

**CTIF HAZARDOUS MATERIALS COMMISSION**

Procedures for emergencies arising during the Guidelines of Brandweer
Nederland for Liquid methane:

**LNG (-162) Characteristics and risks, LNG Fuel Tanks, LNG Bunkering,
LNG tanker truck and LNG Loading and Unloading, LNG filling stations
LNG Fuel Tanks**

A best practice procedure

CTIF Hazardous Materials Commission recommend (23.5.2017 and updated 12.05.2018)
to use these instructions. Commission have made some additions to these instructions,
which are written in this paper.

LNG (-162) Characteristics and risks

- LNG visible white cloud is commonly flammable when air humidity is bigger than 55 %.
- When air humidity is lower than 55 % the flammable area/cloud can be partly inside the visible white cloud or the flammable area can totally be outside the visible white cloud.
- LNG will gasify even 5 times more quickly in water than on land.
- If Drones (UAVs) are used for reconnaissance, make sure to stay away from the cloud to avoid ignition.

LNG Fuel Tanks

- **Possible aids:**
 - * Air humidity meter
- **Scenario: leakage from fuel tank**
 - * Determine (un)safe area with explosion danger meter and use also an infra-red imaging camera (IRC) to find the invisible cloud

LNG Bunkering

- **Possible aids:**
 - * Air humidity meter
- **Scenario: LNG leakage**
 - * Determine the size of the leak and the (un)safe area with an explosion danger meter and use also an infra-red imaging camera (IRC) to find the invisible cloud
 - * Dilute the gas cloud with water, but do not bring water in contact with liquid LNG as water will freeze and LNG will evaporate fast.

LNG Loading and Unloading

- **Possible aids:**
 - * Air humidity meter
- **Scenario: blowing off LNG storage tank/tanker truck**
 - * Determine the (un)safe area with an explosion danger meter and use also an infra-red imaging camera (IRC) to find the invisible cloud.
- **Scenario: LNG leak (unloading hose/storage tank/tanker truck)**

- * Determine the size of the leak and the (un)safe area with an explosion danger meter and use also an infra-red imaging camera (IRC) to find the invisible cloud.

LNG filling stations LNG Fuel Tanks

- Possible aids:

- * Air humidity meter

- Scenario: blowing off LNG storage tank/tanker truck

- * Determine the (un)safe area with an explosion danger meter and use also an infra-red imaging camera (IRC) to find the invisible cloud

- Scenario: LNG leak

- * Determine the size of the leak and the (un)safe area with an explosion danger meter and use also an infra-red imaging camera (IRC) to find the invisible cloud

LNG Tanker Truck

CTIF Hazardous Materials Commission has given recommendation (4.10.2014) to use Swedish Procedures for emergencies arising during the transportation of liquid methane (LNG and LBG Tankers and tank containers). Hazardous Materials Commission has made some additions to these instructions.

CTIF recommendation 4.10.2014, updated in 2018

Swedish Procedures for emergencies arising during the transportation of liquid methane (LNG and LBG Tankers and tank containers)

5.3 Transport unit leaking liquid with no fire

- Start reconnoitering and approach the accident site from an upwind direction
- Eliminate all ignition sources (avoid all activities that may generate sparks such as the use of internal combustion engines and radiophones)
- Use personal protective equipment; Fire suit, breathing apparatus with positive pressure, thermally insulating gloves
Igniting could occur twice the distance of the visible cloud (hot zone)
No one should enter the visible cloud
- Rescue the -victims if there is no ignition hazard; remove the ignition hazard with fog spray.
Thaw frosted body parts with lukewarm water
- Reconnoitre the topography /hazard area by measuring; outdoors with an explosimeter and thermal imaging camera, a liquid leak cause a fog/vapour cloud.

- If necessary, a pair of firefighters reconnoit the location and size of the leak and the amount, appearance, behavior and spreading of the leaking substance
- Evacuate people in danger or advice shelter in place. Rope off the hazard area- with the radius 300 m. Decide the actions to safe people, environment and property. Accident on the road, stop all the traffic. Report the accident to local responsible organization of traffic
- If necessary report the accident to local Safety of Air Navigation Centre. Hazard area up to 300 m
- Expert advice is required to handle the leaking tank. As long as the leak does not ignite, the situation remains the same. A leaking valve may freeze up
- Prevent spreading of gas to sewers and other underground spaces. If there is a pool of liquid gas dike it with sand or with other material suitable for cold substance. You can temporarily reduce the size of the hazard area by diluting the gas cloud with spray jets. Direct the jets towards the visible part of the cloud. Dilution may be necessary to rescue the victims or to close the leak. Do not let any water into a pool of liquid gas because this will add heat and increase evaporation and enlarge the hazard area
- Close the valve if you can do it safely. Do not plug the pressure relief valve. If the valve has frozen up defrost it water or steam. If you cannot close the valve it may be possible to close the leak by freezing it with a wet cloth or otherwise. Monitor the tank pressure, the pressure relief valve may work time to time. Do not spray the tank unnecessarily since the spray water may freeze and plug the pressure relief valve
- Let the pool of liquid gas evaporate,
- Stop the rescue activities
- Take off all the clothes that have absorbed gas and give them, at least a 30 minutes' airing outdoors

Dangers: ignition hazard of the gas. Liquid splashes are extremely cold, the cold liquid makes rubber, plastics and metals brittle and they will fracture. Breathing the cold air may damage the lungs and the cold air may cause cold injuries. The air moisture may freeze in the reducer or demand valve of breathing apparatus causing failure

5.4 Transport unit leaking with fire

- Start reconnoitring (use thermal imaging camera) and find out the nature, direct hazards and the spreading risk of the fire
- Use personal protective equipment; Fire suit, breathing apparatus
- Rescue the victims if you can do it safely. Approach the accident site from an upwind direction and use spray jets.
- If the flames touch the tank, water must be sprayed at the rate of 10 l/min for each square meter of the tank surface.
- Protect surrounding area if possible
- Evacuate people in danger or advice shelter in place
- Rope off the hazard area 1000 m (BLEVE).
- Decide the actions to safe people, environment and property.
- Report the accident to local responsible organization of railway, waterways, road and air traffic if necessary. (Hazard area up to 1000 m.)
- Expert advice is required.

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5.5 External fire affecting the transport unit

- Start reconnoitring (use thermal imaging camera) and find out the nature, direct hazards and the spreading risk of the fire
- Use personal protective equipment; fire suit, breathing apparatus
- Rescue the victims if you can do it safely. Approach the accident site from an upwind direction and use spray jets
- If the flames touch the tank, water must be sprayed at the rate of 10 l/min for each square meter of the tank surface
- Extinguish the fire with a suitable media
- Evacuate people in danger or advice shelter in place
- Isolate the hazard area for 1000 meters (risk of BLEVE)
- Decide the actions to save people, environment and property
- Report the accident to local responsible organization of railway, waterways, road and air traffic if necessary (Hazard area up to 1000 m.)
- Expert advice is required

CTIF update 2018: LNG tanker in accident, loss of vacuum (no fire, no leakage)

- If the cryogenic vessel loses vacuum (and it is not cooled with liquid nitrogen) there is only 5 to 8 hours before the vessel depressurizes and reaches a critical condition
- Depressurization has to be done by:
 - o transfer of gas to another trailer
 - o by flaring off the gas in liquid or gaseous phase
- If depressurization cannot be done within 5 hours evacuate people in danger or advice shelter in place
- Isolate the hazard area for 1000 meters (risk of BLEVE)
- Decide the actions to save people, environment and property
- In case of accident on the road, stop all the traffic
- Report the accident to local responsible organization of railway, waterways, road and air traffic if necessary (Hazard area up to 1000 m.)
- Expert advice is required

