Pipeline Emergency Preparedness & Training: Tailboard Scenario – A Natural Gas Transmission Incident

“Engine 3, Engine 17, Squad 2, and Battalion 3 respond to a natural gas break near the intersection of Oak Hill Drive and Shadow Brook Avenue. Time out 07:50”...

So here we go, another “typical” gas leak call! Or is it? Upon arrival this scene is anything but typical. A city contractor working with a backhoe has hit a 12 inch natural gas transmission pipeline operating at several hundred pounds of pressure and caused a significant leak. Heavy morning traffic has come to a standstill making response to the scene almost impossible.

As you approach the incident site, you hear an almost deafening roar that sounds like a jet engine and realize this isn’t a “routine” cut gas distribution line. As you begin your scene size-up, you discover that one of the contractor’s employees, who was standing near the backhoe at the time it hit the pipeline, has sustained serious injuries and appears unconscious. Milford Elementary School, located across the street, and to the south of the incident site has 500 students that have arrived and are beginning to start the school day. As you further assess the scene you are advised that the wind is 6 to 8 miles per hour from the north.

Numerous bystanders are gathering at the scene as law enforcement units from the city police department and county sheriff’s department arrive on the scene to assist. Dispatch advises that a serious multi-vehicle accident has just occurred further east on Oak Hill Drive, resulting in several injuries.

A reporter and camera crew from Action 6 News is on the scene and wants to conduct a live interview with someone from the fire department. A reporter with the Daily Tattletale has also arrived, and is requesting an interview.

You have established a Command Post in a safe location north of the incident site, confirmed notification of the pipeline operator and started developing strategic objectives...
What are your priorities based on Life Safety, Incident Stabilization, and Property Conservation?

What directions do you give your Operations Section Chief?

What resources do you need that aren’t currently available on the scene?

What would your Incident Command System structure look like for this type of incident?

How do you coordinate with the pipeline operations personnel that arrive on the scene?

If this incident occurred this afternoon, would you know how to handle it? When was the last time you ran a tabletop exercise that would test your standard operating procedures and decision making for a complex event of this nature? Are you familiar with the pipeline operator’s response procedures and capabilities to assist you in managing the emergency?

Pipeline Emergency Response Tactics: Signs of a Natural Gas Leak

While natural gas emergencies are relatively rare, sometimes they do occur and emergency responders are called to respond. So how would you identify a natural gas leak? In pre-planning a response to a suspected natural gas leak, it is important to understand the signs. While the general public and emergency responders have long associated leaking natural gas with the “rotten egg” odor, it is important to understand that not all natural gas is transported with odorant.

Mercaptan, the product used to provide the distinctive odor to natural gas, is added to the gas stream at the rate of ½ pound per one thousand cubic feet. This is typically done at town border or “gate” stations where the gas is delivered by transmission pipelines to local distribution companies. Transmission pipelines do not typically transport odorized gas due to the volumes, rural nature of the operations, and the fact that some industrial customers cannot accept odorized gas in their production processes.

Understanding that natural gas may be transported in an odorized or un-odorized manner, it is important to identify the type of pipeline that may be experiencing a leak as early as possible. Do not rely on your sense of smell exclusively to identify leaking natural gas.

Some common signs of leaking natural gas include:

- Dead or dying vegetation in an area with existing healthy plant life
- A hissing sound or noise
- Bubbles in bodies of water containing pipeline crossings
- Blowing dirt or mud
- The distinctive “rotten egg” or sulfur odor associated with natural gas containing Mercaptan

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The only proven method to ascertain the exact location of leaking natural gas is through the use of combustible gas indicators or CGI's. These devices are calibrated for methane, the main constituent on natural gas, and have the ability to measure the gas in percent of the flammable range, and in some cases parts per million, or percent of gas by volume.

If your agency has CGI's, make sure that they are calibrated on a regular basis and that responders are trained in their operation. If CGI's are not a part of your response arsenal, it is important to remember that pipeline operations personnel are equipped with these devices and can assist the public sector responders in identifying the source and location of leaking gas.

**Overview of Pipeline Systems: Underground Storage Facilities**

So how do you store natural gas and liquefied petroleum gas (LPG) in large quantities for future demand, without constructing massive storage tank farms? The answer is you store the products in underground facilities.

Underground storage facilities are developed from three sources: depleted gas reservoirs, aquifers and salt caverns. Depleted gas reservoirs are the most frequently used type of storage facility. After gas supplies have been depleted from a reservoir and the integrity of former well sites are determined to be safe, gas is transferred into the cavern and stored for future use. Aquifers are used in isolated cases for underground storage when there are not any local depleted reservoirs. Extensive geological studies are executed prior to use of an aquifer for storage to ensure safety and integrity. Given the fact that aquifers are comprised of porous, permeable rock, some of the gas that is injected into the well to maintain adequate pressures is not recoverable. Salt caverns are frequently used for natural gas storage. Given the significant structural integrity of the walls of a salt cavern, they are well suited to serve as storage facilities. Typically salt caverns used for storage are located several thousand feet below the surface. Once a suitable salt bed deposit is discovered, a well is drilled into the feature followed by water injection to dissolve and remove the salt deposits. Delivery rates from salt caverns are usually higher than those from depleted gas reservoirs or aquifers.

Given that much of the infrastructure associated with an underground storage facility is located below ground, there are few indicators of the presence of the site in comparison to above ground storage facilities. Typically, at underground storage facilities you will find pumping and de-watering apparatus, control and telemetry systems, and piping associated with product injection and removal. In some cases, railroad and truck loading terminals may be located at the underground storage facility as well.

In the unlikely event of an emergency at an underground storage facility, the first priority should be to isolate the area and contact the operator so that they can advise you of tactical response recommendations.
Keeping Pipelines Safe/Practices & Protocols: National Pipeline Mapping System Overview

With over 2.3 million miles of pipelines in the United States transporting natural gas and petroleum products to serve the country’s energy needs, it may seem to be a daunting goal to collect mapping data of these critical energy assets. However, with the passage of the Pipeline Safety Improvement Act of 2002, a process was initiated to begin that very task. The United States Department of Transportation established the National Pipeline Mapping System National Repository to collect pipeline data from the nation’s operators.

On an annual basis, operators of natural gas transmission and hazardous liquids pipelines, as well as liquefied natural gas (LNG) plants are required to submit electronic mapping data to the Repository. Pipeline operators are requested to submit mapping data that has an accuracy of plus or minus 500 feet. In addition to the geographic information system (GIS) data, pipeline operators are required to submit contact information for the public in the event additional information is needed.

Federal, state and local government agencies and the pipeline industry may access all of the layers of information provided in the National Pipeline Mapping System. The Public Viewer portion of the system allows the public to view general information about the pipelines, however mapping data is limited in content and scale.

It’s important to understand that the information provided in the National Pipeline Mapping System (NPMS) does not take the place of contacting damage prevention one-call centers to allow pipeline operators to provide accurate location data of their pipelines prior to any excavation.

Emergency response agencies that need pipeline mapping data for response planning purposes may contact the National Pipeline Mapping System’s Repository to obtain raw GIS layer data for importation into their GIS or they can gain access to the Pipeline Integrity Management Mapping Application (PIMMA) in the event they do not have an existing GIS tool.

For more information about the resources available through the National Pipeline Mapping System, or to register your agency, please visit: https://www.npms.phmsa.dot.gov/Documents/NPMS%20resources.pdf

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Note

Find out who operates a pipeline in your area by accessing the National Pipeline Mapping System at http://www.npms.phmsa.dot.gov/