



REGIONAL FIRE OPERATIONS GROUP

Clackamas, Columbia, Multnomah,
Washington, and Yamhill Counties

Adopted 11/20/2007 Revised _____

Subject: Natural Gas Response (Pentane Version)

Purpose: To establish safe operating procedures for incidents involving natural gas

Authority & Responsibility: All Fire department personnel operating at a natural gas incident.

Policy:

1. All Natural Gas Incidents
 - a. Incidents involving natural gas are considered to be hazardous material incidents with explosive potential.
 - b. Upon arrival, access scene information from a safe distance. Request additional resources as appropriate (gas company, power company, phone company, public works, law enforcement, etc.). Consider Unified Command with utility representatives if appropriate.
 - c. Control incident access. Keep citizens, utility workers and suppression crews clear of potential exterior blast zones (garage doors, man doors, windows, etc.).
 - d. All personnel will wear full PPE. There will be no entry into a confined area with a possible gas leak without utilization of SCBAs and a **<Your Department Name>** gas monitor. **The atmosphere will be considered IDLH until proven otherwise, 2-in/2-out is required.**

- e. Initial size-up must determine leak cause and if the gas leak is venting to atmosphere or contained in a structure – remember that some “outside” gas leaks can cause subterranean migration of natural gas into surrounding structures.
- If any level above 0% LEL of Pentane is detected, inside or outside, the gas company shall be requested. If gas is detected inside a residential structure, turn off the gas service at the meter immediately.
 - For “to atmosphere” gas leaks, evacuate civilians and emergency response personnel an appropriate distance based on the size of the leak. Maintain a safety perimeter until gas company personnel stop the leak and the gas has dissipated.
 - Civilians should be evacuated from any structure with an odor of natural gas, and fire personnel in PPE may then make entry to determine if any natural gas is present - start by monitoring garages and crawl spaces.
 - **DO NOT make initial entry** if it is confirmed that there is a natural gas level at or above 20% LEL (**a reading of 20% LEL on <Your Department Name> gas detectors equals 0.5% (by volume of air)**), unless in a known rescue situation. If at any time during gas presence determination of **20% LEL for Pentane** is reached, the structure is considered potentially explosive and the following actions should be taken:
 - Re-confirm civilians are evacuated.
 - **Immediately withdraw** from the structure and evacuate civilians and emergency response personnel to a safe distance. This includes evacuation of nearby structures that could be impacted should the “loaded” structure explode.
 - Have dispatch expedite the gas company and the power company to the scene. Power to the structure shall be cut from the outside as soon as possible to minimize ignition sources.
 - Upgrade to an appropriate alarm assignment for area evacuation and potential fire suppression needs.
 - After the power has been cut and the gas leak has been stopped, work with the gas company supervisor to determine a structural ventilation plan. No one shall enter the de-energized structure until the gas level is less than **20% LEL**.
 - Fire personnel shall only use gas monitors they have been trained on. Gas company personnel have meters with superior probing capability, and their personnel should be utilized to probe under doors and in crawl spaces when appropriate.
- f. On some outdoor leakage events such as a main or service damage from a backhoe, water fog may be useful for the following:

- Water fog can provide some natural gas vapor vectoring away from an ignition hazard area.
- Water fog can help mitigate static generated by blowing gas from a polyethylene or steel gas line. By applying water to the surrounding area inside the excavation, the damp soil conditions help to reduce static discharge potential.
- Do not flood the excavation area.
- Water may be applied to protect exposures from **ignited** leaks. DO NOT extinguish ignited leaks.
- Command will determine the need/extent of area evacuation based on size, type of leak/fire and the hazard created.

2. Industrial Gas Service

- a. Industrial gas installations frequently have grids and sectional controls within the plant. Shutting off a gas supply at the meter installation may create severe financial loss to the industry involved.
- b. Whenever practical, first check with responsible plant operations personnel before shutting off an industrial service.
- c. Industrial gas shut-off valves are normally located above ground and at the meter site. These meter shut-off valves are usually identified by a tag/marker.

3. Domestic Gas Service

- a. Firefighters may turn off gas services at the meter or curb cock if the need is indicated in controlling a dwelling fire. All meters do have meter cocks – this is the most desirable place to shut-off gas service.
- b. Gas service may be turned off at the meter if there is a significant leak between the meter cock and the house/appliance.
- c. Domestic curb cocks are usually one foot outside the property line and in line with the meter.

KEY CONSIDERATIONS

- This protocol may be applied to similar incidents involving explosive gas hazards.
- The gas utility company may report measurements by % of volume. Table 1 represents a conversion from % by volume to % of LEL as read by detectors calibrated to Methane. Table 2 represents a conversion from % by volume to % of LEL as read by detectors calibrated to Pentane.
- If there are directional boring operations taking place in the area, subterranean gas migration should be suspected and surrounding structures must be checked. Under these circumstances, garages and crawl spaces are the most likely areas for migrating gas to accumulate.
- When cutting power to a “loaded” structure, be aware of potential issues with multiple feeds, battery back-up systems, and automatic emergency generators.
- Firefighters are not authorized to restore gas services. **Never** turn gas back on, call the gas company.
- Patient considerations:
 - Natural gas may cause asphyxia.
 - Natural gas equipment that is malfunctioning may produce carbon monoxide.
 - Consider referring to EMS Protocol, *Poisoning and Overdose* and *Respiratory Distress*.
- DOT Number 1971 (Compressed), and 1972 (Liquefied); DOT Guide, page 115.
- Physical Properties:
 - Flammable Gas
 - UEL: 15%
 - LEL: 5%
 - Specific Gravity: 0.65 (lighter than air)

Methane Calibration	
Volume	LEL
0.5%	10%
1.0%	20%
2.0%	40%
3.0%	60%
4.0%	80%
5.0%	100%

Table 1

Pentane Calibration	
Volume	LEL
0.25%	10%
0.5%	20%
1.0%	40%
1.5%	60%
2.0%	80%
2.5%	100%

Table 2

Related Documents: Natural Gas Checklist

Author: