capabilities and the results will be accessible to all organizations: pipelineawareness.org/capabilities

Online Interactive Scenarios and Training Aids

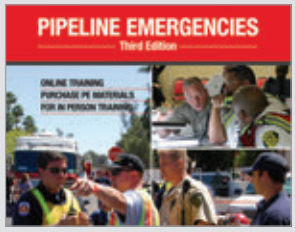
Access a library of interactive training scenarios to apply your knowledge and solve problems. The training materials include: interactive training scenarios, training videos, a PPT presentation based on the Pipeline Emergency Response Guidelines booklet, instructors guide, and practice test. These resources may be accessed at: **https://training.pipelineawareness.org/**

Responding to Natural Gas Emergencies Interactive Textbook and Online Course

Textbook with video instruction and supportive online course prepares all first responders and community officials with practical knowledge addressing potential hazards and safe emergency response procedures. Program is recommended by PHMSA for meeting and exceeding industry API RP 1162 compliance requirements. Certificates are provided for completing online course. Web address is https://papa.rtueonline.com. Textbooks, **http://www.redhatpub.com/naturalgasemergencies.html.**

Pipeline Emergencies—Online Course

This curriculum is provided by the National Association of State Fire Marshalls. The online book contains extensive background information about various types of liquid and gas pipeline facilities. The online book and other training materials are available at: **www.firemarshals.org/Store**



Fire Department Pipeline Response Emergency Planning & Preparedness (FD PREPP)—Online Resources and Toolkit

These resources are provided by the National Volunteer Fire Council (NVFC). The program includes easy-to-use training aids coupled with practical tools to create a "user friendly" experience. The training materials can be accessed at: **www.nvfc.org/pipelines/**

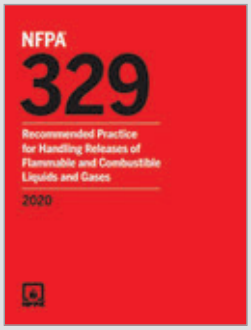
National Emergency Number Association (NENA) Pipeline Emergency Operations Standard/Model Recommendation Document 56-007

This Standard is intended to aid Public Safety Answering Points (PSAP) in the development and implementation of emergency communications protocols pertaining to pipeline emergencies. The web address is **www.nena.org**

NENA THE 9·1·1 ASSOCIATION

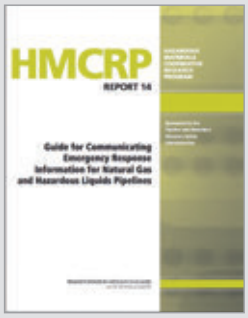
NFPA 329: Recommended Practice for Handling Releases of Flammable and Combustible Liquids and Gases

This recommended practice outlines the appropriate methods for responding to fire, explosion, and human health hazards resulting from the release of a flammable, combustible, or otherwise hazardous liquid, gas, or vapor that may migrate to a subsurface structure. This resource may be accessed at: **www.nfpa.org/codes-and-standards /document-information-pages?mode=code &code=329**



Guide for Communicating Emergency Response Information for Natural Gas and Hazardous Liquids Pipelines

The Transportation Research Board's Hazardous recently released Report 14: Guide for Communicating Emergency Response Information for Natural Gas and Hazardous Liquids Pipelines. This report provides guidance on responding to a pipeline emergency. **https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/hmcrp_rpt_014.pdf**



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Emergency Response Capabilities

Pipeline Association *for* Public Awareness

Scan to submit electronically!

The **Emergency Response Capabilities Database & Reporting Tool** is a web-based application that is intended for emergency planning activities (it is not a contractual or binding agreement). It can be accessed at: **http://capabilities.pipelineawareness.org** Emergency Responders are encouraged to contact pipeline operators to discuss specific response capabilities.

Please provide your organization's response capabilities by filling out this form and emailing it to **pipeline.association@pipelineawareness.info.** Your information will be entered into the database and included in the on line reports. After your information has been entered, you will receive a confirmation e-mail with your assigned user name and password.

Organization Information

Organization Name:

Contact Name:

Contact Email:

Contact Phone:

Organization Type

☐ Response Agency ☐ Pipeline Operator

Location Information

Location information allows capabilities to be reported by state and county. You can list up to two states with the corresponding counties below. Attach a separate listing if your jurisdiction includesmore than two states.

State: Counties:

State: Counties:

8601 W Cross Dr PMB 302 Unit F5, Littleton, CO 80123 www.pipelineawareness.org

Pipeline Association *for* Public Awareness

Emergency Response Capabilities

Capabilities

Select all items that may apply to your organization

Personnel have:

- ☐ training on the Incident Command System
- ☐ training on the National Incident Management System
- ☐ training on the DOT Emergency Response Guidebook
- ☐ HAZWOPER 1ST Responder Awareness Level training
- ☐ HAZWOPER 1ST Responder Operations Level II training
- ☐ taken a HAZWOPER 24 or 40 Hour Course
- ☐ training on responding to pipeline emergencies
- ☐ participated in pipeline emergency mock exercises or drills
- ☐ responded to an actual gas leak in a building
- ☐ responded to an actual pipeline emergency
- ☐ certification for Level 1 First Aid
- ☐ certification for Emergency Medical Technician (EMT)
- ☐ operations Level Certification under NFPA 472
- ☐ knowledge of the practices in NFPA 329
- ☐ accessed the National Pipeline Mapping System

Agreements are in place to:

- ☐ dispatch Hazmat Units
- ☐ deploy containment devices
- ☐ deploy absorbent materials
- ☐ deploy earth moving equipment

Responding units carry:

- ☐ DOT Emergency Response Guidebook
- ☐ other response plans or procedures
- ☐ listing of emergency contacts for their area
- ☐ flares or other traffic control devices
- ☐ instruments to detect Natural Gas (methane)
- ☐ instruments to detect Propane (hydrocarbons)
- ☐ instruments to detect Hydrogen Sulfide (H2S)
- ☐ instruments to monitor Oxygen levels
- ☐ instruments to detect Carbon Monoxide (CO)
- ☐ 800 trunking radios
- ☐ computer or mobile on scene internet access
- ☐ equipment to deploy foam
- ☐ dry chemical (Class BC) handheld fire extinguishers

The Organization:

- ☐ will notify other dispatch centers of pipeline leaks or unsafe conditions
- ☐ will dispatch personnel to investigate potentially hazardous leaks
- ☐ will provide product hazard information / Safety Data Sheets
- ☐ will share appropriate emergency response plans or procedures
- ☐ will coordinate valve closures with all affected parties
- ☐ will participate in Unified Incident Command
- ☐ has a mutual understanding with other response organizations regarding coordination of pipeline emergency response efforts

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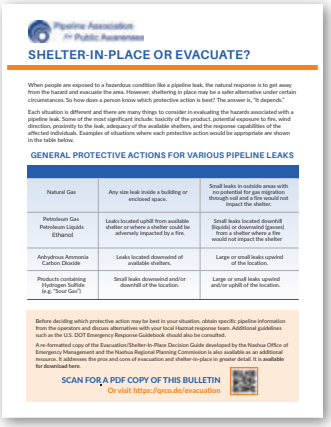
FREE RESOURCES FOR EMERGENCY RESPONDERS

Shelter In-Place or Evacuate


SHELTER-IN-PLACE OR EVACUATE?

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SCAN FOR A PDF COPY OF THIS BULLETIN
Or visit https://qrco.de/evacuation

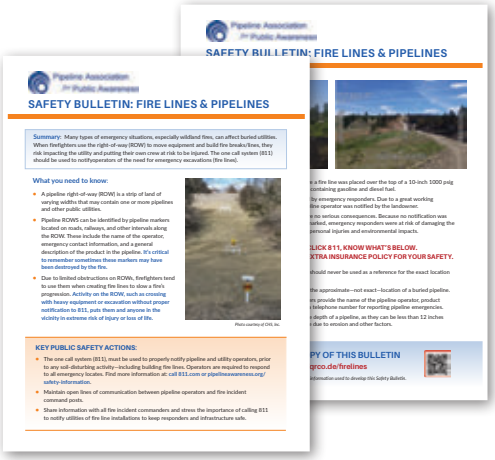
This one-page guidance document provides considerations on when to shelter-in-place and when to evacuate during pipeline emergencies, and can be found on page 44 of this guide.

https://qrco.de/evacuation

You can also download a detailed decision guide funded by a US Department of Transportation Pipeline and Hazardous Materials Safety Administration Technical Assistance Grant with services provided by the City of Nashua Office of Emergency Management and the Nashua Regional Planning Commission.

https://qrco.de/decisionguide

Safety Bulletin: Fire Lines & Pipelines


SAFETY BULLETIN: FIRE LINES & PIPELINES

Summary: Many types of emergency situations, especially wildland fires, can affect buried utilities. When firefighters use the right-of-way (ROW) to move equipment and build fire breaks/lines, they risk impacting the utility and putting their own crew at risk to be injured. The one call system (811) should be used to notifyoperators of the need for emergency excavations (fire lines).

What you need to know:

- A pipeline right-of-way (ROW) is a strip of land of varying widths that may contain one or more pipelines and other public utilities.
- Pipeline ROWS can be identified by pipeline markers located on roads, railways, and other intervals along the ROW. These include the name of the operator, emergency contact information, and a general description of the product in the pipeline. It's critical to remember sometimes those markers may have been destroyed by the fire.
- Due to limited obstructions on ROWs, firefighters tend to use them when creating fire lines to slow a fire's progression. Activity on the ROW, such as crossing with heavy equipment or excavation without proper notification to 811, puts them and anyone in the vicinity in extreme risk of injury or loss of life.

Photo courtesy of CHS, Inc.

KEY PUBLIC SAFETY ACTIONS:

- The one call system (811), must be used to properly notify pipeline and utility operators, prior to any soil-disturbing activity—including building fire lines. Operators are required to respond to all emergency locates. Find more information at: call 811.com or pipelineawareness.org/safety-information.
- Maintain open lines of communication between pipeline operators and fire incident command posts.
- Share information with all fire incident commanders and stress the importance of calling 811 to notify utilities of fire line installations to keep responders and infrastructure safe.

This safety bulletin provides real-life, practical information for emergency responders when constructing fire lines or operating heavy equipment over pipelines.

https://qrco.de/firelines

Online Training and Scenarios

When it comes to training your team to respond to pipeline emergencies, you are not alone! The Pipeline Association for Public Awareness offers **FREE training resources** including:

- Online Training and Scenarios
- Presentation PowerPoint Decks
- Short Training Videos
- One Page Handouts

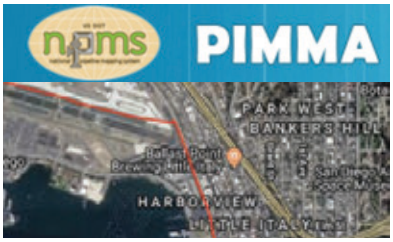
https://training.pipelineawareness.org/

Pipeline Association *for* Public Awareness

FREE RESOURCES FOR EMERGENCY RESPONDERS

Maps and Contact Information

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides access to maps, critical contact info and other key information through the National Pipeline Mapping System (NPMS). Local, state, tribal and federal officials can apply for specialized access to information on hazardous liquid and gas transmission pipelines in their jurisdiction by registering for NPMS's Pipeline Information Management Mapping Application (PIMMA).

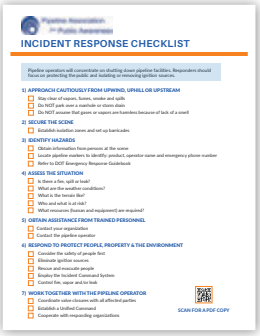


https://www.npms.phmsa.dot.gov/

NPMS does not include gathering or distribution pipelines. Visit the PAPA website for additional information on pipelines operated by our member companies, including distribution and gathering pipelines.

https://pipevision.pipelineawareness.org

Pipeline Emergency Checklist


INCIDENT RESPONSE CHECKLIST

PAPA's Incident Response Checklist provides you and your agency with a step-by-step procedure for responding to pipeline emergencies. You can find a version on the inside cover of this guide, download a copy on our website, or request hard copies are mailed to you for sharing with others.

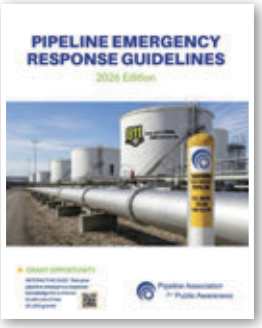
REQUEST MATERIALS

https://qrco.de/copies

DOWNLOAD PDF

https:/pipelineawareness.org/responsechecklist

Grant Opportunity!



Certify your knowledge for a chance to win one of two $1,250 grants for your agency!

PAPA is offering emergency responders the opportunity to take a short interactive quiz, certifying their knowledge of pipeline emergency response and pipeline awareness to be entered in a drawing to win a $1,250 grant!

Complete the quiz by April 1, 2027 to be eligible to win one of two $1,250 grants.

https://qrco.de/perg25quiz

PIPELINEAWARENESS.ORG
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Pipeline Association *for* Public Awareness