Title:	Flammable/Combustible Gas Leaks		
Section:	600 Special Operations		
SOG #:	615	Page:	1
Effective Date:	January 1, 2024	Reviewed	
Authorized By:	Fox River Fire District Chiefs		

A. PURPOSE

The purpose of this guideline is to provide direction for the safe response to gas leaks or potential gas leaks. These types of incidents would include, but are not limited to, natural gas, liquefied petroleum gas (LPG), and propane.

B. SCOPE

This guideline shall apply to personnel when responding to gas leaks and potential gas leaks.

C. TERMS AND DEFINITIONS

DOT ERG – Department of Transportation, Emergency Response Guidebook. A listing of transported chemicals and the initial precautions and actions that should be taken in the event of a release.

Natural Gas - Flammable gas, consisting largely of methane (90-95%) and other hydrocarbons, occurring naturally underground (often in association with petroleum) and used as fuel.

Propane, Liquified Petroleum Gas (LPG) – A liquefied colorless gas stored under pressure that is used for cooking and heating

4 Gas Detector – A detector capable of monitoring 4 gases at the same time, (O_2, LEL, CO, H_2S).

WISER, Wireless Information System for Emergency Responders – A mobile app used to research chemicals.

D. GUIDELINE

1) Gas leaks are frequent occurrences. The exact type and source are not always known and will need to be investigated. The most common gases used in residential, commercial, or industrial applications are; natural gas, liquefied petroleum gas (LPG), and propane. Identifying the type of gas that is leaking will aid in the response.
2) Response to gas leaks will focus heavily on responder and civilian safety while effectively mitigating the leak when able. Understanding the characteristics of the various gases that may be encountered is critical to maintaining firefighter safety.
3) If on arrival it is determined that the type of leak is a petroleum product such as gasoline, heating oil, kerosene, or diesel fuel, refer to the OE 53, Fuel/Oil Leaks.
4) If it is determined that the type of leak is a potentially hazardous chemical evacuate all civilians and fire personnel from the area, go uphill and upwind.
5) Initial Response
    a) Enroute get wind direction, speed, temperature, and humidity
    b) Have dispatch notify Wisconsin Public Service (WPS)
    c) Respond from upwind and upgrade if possible
    d) Upon arrival, personnel should evacuate and secure the immediate area.
    e) If gas leak is burning do not extinguish the fire.
        i) Protect exposures
        ii) Shut off gas flow at valve if possible
        iii) Wait for WPS arrival
    f) All members shall wear full fire PPE while investigating with their SCBA donned (off air)
    g) Neutralize all ignition sources
    i) Do not introduce or allow the introduction of an ignition source.
    h) Note any odors normally associated with gas leaks (mercaptan)
    i) Use the 4-gas detector to monitor for combustible gas as well as the oxygen percentage.
    j) Begin monitoring prior to entering any enclosed structure.
    k) Monitor around openings (doors, windows, etc.) prior to opening them or entering
    l) If natural gas is smelled or detected prior to entry, ensure that the LEL is below 10%.
    m) While entering an area or in a structure, continually monitor the atmosphere
    n) If the LEL begins to rise or the oxygen saturation begins to drop
        i) At 10% of the LEL don your facepieces.
        ii) At 25% of the LEL all members shall evacuate the area or structure.
    o) It is important to note:
        i) **METHANE** and **NATURAL GAS** tend to **RISE** because they are lighter than air. Monitor high in a structure or area

ii) **PROPANE** and **LPG** tend to **SINK** because they are heavier than air. Monitor low in a structure or area.

6) Exterior Gas Leaks
    a) Damaged natural gas meter
        i) Verify WPS response
        ii) Secure leak, if possible, by shutting down gas at the meter or plugging the leak with a gas plug.
        iii) Evacuate structure if unable to control the leak or an interior investigation reveals 10% or greater of the LEL.
        iv) While wearing full PPE with SCBA (off air), investigate and monitor all floors, including the basement
        v) It is critical that personnel do not introduce an ignition source
        vi) Ventilate as needed.
            (a) For high levels of natural gas, use PPV from the exterior until levels are brought below 10% of the LEL.
            (b) Natural ventilation is often adequate for lower levels of gas
        vii) Remain on scene until the arrival and assumption of control by WPS
7) Damaged in-ground gas service line or main (caused by trenching, roadway collapse, or gas main deterioration)
    a) Verify WPS response
    b) Determine if high or low pressure leak
        i) Leaking high pressure mains emit a loud jet engine like noise
    c) Evacuate an area commensurate to the scope of the leak
    d) Be aware of potential ignition sources within the area and take necessary steps to eliminate them
    e) For a large leak in a high pressure main
        i) Refer to the DOT Emergency Response Guidebook (ERG) for evacuation distances
        ii) Utilize WISER to plume map the release
    f) Enlist police and additional fire crews for assistance
    g) Monitor the atmosphere using the 4 gas detectors.
    h) Lay protective hoselines
    i) Natural gas can travel great distances either through underground utility conduits or beneath frozen soil
        i) While wearing full PPE with SCBA, investigate and monitor structures adjacent to the leak to determine if the exterior leak may have migrated into the buildings.
    j) AFTER THE EXTERIOR LEAK IS CONTROLLED, Ventilate affected buildings as needed.

i) For high levels of natural gas, use PPV from the exterior until levels are brought below 10% of the LEL.
ii) Natural ventilation is often adequate for lower levels of gas

k) DO NOT at any time enter underground vaults or pits to access gas meters
l) Communicate with and provide support for WPS or other gas utility personnel.
m) Remain on scene until the arrival and assumption of control by gas utility personnel

8) **Damaged or opened LPG or Propane tank** (accidental opening or damage while in use)
   a) Secure the leak, if possible, by shutting down the gas at the grill knob or cylinder valve, or by plugging the leak with a gas plug
   b) If unable to control the leak, and if it can be done safely, move the grill and/or the offending propane/LPG tank away from any structures.
   c) While wearing full PPE with SCBA, investigate and monitor all floors of nearby structures, including the basement
      i) Evacuate nearby structures or if an interior investigation reveals 10% or greater of the LEL.
   d) Ventilate affected buildings as needed.
      i) For high levels of natural gas, use PPV from the exterior until levels are brought below 10% of the LEL.
      ii) Natural ventilation is often adequate for lower levels of gas
9) Interior Gas Leaks
   a) The investigation of all inside odor/leak complaints should begin INSIDE of the building.
   b) The variety of ignition sources coupled with the life safety hazard inside of a building necessitates an early interior investigation.
   c) Malfunctioning Gas Appliance (Stove, Furnace, Hot Water Heater, Dryer, etc.)
      i) Verify WPS response
      ii) While wearing full PPE with SCBA, locate the source of the leak (use odor differentials and 4-gas detector)
      iii) Evacuate the structure if unable to control the leak or if the interior investigation reveals 10% or greater of the LEL.
      iv) Secure the leak
         (1) Per NFPA 54 (9.6.4), “each appliance connected to a piping system shall have an accessible, approved manual shutoff valve . . . within 6 feet”
         (2) If it does not, or the valve is non-functioning, trace the feed line back to the next available valve

(3) Shut the nearest available isolation valve off; if there are none available, shut off the gas at the meter.
(4) If operating in a multi-family dwelling, attempt to shut down the gas supply only to the unit in which the problem exists

v) Update WPS of the gas shut off via Dispatch.
vi) Ventilate affected buildings as needed.
(1) For high levels of natural gas, use PPV from the exterior until levels are brought below 10% of the LEL.
(2) Natural ventilation is often adequate for lower levels of gas

d) Damaged or leaking gas valve or piping
i) Verify WPS response
ii) While wearing full PPE with SCBA, locate the source of the leak (use odor differentials and MSA multi-gas detector)
(1) This may be problematic as the possibility exists that the leak will be in a utility chase or wall space
iii) Evacuate the structure if unable to control the leak or if the interior investigation reveals 10% or greater of the LEL.
iv) Secure the leak
(1) Shut the nearest available isolation valve off; if there are none available, shut off the gas at the meter.
(2) If operating in a multi-family dwelling, attempt to shut down the gas supply only to the unit in which the problem exists
v) Update WPS of the gas shut off via Dispatch.
vi) Ventilate affected buildings as needed.
(1) For high levels of natural gas, use PPV from the exterior until levels are brought below 10% of the LEL.
(2) Natural ventilation is often adequate for lower levels of gas

e) Problems from supplemental heating (propane heater, kerosene heater, salamander heater, etc.)
i) Per WI Stats. SPS 365; “Portable, gas-fired, un-vented heating appliances are prohibited, except during construction or demolition of a building. . .”
ii) Monitor area/building similarly to other interior gas leaks, with awareness that there may be elevated CARBON MONOXIDE levels from un-vented combustion
iii) If LPG or Propane is the involved gas and a leak has occurred, expect fumes to accumulate low in the room, structure, or area
iv) Evacuate the structure if unable to control the leak or if an interior investigation reveals 10% or greater of the LEL

v) While wearing full PPE with SCBA, attempt to shut off the fuel source at the valve and then remove the portable heater from the structure if it can be done safely.
vi) If the weather is inclement and the portable heater was being used in place of a non-functioning furnace attempt to contact the construction company
vii) Ventilate affected buildings as needed.
    (1) For high levels of natural gas, use PPV from the exterior until levels are brought below 10% of the LEL.
    (2) Natural ventilation is often adequate for lower levels of gas

10) If, after completing all possible investigations a source is not located, be sure to check the drain traps of all sinks, bathtubs, and floor drains. There is the distinct possibility that if one of these traps has been let to dry out that sewer gas may be backing up into the occupancy.

11) In the event that the gas concentration is within its explosive level AND there exists an ignition source, an explosion will occur. Be prepared to provide exposure control with master streams and evacuate adjacent structures. If the involved structure was not evacuated prior to the explosion, the structure will need to be searched.

-END-