



## **PURPOSE**

The accidental release of natural gas is a common incident. Often mechanical damage to regulators, meters, and piping will precipitate the release of the gas. The following procedures have been established for use in such incidents to ensure appropriate and safe management.

## **POLICY**

### **Natural Gas Chemistry**

The primary component of natural gas is methane. Methane has a vapor density of .55 and will rise through air. There are no toxic components or health hazards associated with natural gas. However, in concentrations, it will displace oxygen and cause drowsiness and potential suffocation. An odorant called mercaptan is added to natural gas to give it a pungent odor. Without mercaptan, natural gas is odorless. The flammable range for natural gas is from 5% to 15%. This means that any mixture in air of less than 5% or greater than 15% will not ignite.

### **Signs of Natural Gas Leaks**

The most common reasons for natural gas leaks are accidental damage caused by excavation, construction, farming activities, or careless driving. While many times it is easy to spot a natural gas leak, sometimes it is not so obvious. Do not rely on the odor of mercaptan to determine the presence of a leak. In underground leaks where natural gas is passed through the soil, the mercaptan odor may be eliminated. The following conditions along a pipeline easement could indicate a natural gas leak:

- A hissing or roaring sound
- Unusual odor
- Dead or discolored vegetation
- Fire coming from the ground or burning above the ground
- Dirt being blown or thrown into the air
- Water bubbling or being blown into the air at a pond, creek, or river
- A dry spot in a moist field

### **Initial Response**

Companies shall position themselves upwind of the hazard area and evaluate water supply options in case of fire or explosion. Full structural firefighting clothing with SCBA is mandatory for all personnel working in the warm or hot zones of natural gas emergencies. Establishing a hot zone and evacuating the immediate area should be a high priority for the first-arriving company. The hot zone shall be an exclusion zone. The DOT Emergency Response Guide (ERG) suggests an initial isolation distance (hot zone) of 330 feet for all civilians. Companies shall stage apparatus and personnel at least 100 feet away from the leak. Anything within this area should be evacuated, including occupied buildings. Sources of potential ignition should be eliminated. This includes open flames, electrical switches, gas-fueled machinery and engines. As soon as the incident commander suspects a natural gas leak, the gas company should be notified. Do not assume that Dispatch has already contacted the gas company.

### **Intervention – Outside Leaks**

#### Residential Gas Leak (Outside)

Approved



RUSSELLVILLE FIRE DEPARTMENT  
POLICY MANUAL

Policy Number:  
Section:  
Original Date:  
Revised Date:

The initial response for a residential natural gas emergency is the closest engine company. The engine company will conduct the initial investigation, prepare for suppression (if necessary), identify control zones, conduct air monitoring, and initiate tactics to isolate the leaking natural gas.

Main Line Gas Leak (Outside)

The initial response for natural gas emergencies occurring outside of a structure shall be:  
- 2 Closest Engine Companies  
- Battalion 1

First-Due Engine Company - conduct initial investigation, prepare for fire suppression (if necessary), and identify control zones

Second-Due Engine Company – conduct air monitoring and initiate tactics to isolate, plug, or shut off the leaking natural gas.

Battalion 1 – Incident Command

Fire department personnel shall intervene to stop natural gas leaks when a threat to life or property exists. If a standard shut off is not available, no gas is entering any structure, the surrounding area is void of any exposures, and the gas is dissipating into the atmosphere, a non-intervention strategy is encouraged.

If an offensive strategy is implemented to control and stop leaking gas, members shall adhere to policies regarding proper PPE, respiratory protection, and hazardous materials leak intervention. During the implementation of offensive strategies, the following safety precautions must be taken:

- The fire company must identify a water supply source and position their apparatus accordingly in case it becomes necessary to use it.
- A charged 1.75" hoseline must be stretched and staffed.
- Adequate reconnaissance of the leak must be conducted to determine whether it can be stopped or plugged.
- Air monitoring of the control zone boundaries shall occur to determine the presence of a flammable atmosphere and manage control zones.

Shifting air currents can cause rapid changes in the concentration of natural gas. If the decision is made to monitor the leak and allow the gas company to intervene, it remains the responsibility of the incident commander to make sure gas company personnel in the hot zone wear protective equipment that is commensurate with the risk. Under no circumstance will the RFD allow gas company personnel to create an unsafe situation.

If companies are able to successfully plug and stop a leak, they can return to service as long as they're confident in the stability of the plug and they've notified the gas company of the situation. At least one company should remain on scene of plugged leaks in high-risk areas until the arrival of the gas company.

**Intervention – Leaks Inside a Structure**

Residential Gas Leak (Inside)

The initial response for a residential natural gas emergency inside of a structure is the closest engine company. The engine company will conduct the initial investigation, prepare for suppression (if necessary), identify control zones, conduct air monitoring, and initiate tactics to isolate the leaking natural gas.

Approved

Fire Chief

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Commercial Gas Leak (Commercial, Industrial, High-rise, or multi-family structure)

When natural gas leaks are reported inside a commercial, industrial, high-rise, or multi-family structure, a full hazardous materials assignment shall be:

- 2 Closest Engine Companies
- Battalion 1
- Hazmat 1

Natural gas leaks inside structures will be mitigated using monitors to determine the affected areas and the appropriate control zones. Any building with a natural gas odor or confirmed leak should be evacuated. Based on the risk and fence line monitoring, it may be prudent to evacuate adjacent structures as well. All ignition sources should be quickly and completely eliminated inside evacuated structures. Whenever possible, electrical service should be shut down from the outside of the building. Consideration must also be given to eliminate auxiliary generators from becoming active when electrical service is shut down. Upper stories, attics and cocklofts need to be monitored due to the vapor density of natural gas.

Exposures, whether attached or unattached, shall be monitored to determine the extent of the leak. All sources of ignition shall be controlled, if odor or metered concentration is detected. Ventilation should be initiated early to prevent natural gas from accumulating above the lower explosive limit (LEL). Firefighters should be aware that sometimes gas may have to be ventilated from above the upper explosive limit (UEL) through the explosive range. Firefighters must be careful and non-complacent during the ventilation effort. Natural ventilation is the preferred method to remove natural gas.

Turning off gas service in any structure requires the identification of the regulator or meter. The regulator takes street pressure of up to 40 psi and "steps" it down to 0.5 or 0.25 psi prior to being metered. When turning the gas off at the meter, crews should operate the shut-off valve prior to the meter. The valve is always a quarter-turn in the piping prior to the regulator. Normally, this is the pipe coming from the ground. Before closing the valve, note the sound of gas flowing through the meter and look for movement of the numbers of the face of the meter. After the valve has been shut off, the sound and movement should cease.

Fire companies will not shut-off gas in curb boxes, street boxes, or manholes. Only gas company personnel should operate these valves. Operating valves located in these locations may actually increase pressure to customer service and exacerbate the incident.

Note that mercaptan is heavier than air. If a building is unoccupied for an extended amount of time, and natural gas has been leaking for an extended period of time, the mercaptan and natural gas may separate, causing an odor in lower floors with little to no presence of natural gas, and an area of natural gas with no odor in upper floors.

**Natural Gas Fires**

The tactics and positioning employed for an outside gas leak can also be used for a natural gas-fed fire outside. The IC shall always ensure at least two fire companies are assigned to fires of this variety, thereby increasing the initial response. Apparatus and hose lines should be placed with consideration to the responding gas company vehicle. At a minimum, a 1.75" line along with a dry powder extinguisher shall be deployed. The goal of any suppression effort should be to protect exposures, not necessarily to extinguish the fire.

The best way to control an outdoor natural gas fire is to shut off the flow of natural gas upstream of the incident.

Approved

Fire Chief

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