

We respond to incidents involving propane almost daily. Due to the frequency of these incidents and the increased risks associated with these types of emergencies, we have developed this document to provide consistent guidance to our personnel.

TYPES OF METERS

Jefferson County Fire and Rescue Companies deploy different models of meters on their apparatus, as such the models implore the same readings/actions: 4-gas Meters and Combustible Gas Indicators (Sensit Meters)

4-GAS METER

- Detects Hydrogen Sulfide (H₂S), Carbon
- Monoxide (CO), Explosive or Flammable Range (LEL), and Oxygen (O₂).
- Designed for area monitoring.
- Personnel need to move slowly when using, which can cause up to a 30-second delay in real-time readings.
- Personnel should monitor low (near feet), middle (waist level) and high (above head).

COMBUSTIBLE GAS DETECTOR

- Focus on the audible "Tick Rate."
- Used to detect pinpoint leaks, NOT to be used as an area detection meter.

RESPONSE GUIDELINES

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- As a rule, when arriving on the scene for a gas utility emergency, personnel should position apparatus prior to and upwind of the hazard area. Units should not be positioned directly in front of, to the rear of, or beside a building involved in a gas utility emergency. Drivers should avoid parking their vehicles over sewers, valve covers, and manhole covers because the collection of gases in these locations could present a potential hazard.
- When possible, first-arriving units should be positioned 100 ft or further from the incident location. First-arriving engine company officers should consider assigning a firefighter to remain at the vehicle with the driver to deploy a hose line if needed.
- Other responders should stage upwind and prior to the affected area, no closer than 300 ft, and remain at that location until assigned otherwise by the initial company officer. After receiving an assignment, officers should consider having their drivers remain with their apparatus, as units may need to relocate later in the event. If personnel detect the odor of mercaptan when arriving on the scene, they should move their apparatus to an area without odor.
- The PPE for these types of incidents is full structural firefighting PPE, including SCBA. Until proven otherwise, consider the area an IDLH.
- A 360 needs to be completed to check for:
 - Free spinning gas meter.
 - If there are detectable readings (in percentages) on the exterior, personnel must shut the gas off at an exterior valve.
 - The presence of an exterior vent indicates interior gas service, with possible readings.
 - Hissing or a roaring sound.
 - Dirt blowing or spraying into the air.
 - The presence of a tank of propane and the percentage of gas in the tank.

RESPONSE GUIDELINES

- If special services arrive at the same time, consider having them complete the investigation.
- Do NOT deploy an attack line
- Check exposure building (s) if attached or in the immediate area
- Consider calling for hazmat for outside gas leaks with 2" or larger gas lines or readings over a large area.
- Consider calling for hazmat for a gas leak involving the container (tank) or the valve assembly (anything beyond turning the valve off to secure the leak).
- Do NOT change the status of electrical services, e.g., If lights are on, leave them on; if the lights are off, leave them off.

ADDITIONAL RESPONSE GUIDELINES

If you are at 10% or greater of the LEL:

- Look for other means of ignition, i.e., generators, vehicles, etc.
- Avoid turning electrical equipment on or off.
- Ventilate the structure. Personnel should confirm that ignition sources have been controlled before beginning ventilation operations.
- Avoid using doorbells, light switches, matches or lighters.
- Evacuate the area appropriately.
- Be cautious of migrating gas. Remember that propane will settle in low places, and natural gas will rise to collect at the ceiling level and/or in attic spaces.
- Propane vapors can be dispersed/pushed with a fog water spray.
- Ensure that the area you are sending vapors to is open and free of ignition sources

If you are at 25% or greater of the LEL:

- Do NOT enter the area or the structure
- Control the exterior gas service.
- Perform exterior natural ventilation.
- Consider requesting the hazardous materials response team to respond.

ACTION LIMITS AND ADDITIONAL METER INFORMATION

Oxygen—O₂

- **19.5% or less** is oxygen deficient
 - Don SCBA
 - Ventilate
- **23.5% or greater** is oxygen-enriched
 - Don SCBA

Hydrogen Sulfide—H₂S

- **Alarms at 10ppm**
 - Normally considered as sewer gas
 - Common chemical suicide gas
 - Ventilate

Carbon Monoxide—CO

- **0-10 PPM**
 - Investigate the area in full PPE.
 - Monitor readings.
 - Isolate source and ventilate.
- **10-34 PPM**
 - Investigate the area in full PPE.
 - Isolate source and ventilate.
 - Exit with any patients.
 - Initiate civilian evacuation.
- **≥ 35 PPM (**Alarms at 35 ppm**)**
 - Continue to investigate utilizing Full PPE & SCBA.
 - Initiate civilian evacuation. Isolate source and ventilate.

Lower Explosive Limit—LEL

- **0–10%:** Investigate the area in full PPE.
- **10–25%:** Continue to investigate utilizing SCBA.
- **25% or greater:** Evacuate, secure utility from the structure's exterior, and perform exterior natural ventilation.
- **"OR"** Over-range: for any sensor in over-range, indicates the measured gas concentration is greater than the measurement range of the sensor Exit area/structure immediately.

PROPANE INFORMATION

It is most common the county.

Common Suppliers are Thompson, Holtzman Propane, Southern States, Valley Energy and AmeriGas.

Colorless, odorless gas in its natural state. Mercaptan (odorant) is added for distribution.

NFPA 704—Health: 2 Moderate, Flammability: 4 High, Instability: 0 Minimal, No Special Hazards.

LEL is 2.1%, and the UEL is 9.5%.

Flash Point is: -156° F.

The expansion ratio of Liquefied Propane is 270:1.

Propane is **HEAVIER** than air—therefore, it collects in low-lying areas. Operating pressures range from 10 — 200psig.

Tank sizes and capacities range from 5 lb. to 50,000-gallon tanks:

- 20lb is typical BBQ grill size
- 33lb is typical for forklifts and auto gas-fueled vehicles
- 100—150 gallons are common on construction sites for temporary heating (salamander heaters).
- 120 — 1000 gallons are above or below ground for residential use
- 10,000 — 50,000-gallon tanks are for commercial use

Officers should establish a hot zone using detection and monitoring equipment and make evacuation decisions based on monitoring data, wind direction, terrain, and leak size.

Whenever possible, approach the fire or leak from the up-wind side.

Hose lines utilizing coordinated narrow-fog patterns can efficiently disperse propane vapor.

Personnel should not direct water at the leak's source or at safety devices because icing may occur, restricting the discharge from the relief valve and increasing the tank's internal pressure. **Personnel should not stop the vapor release of a properly operating relief valve.**

The potential for a boiling-liquid expanding-vapor explosion (BLEVE) represents the most significant life safety concern associated with outside gas fires involving propane tanks.

The best operation for mitigating a burning propane gas line involves turning off the valve at the tank. This often represents the best option for any propane issue unless the leak originates with the tank. When the relief valve sets, a crew protected by an attack line can move in and close the valve. Tank valves operate like a water faucet (i.e., left for on and right for off). Personnel should not stand or walk directly in front of the relief valve when approaching the tank to lessen potential exposure. Protective attack lines should continue to cool the tank to prevent re-ignition.

Propane fires should only be extinguished if the fuel source can be isolated. If the fuel source is not shut off and the fire is extinguished, the leaking gas can migrate away from the container and may find an ignition source.

Response times for propane contractors can be extensive.

