

# LNG INFORMATION

## For Firefighters

- LNG is a cryogenic liquid kept at  $-162^{\circ}\text{C}$  or  $-262^{\circ}\text{F}$  and will vaporize rapidly if released if accidentally released.

Hazard	LNG	LPG	Gasoline
Toxic	No	No	Yes
Carcinogenic	No	No	Yes
Flammable	Yes	Yes	Yes
Forms vapor clouds	Under certain conditions	Yes	No
Asphyxiant	Yes, in confined spaces	Yes, same as LNG	No
Other health issues	No	No	Eye irritant, narcosis, nausea, others
Flash point $^{\circ}\text{C}$ ( $^{\circ}\text{F}$ )	-188 (-306)	-104 (-156)	-45 (-50)
Boiling Point $^{\circ}\text{C}$ ( $^{\circ}\text{F}$ )	-161 (-258)	-42 (-44)	32 (90)
Explosive limits in air (%)	5 – 15%	2.9 – 9.5%	1.3 – 6%
Stored pressure	Ambient	Pressurized	Ambient
Behavior if spilled	Evaporates, forms visible “cloud” that disperses rapidly	Evaporates forming vapor cloud, slow to disperse and accumulates in low areas	Form a flammable pool, environmental cleanup required

- At temperatures of  $-162^{\circ}\text{C}$  or  $-262^{\circ}\text{F}$  LNG causes embrittlement of carbon steel. Stainless and aluminum are used in piping and storage tanks.

- LNG at pipeline quality is primarily 85% - 99% methane.
- Ratio of liquid volume to gas volume is 618 times at atmospheric pressure.
- The LEL of LNG is 5% and the UEL is 15%.
- Auto ignition temperature is 540<sup>0</sup>C or 1000<sup>0</sup>F but this will vary depending on air-to-fuel ratio and composition of fuel.
- Minimum heat energy to ignite is 0.29 mJ (millijoule) or temperature of most common sparks.
- A unique characteristic of an LNG vapor cloud emanating from a spill or pool of LNG, is that it is generally visible. The outer edges will appear as a fog due to the low temperatures of the vapor. This fog will indicate the dispersion direction depending on wind direction and velocity.
- The hazard area of an LNG vapor cloud exists outside of the visible cloud area and should be included in the exclusion zone as determined by the DEGADIS (Dense Gas Dispersion) Model accounting for irregular mixing of gas vapors in the visible cloud.
- Rainfall on LNG accelerates the rate of vaporization which needs to be factored into the Incident Action Plan.
- Flash fires are the greatest risk and ignited vapors will burn back to the liquid source. These fires may only be seconds in duration but have a significantly higher heat release rate than others fuels.
- LNG fires will produce higher radiant heat levels typically 57% higher than other fuels such as gasoline. First responders must also be aware that since there is none or very little smoke mask, the radiant heat is not defined by visible indicators.
- A BLEVE type accident, though experienced by LPG vessels, is NOT a credible accident for LNG fixed storage tanks because of the outer tank material, design and insulation protects the inner vessel (tank) and provides for a cooling action to take place.
- Rapid Phase Transformation (RPT) may occur in certain situations where LNG begins to vaporize and is confined. An explosion is not a likely event, however brief over pressurization in the confined space could result in minor damage to lightweight structures and create a potential hazard to personnel.