Intent

The intent of this guideline is to establish standard procedures for response to Flammable Gas Incidents

References

National Fire Protection Association (NFPA) Standard 471 Responding to Hazardous Materials Incidents

US Department of Transportation Chart 15 Hazardous Materials Markings, Labeling and Placarding Guide

Definitions

Flammable Gas Division 2.1- any material that is a gas at 20 degrees Celsius (68 F) or less and 101.3 kPa (14.7 psi or one atmosphere) of pressure *and* has a boiling point of 20 degrees Celsius (68 F) or less and one atmosphere of pressure and is

- ignitable at one atmosphere when in a mixture of 13% or less by volume with air
- has a flammable range at one atmosphere with a 12% or less by volume with air, regardless of the lower limit
- Common flammable gases include liquefied natural gas (LNG) and liquefied petroleum gas (LPG)

Liquefied Natural Gas (LNG)- a flammable liquefied gas (major consistent is Methane) at normal atmospheric pressure (14.7 psi or 101.3 kPa), that is colorless and odorless. Properties of LNG are:

- Autoignition temperature = 999 F (537 C)
- Boling Point = -161.50 C at one atmosphere
- Specific Gravity = 0.554
- Vapor Density = .554
- Vapor Pressure =-4.66x10+5 mm Hg
- No Immediately Dangerous to Life and Health limits, however LNG displaces oxygen
- Lower Explosive Limit = 5.53% by volume in air
- Upper Explosive Limit – 14% by volume in air

Liquefied Petroleum Gas (LPG)- a flammable liquefied gas at normal atmospheric pressure (14.7 psi or 101.3 kPa), that is colorless and odorless. Properties of LPG are:

- Autoignition temperature = 842 F (450 C)
- Boling Point = -42 C at one atmosphere
- Specific Gravity = 0.493
- Vapor Density = 1.56
- Vapor Pressure =-7150 mm Hg

- Immediately Dangerous to Life and Health (IDLH) 2100 ppm
- Lower Explosive Limit = 2.37% by volume in air
- Upper Explosive Limit – 9.5% by volume in air

Guideline

1. The first arriving fire company should investigate the incident from uphill and upwind position and determine the following:
    a. Product Identification
    b. Container Size
    c. Fire/Explosion Potential
    d. Leak Severity
    e. Life Safety Hazards
    f. Environmental Impact
    g. Container Integrity

2. For transportation incidents, including railcars and over the road trucks, flammable gasses will have a Class 2 Flammable Gas, square on point placard which is red in color and has a white "2" in the lower point

3. Consider all areas involved in a flammable gas leak as an Immediately Dangerous to Life and Health (IDLH) area and utilize proper personal protective equipment (PPE) to include
    a. Full turnout gear
    b. Self-Contained Breathing Apparatus (SCBA)
    c. Portable radio

4. Indoor leaks can occur from LNG or LPG plumbing or appliance failures. As such, the risk of explosion is much higher compared to an outdoor leak.
    a. In full PPE, firefighters should begin air monitoring at the entry point of the building using both a four-gas meter and photo-ionization detector
    b. If the LEL reading climbs above a 100% of LEL exit the area and control the gas at the meter shut off
    c. Declare the entire structure as the "hot zone"
    d. Take steps to ventilate the area and eliminate all ignition factors.
    e. Stretch an 1 ¾ line and establish a water supply for fire or explosion hazards
    f. Continue to monitor the area until LEL falls back to below 100% LEL

5. For outside leaks, commence atmospheric monitoring utilizing both a four-gas monitor with lower explosive limits and a photo ionization detector from the outside of the building or 100 feet upwind of a leak.

a. Establish a hot zone by air monitoring downwind, marking the zone where the LEL goes above 100%
b. Establish a warm zone by air monitoring downwind, marking the zone where the LEL goes below 100% and ending at where the air monitoring marks 0% LEL

6. For areas involved in fire or post-explosion, maintain situational awareness on scene, to include being aware of weather conditions.
    a. Do not extinguish fires involving flammable gas leaks
        i. Cool adjacent areas with flooding quantities of water
        ii. Cool tanks impinged by fire with unmanned monitors, with water applied in flooding quantities and aimed at the vapor space of the vessel, rather than the fire or base