Emergency procedure guide-
Transport (Road, Rail)
Part 8: Gases

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TECHNICAL COMMITTEE REPRESENTATION

The following organizations were represented on the Technical Committee:

Government chemist
National Environmental Management Authority
National Transport and Safety Authority
Kenya Railways
Directorate occupational health and safety service
Ministry of Health
Ministry of Transport
Kenya Maritime Authority
Kenya Airways
Kenya Transport Association
Kenya ports authority
Radiation protection board
National Corridor Transit and transport authority
Nairobi University
Kenya police Service (Traffic department)
Dangerous goods management ltd.
Kenya Bureau of Standards — Secretariat.

The following organizations were represented on the Technical Committee

REVISION OF KENYA STANDARDS

In order to keep abreast of progress in industry, Kenya Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Managing Director, Kenya Bureau of Standards, are welcome.
Emergency procedure guide-Transport (Road, Rail)

Part 8: Gases
P R E F A C E

This Kenyan standard was developed by the technical committee on transport of dangerous goods under the guidance of the standards project committee, and accordance with the procedures of the Kenya bureau of standards. The standard is intended for use by first responders during the initial phase of a transportation incident involving dangerous goods/hazardous materials. Provides guidance to drivers, emergency services and others dealing with emergencies involving the transport of gases.

During the preparation of this standard, reference was made to the following documents:

Emergency response guidebook 2016

The assistance received from the above documents is acknowledged with thanks.
KENYA STANDARD
Emergency procedure guide-Transport (Road, Rail)
Part 8: Gases

GASES

<table>
<thead>
<tr>
<th>NAME*</th>
<th>UN No</th>
<th>HAZCHEM</th>
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<td>TRADE NAMEI</td>
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*As described in KS 2605, KS 2606
ITrade or common name on label

EMERGENCY CONTACTS

POLICE DIAL ;911,999,112

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<tr>
<th>Organization</th>
<th>Location</th>
<th>Telephone</th>
<th>Ask for</th>
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GASES – FLAMMABLE (INCLUDING REFRIGERATED LIQUIDS HAZARD)
### FIRE
- Extremely flammable.
- Will be easily ignited by heat, sparks or flames.
- Will form explosive mixtures with air.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
  - **CAUTION:** Hydrogen (UN1049), Deuterium (UN1957), Hydrogen, refrigerated liquid (UN1966) and Methane (UN1971) are lighter than air and will rise. Hydrogen and Deuterium fires are difficult to detect since they burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.).
- Vapors may travel to source of ignition and flash back.
- Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

### HEALTH AND ENVIRONMENT
- Vapors may cause dizziness or asphyxiation without warning.
- Some may be irritating if inhaled at high concentrations.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire may produce irritating and/or toxic gases.

### PROTECTIVE CLOTHING
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters’ protective clothing will only provide limited protection.
- Always wear thermal protective clothing when handling refrigerated/cryogenic liquids.

### EMERGENCY PROCEDURES

#### IF THIS HAPPENS

#### DO THIS

**FOR ALL EMERGENCIES**
- **IMMEDIATELY CONTACT POLICE OR FIRE BRIGADE**
  - Tell them location, material, UN Number, quantity and emergency contact (name and telephone number) Indicate condition of the vehicle and any damage observed
  - As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
  - Keep unauthorized personnel away.
  - Stay upwind, uphill and/or upstream.
  - Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
  - **Large Spill**
    - Consider initial downwind evacuation for at least 800 meters (1/2 mile).
  - **Fire**
    - If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.
    - In fires involving Liquefied Petroleum Gases (LPG) (UN1075); Butane, (UN1011); Butylene, (UN1012); Isobutylene, (UN1055); Propylene, (UN1077); Isobutane, (UN1969) and Propane, (UN1978)

**TANKER/VEHICLE ACCIDENT**
- Carry out action under ‘for all emergencies’
  - Check for spills and leaks
  - Warn other traffic and people at risk

**SPILL OR LEAK**
- Carry out action under ‘for all emergencies’
  - ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
  - All equipment used when handling the product must be grounded.
  - Do not touch or walk through spilled material.
  - Stop leak if you can do it without risk.
  - If possible, turn leaking containers so that gas escapes rather than liquid.
  - Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water
runoff to contact spilled material.
  • Do not direct water at spill or source of leak.
  • Prevent spreading of vapors through sewers, ventilation systems and confined areas.
  • Isolate area until gas has dispersed.
CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

FIRE
  • DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.
CAUTION: Hydrogen (UN1049), Deuterium (UN1957) and Hydrogen, refrigerated liquid (UN1966) burn with an invisible flame. Hydrogen and Methane mixture, compressed (UN2034) may burn with an invisible flame.
  Small Fire
  • Dry chemical or CO2.
  Large Fire
  • Water spray or fog.
  • Move containers from fire area if you can do it without risk.
Fire involving Tanks
  • Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
  • Cool containers with flooding quantities of water until well after fire is out.
  • Do not direct water at source of leak or safety devices; icing may occur.
  • Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
  • ALWAYS stay away from tanks engulfed in fire.
  • For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

FIRST AID
GENERAL
  • Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
  • Move victim to fresh air.
  • Remove and isolate contaminated clothing and shoes.
  • In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
  • Keep victim calm and warm.
INHALED OR INGESTED
  • Give artificial respiration if victim is not breathing.
  • Administer oxygen if breathing is difficult.
EYES OR SKIN
  • In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
  • Clothing frozen to the skin should be thawed before being removed.

GASES - FLAMMABLE (UNSTABLE)
HAZARD
FIRE
  • EXTREMELY FLAMMABLE.
  • Will be easily ignited by heat, sparks or flames.
  • Will form explosive mixtures with air.
  • Silane (UN2203) will ignite spontaneously in air.
  • Those substances designated with a (P) may polymerize explosively when heated or involved in a fire.
  • Vapors from liquefied gas are initially heavier than air and spread along ground.
  • Vapors may travel to source of ignition and flash back.
  • Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
  • Containers may explode when heated.
  • Ruptured cylinders may rocket.
### HEALTH AND ENVIRONMENT
- Vapors may cause dizziness or asphyxiation without warning.
- Some may be toxic if inhaled at high concentrations.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire may produce irritating and/or toxic gases

### PROTECTIVE CLOTHING

**EMERGENCY RESPONDERS**
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters’ protective clothing will only provide limited protection

### EMERGENCY PROCEDURES

#### IF THIS HAPPENS

<table>
<thead>
<tr>
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<td>• Stay upwind, uphill and/or upstream.</td>
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<td>• Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).</td>
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<td>• Consider initial downwind evacuation for at least 800 meters (1/2 mile).</td>
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<td><strong>Fire</strong></td>
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<td>• If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.</td>
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<th>TANKER/VEHICLE ACCIDENT</th>
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<td>Warn other traffic and people at risk</td>
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<td>ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).</td>
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<td>Stop leak if you can do it without risk.</td>
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<td>Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.</td>
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<td>If possible, turn leaking containers so that gas escapes rather than liquid.</td>
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<td>Prevent entry into waterways, sewers, basements or confined areas.</td>
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<td>Isolate area until gas has dispersed.</td>
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<td>• Water spray or fog.</td>
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<td>• Move containers from fire area if you can do it without risk.</td>
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<td><strong>Fire involving Tanks</strong></td>
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<tr>
<td>• Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.</td>
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<td>• Cool containers with flooding quantities of water until well after fire is out.</td>
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<td>• Do not direct water at source of leak or safety devices; icing may occur.</td>
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<td>• Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.</td>
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<td>• ALWAYS stay away from tanks engulfed in fire.</td>
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For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

### FIRST AID

#### GENERAL
Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Move victim to fresh air.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
- Keep victim calm and warm.

#### INHALED OR INGESTED
Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult

#### EYES OR SKIN
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin

### GASES - FLAMMABLE (CORROSIVE) HAZARD

#### FIRE
- EXTREMELY FLAMMABLE.
- May be ignited by heat, sparks or flames.
- May form explosive mixtures with air.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Vapors may travel to source of ignition and flash back.
- Some of these materials may react violently with water.
- Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

#### HEALTH AND ENVIRONMENT
- May cause toxic effects if inhaled.
- Vapors are extremely irritating.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control may cause pollution.

### PROTECTIVE CLOTHING

#### EMERGENCY RESPONDERS
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters’ protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

### EMERGENCY PROCEDURES

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<th>DO THIS</th>
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## FOR ALL EMERGENCIES

**IMMEDIATELY CONTACT POLICE OR FIRE BRIGADE**
- Tell them location, material, UN Number, quantity and emergency contact (name and telephone number).
- Indicate condition of the vehicle and any damage observed.
- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind, uphill and/or upstream.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Ventilate closed spaces before entering.

### Large Spill
- Consider initial downwind evacuation for at least 800 meters (1/2 mile).

### Fire
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

## TANKER/VEHICLE ACCIDENT

**Carry out action under ‘for all emergencies’**
- Check for spills and leaks
- Warn other traffic and people at risk

## SPILL OR LEAK

**Carry out action under ‘for all emergencies’**
- **ELIMINATE all ignition sources** (no smoking, flares, sparks or flames in immediate area).
- **All equipment used when handling the product must be grounded.**
- **Fully encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire.**
- **Do not touch or walk through spilled material.**
- **Stop leak if you can do it without risk.**
- **If possible, turn leaking containers so that gas escapes rather than liquid.**
- **Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.**
- **Do not direct water at spill or source of leak.**
- **Isolate area until gas has dispersed.**

## FIRE

**Carry out action under ‘for all emergencies’**
- **DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.**

### Small Fire
- Dry chemical or CO2.

### Large Fire
- Water spray, fog or regular foam.
- Move containers from fire area if you can do it without risk.
- Damaged cylinders should be handled only by specialists.

### Fire involving Tanks
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may occur.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- **ALWAYS** stay away from tanks engulfed in fire.

## FIRST AID

### GENERAL
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Remove and isolate contaminated clothing and shoes.
- Keep victim calm and warm.
- Keep victim under observation.
- Move victim to fresh air.
- Remove and isolate contaminated clothing and shoes.
- Keep victim calm and warm.

### INHALED OR
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give
<table>
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<th>INGESTED</th>
<th>artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.</th>
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<tbody>
<tr>
<td>• Administer oxygen if breathing is difficult</td>
<td>• Give artificial respiration if victim is not breathing.</td>
</tr>
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<td>EYES OR SKIN</td>
<td>• Effects of contact or inhalation may be delayed. Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.</td>
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<tr>
<td>• In case of contact with liquefied gas, thaw frosted parts with lukewarm water.</td>
<td>• In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.</td>
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</table>

### GASES - TOXIC - FLAMMABLE HAZARD

#### FIRE
- Flammable; may be ignited by heat, sparks or flames.
- May form explosive mixtures with air.
- Those substances designated with a (P) may polymerize explosively when heated or involved in a fire.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Vapors may travel to source of ignition and flash back.
- Some of these materials may react violently with water.
- Cylinders exposed to fire may vent and release toxic and flammable gas through pressure relief devices.
- Containers may explode when heated.
- Ruptured cylinders may rocket.
- Runoff may create fire or explosion hazard.

#### HEALTH AND ENVIRONMENT
- **TOXIC**; may be fatal if inhaled or absorbed through skin.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control may cause pollution.

### PROTECTIVE CLOTHING

#### EMERGENCY RESPONDERS
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters’ protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

### EMERGENCY PROCEDURES

#### IF THIS HAPPENS

#### DO THIS

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11
FOR ALL EMERGENCIES

IMMEDIATELY CONTACT POLICE OR FIRE BRIGADE
Tell them location, material, UN Number, quantity and emergency contact (name and telephone number) Indicate condition of the vehicle and any damage observed.
- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind, uphill and/or upstream.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Ventilate closed spaces before entering.

Spill
- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For non-highlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under “PUBLIC SAFETY”.

Fire
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also consider initial evacuation for 1600 meters (1 mile) in all directions.

TANKER/VEHICLE ACCIDENT
Carry out action under ‘for all emergencies’
- Check for spills and leaks
- Warn other traffic and people at risk

SPILL OR LEAK
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Fully encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Do not direct water at spill or source of leak.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- FOR CHLOROSILANES, use AFFF alcohol-resistant medium-expansion foam to reduce vapors.
- If possible, turn leaking containers so that gas escapes rather than liquid.
- Prevent entry into waterways, sewers, basements or confined areas.
- Isolate area until gas has dispersed.

FIRE
- DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.
- Small Fire
  - Dry chemical, CO2, water spray or alcohol-resistant foam.
- Large Fire
  - Water spray, fog or alcohol-resistant foam.
  - FOR CHLOROSILANES, DO NOT USE WATER; use AFFF alcohol-resistant medium-expansion foam.
  - Move containers from fire area if you can do it without risk.
  - Damaged cylinders should be handled only by specialists.

Fire Involving Tanks
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may occur.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

FIRST AID

GENERAL
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Move victim to fresh air.
- Give artificial respiration if victim is not breathing.
- Remove and isolate contaminated clothing and shoes.
- Keep victim calm and warm.
Keep victim under observation.
- Effects of contact or inhalation may be delayed.

**INHALED OR INGESTED**
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- Administer oxygen if breathing is difficult.

**EYES OR SKIN**
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.

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**GASES – INERT**
**(INCLUDING REFRIGERATED LIQUIDS)**

**HAZARD**

**FIRE**
- Non-flammable gases.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

**HEALTH AND ENVIRONMENT**
- Vapors may cause dizziness or asphyxiation without warning.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.

**PROTECTIVE CLOTHING**

**EMERGENCY RESPONDERS**
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.
- Always wear thermal protective clothing when handling refrigerated/cryogenic liquids or solids.

**EMERGENCY PROCEDURES**

**IF THIS HAPPENS**

**DO THIS**

**FOR ALL EMERGENCIES**
- IMMEDIATELY CONTACT POLICE OR FIRE BRIGADE
  Tell them location, material, UN Number, quantity and emergency contact (name and telephone number)
  Indicate condition of the vehicle and any damage observed
  - As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
  - As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
  - Keep unauthorized personnel away.
  - Stay upwind, uphill and/or upstream.
  - Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
  - Ventilate closed spaces before entering.

**Large Spill**
- Consider initial downwind evacuation for at least 100 meters (330 feet).

**Fire**
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

**TANKER/VEHICLE ACCIDENT**
- Carry out action under ‘for all emergencies’
  Check for spills and leaks
  Warn other traffic and people at risk
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<td>• Stop leak if you can do it without risk.</td>
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<td>• Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.</td>
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<td>• Prevent entry into waterways, sewers, basements or confined areas.</td>
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<td>• Allow substance to evaporate.</td>
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<td>• Ventilate the area.</td>
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<td><strong>CAUTION:</strong> When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.</td>
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| FIRE | • Use extinguishing agent suitable for type of surrounding fire. |
|      | • Move containers from fire area if you can do it without risk. |
|      | • Damaged cylinders should be handled only by specialists. |
|      | **Fire involving Tanks** |
|      | • Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. |
|      | • Cool containers with flooding quantities of water until well after fire is out. |
|      | • Do not direct water at source of leak or safety devices; icing may occur. |
|      | • Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. |
|      | • **ALWAYS** stay away from tanks engulfed in fire. |

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<td>• In case of contact with liquefied gas, thaw frosted parts with lukewarm water.</td>
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<td>• Keep victim calm and warm.</td>
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</tbody>
</table>

| INHALED OR INGESTED | Administer oxygen if breathing is difficult. |
|                     | • Clothing frozen to the skin should be thawed before being removed. |

| EYES OR SKIN | • Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. |
|             | • Move victim to fresh air. |
|             | • Give artificial respiration if victim is not breathing. |
|             | • In case of contact with liquefied gas, thaw frosted parts with lukewarm water. |
|             | • Keep victim calm and warm. |

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<tr>
<th>GASES – INERT</th>
<th><strong>HAZARD</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRE</strong></td>
<td>• Non-flammable gases.</td>
</tr>
<tr>
<td></td>
<td>• Containers may explode when heated.</td>
</tr>
<tr>
<td></td>
<td>• Ruptured cylinders may rocket.</td>
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</tbody>
</table>
**HEALTH AND ENVIRONMENT**

- Vapors may cause dizziness or asphyxiation without warning.
- Vapors from liquefied gas are initially heavier than air and spread along ground.

**PROTECTIVE CLOTHING**

**EMERGENCY RESPONDERS**

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters’ protective clothing will only provide limited protection.

**EMERGENCY PROCEDURES**

<table>
<thead>
<tr>
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<td>• Keep unauthorized personnel away.</td>
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<td>• Stay upwind, uphill and/or upstream.</td>
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<td>• Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).</td>
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<td></td>
<td>• Ventilate closed spaces before entering.</td>
</tr>
<tr>
<td></td>
<td><strong>EVACUATION</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Large Spill</strong></td>
</tr>
<tr>
<td></td>
<td>• Consider initial downwind evacuation for at least 100 meters (330 feet).</td>
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<td><strong>Fire</strong></td>
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<td></td>
<td>• If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.</td>
</tr>
<tr>
<td><strong>TANKER/VEHICLE ACCIDENT</strong></td>
<td>Carry out action under ‘for all emergencies’</td>
</tr>
<tr>
<td></td>
<td>Check for spills and leaks</td>
</tr>
<tr>
<td></td>
<td>Warn other traffic and people at risk</td>
</tr>
<tr>
<td><strong>SPILL OR LEAK</strong></td>
<td>Do not touch or walk through spilled material.</td>
</tr>
<tr>
<td></td>
<td>• Stop leak if you can do it without risk.</td>
</tr>
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<td>• Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.</td>
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<td>• Do not direct water at spill or source of leak.</td>
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<td>• If possible, turn leaking containers so that gas escapes rather than liquid.</td>
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<td>• Prevent entry into waterways, sewers, basements or confined areas.</td>
</tr>
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<td>• Allow substance to evaporate.</td>
</tr>
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<td></td>
<td>• Ventilate the area.</td>
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<tr>
<td><strong>FIRE</strong></td>
<td>Fire involving Tanks</td>
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<tr>
<td></td>
<td>• Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.</td>
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<tr>
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<td>• Cool containers with flooding quantities of water until well after fire is out.</td>
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<td>• Do not direct water at source of leak or safety devices; icing may occur.</td>
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<td>• Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.</td>
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<td>• ALWAYS stay away from tanks engulfed in fire. Use extinguishing agent suitable for type of surrounding fire.</td>
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<tr>
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<td>• Move containers from fire area if you can do it without risk.</td>
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<td>• Damaged cylinders should be handled only by specialists.</td>
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<td><strong>FIRST AID</strong></td>
<td>Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.</td>
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<td>• Move victim to fresh air.</td>
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<td>• Give artificial respiration if victim is not breathing.</td>
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</table>
| | • Administer oxygen if breathing is difficult.
## GASES – OXIDISING (INCLUDING REFRIGERATED LIQUIDS) HAZARD

### FIRE
- Substance does not burn but will support combustion.
- Some may react explosively with fuels.
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Runoff may create fire or explosion hazard.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

### HEALTH AND ENVIRONMENT
- Vapors may cause dizziness or asphyxiatiion without warning.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire may produce irritating and/or toxic gases.

### PROTECTIVE CLOTHING

#### EMERGENCY RESPONDERS
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no ‘thermal protection.
- Structural firefighters’ protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
- Always wear thermal protective clothing when handling refrigerated/cryogenic liquids.

### EMERGENCY PROCEDURES

#### IF THIS HAPPENS

##### FOR ALL EMERGENCIES
As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind, uphill and/or upstream.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Ventilate closed spaces before entering.

##### EVACUATION
- Large Spill
  - Consider initial downwind evacuation for at least 500 meters (1/3 mile).
- Fire
  - If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

##### TANKER/VEHICLE ACCIDENT
- Carry out action under ‘for all emergencies’
- Check for spills and leaks
- Warn other traffic and people at risk

##### SPILL OR LEAK
- Keep combustibles (wood, paper, oil, etc.) away from spilled material.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- If possible, turn leaking containers so that gas escapes rather than liquid.
- Do not direct water at spill or source of leak.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Prevent entry into waterways, sewers, basements or confined areas.
**FIRE**

- Use extinguishing agent suitable for type of surrounding fire.
  - **Small Fire**
    - Dry chemical or CO2.
  - **Large Fire**
    - Water spray, fog or regular foam.
    - Move containers from fire area if you can do it without risk.
    - Damaged cylinders should be handled only by specialists.

**Fire involving Tanks**

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may occur.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

**FIRST AID**

**GENERAL**

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Move victim to fresh air.
- Keep victim calm and warm.

**INHALED OR INGESTED**

- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.

**EYES OR SKIN**

Remove and isolate contaminated clothing and shoes.
- Clothing frozen to the skin should be thawed before being removed.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water.

**GASES - TOXIC AND/OR CORROSIVE HAZARD**

**FIRE**

- TOXIC; may be fatal if inhaled or absorbed through skin.
- Vapors may be irritating.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control may cause pollution.

**HEALTH AND ENVIRONMENT**

- Some may burn but none ignite readily.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Cylinders exposed to fire may vent and release toxic and/or corrosive gas through pressure relief devices.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

**PROTECTIVE CLOTHING**

**EMERGENCY RESPONDERS**

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters’ protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.
## EMERGENCY PROCEDURES

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### EVACUATION

**Spill**
- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For nonhighlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under “PUBLIC SAFETY”.

**Fire**
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

### TANKER/VEHICLE ACCIDENT

Carry out action under ‘for all emergencies’
- Check for spills and leaks
- Warn other traffic and people at risk

### SPILL OR LEAK

- Fully encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- If possible, turn leaking containers so that gas escapes rather than liquid.
- Prevent entry into waterways, sewers, basements or confined areas.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Do not direct water at spill or source of leak.
- Isolate area until gas has dispersed.

### FIRE

**Small Fire**
- Dry chemical or CO2.

**Large Fire**
- Water spray, fog or regular foam.
- Do not get water inside containers.
- Move containers from fire area if you can do it without risk.
- Damaged cylinders should be handled only by specialists.

**Fire involving Tanks**
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may occur.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

### FIRST AID

**GENERAL**
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Move victim to fresh air.
- Keep victim calm and warm.
- Keep victim under observation.
- Effects of contact or inhalation may be delayed.
### INHALED OR INGESTED
- Give artificial respiration if victim is not breathing.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- Administer oxygen if breathing is difficult.

### EYES OR SKIN
- Remove and isolate contaminated clothing and shoes.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.

### GASES - TOXIC AND/OR CORROSIVE - OXIDIZING HAZARD

#### FIRE
- **TOXIC:** may be fatal if inhaled or absorbed through skin.
- Fire will produce irritating, corrosive and/or toxic gases.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
- Runoff from fire control may cause pollution.

#### HEALTH AND ENVIRONMENT
- Substance does not burn but will support combustion.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- These are strong oxidizers and will react vigorously or explosively with many materials including fuels.
- May ignite combustibles (wood, paper, oil, clothing, etc.).
- Some will react violently with air, moist air and/or water.
- Cylinders exposed to fire may vent and release toxic and/or corrosive gas through pressure relief devices.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

### PROTECTIVE CLOTHING

#### EMERGENCY RESPONDERS
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters’ protective clothing provides limited protection in fire situations only; it is not effective in spill situations where direct contact with the substance is possible.

### EMERGENCY PROCEDURES

#### IF THIS HAPPENS

#### DO THIS

### FOR ALL EMERGENCIES
- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind, uphill and/or upstream.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Ventilate closed spaces before entering.

#### EVACUATION

- **Spill**
  - See Table 1 - Initial Isolation and Protective Action Distances.
- **Fire**
  - If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

### TANKER/VEHICLE ACCIDENT
- Carry out action under ‘for all emergencies’
- Check for spills and leaks
- Warn other traffic and people at risk.
### SPILL OR LEAK

- Fully encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire.
- Do not touch or walk through spilled material.
- Keep combustibles (wood, paper, oil, etc.) away from spilled material.
- Stop leak if you can do it without risk.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Do not direct water at spill or source of leak.
- If possible, turn leaking containers so that gas escapes rather than liquid.
- Prevent entry into waterways, sewers, basements or confined areas.
- Isolate area until gas has dispersed.
- Ventilate the area.

### FIRE

**Small Fire**

*CAUTION:* These materials do not burn but will support combustion. Some will react violently with water.
- Contain fire and let burn. If fire must be fought, water spray or fog is recommended.
- Water only; no dry chemical, CO2 or Halon®.
- Do not get water inside containers.
- Move containers from fire area if you can do it without risk.
- Damaged cylinders should be handled only by specialists.

**Fire involving Tanks**

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may occur.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

### FIRST AID

**GENERAL**

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.
- Move victim to fresh air.
- Keep victim calm and warm.
- Keep victim under observation.
- Effects of contact or inhalation may be delayed.

**INHALED OR INGESTED**

- Give artificial respiration if victim is not breathing.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- Administer oxygen if breathing is difficult.

**EYES OR SKIN**

- Clothing frozen to the skin should be thawed before being removed.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.

### GASES - CORROSIVE HAZARD

**FIRE**

- **TOXIC:** may be fatal if inhaled, ingested or absorbed through skin.
- Vapors are extremely irritating and corrosive.
- Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite.
**HEALTH AND ENVIRONMENT**

- Fire will produce irritating, corrosive and/or toxic gases.
- Runoff from fire control may cause pollution.
- Some may burn but none ignite readily.
- Vapors from liquefied gas are initially heavier than air and spread along ground.
- Some of these materials may react violently with water.
- Cylinders exposed to fire may vent and release toxic and/or corrosive gas through pressure relief devices.
- Containers may explode when heated.
- Ruptured cylinders may rocket.
- For UN1005: Anhydrous ammonia, at high concentrations in confined spaces, presents a flammability risk if a source of ignition is introduced.

**PROTECTIVE CLOTHING**

**EMERGENCY RESPONDERS**

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection.
- Structural firefighters’ protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

**EMERGENCY PROCEDURES**

**IF THIS HAPPENS**

**DO THIS**

**FOR ALL EMERGENCIES**

- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind, uphill and/or upstream.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Ventilate closed spaces before entering.

**EVACUATION**

**Spill**

- See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For nonhighlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under “PUBLIC SAFETY”.

**Fire**

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions.

**TANKER/VEHICLE ACCIDENT**

**FIRE**

**Small Fire**

- Dry chemical or CO2.

**Large Fire**

- Water spray, fog or regular foam.
- Move containers from fire area if you can do it without risk.
- Do not get water inside containers.
- Damaged cylinders should be handled only by specialists.

**Fire involving Tanks**

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Do not direct water at source of leak or safety devices; icing may occur.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
|SPILL OR LEAK| • Fully encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire.  
• Do not touch or walk through spilled material.  
• Stop leak if you can do it without risk.  
• If possible, turn leaking containers so that gas escapes rather than liquid.  
• Prevent entry into waterways, sewers, basements or confined areas.  
• Do not direct water at spill or source of leak.  
• Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.  
• Isolate area until gas has dispersed. |

|FIRE| |

|FIRST AID| |

|GENERAL| • Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.  
• Move victim to fresh air.  
• Keep victim calm and warm.  
• Keep victim under observation.  
• Effects of contact or inhalation may be delayed. |

|INHALED OR INGESTED| • Give artificial respiration if victim is not breathing.  
• Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.  
• Administer oxygen if breathing is difficult. |

|EYES OR SKIN| • Remove and isolate contaminated clothing and shoes.  
• In case of contact with liquefied gas, thaw frosted parts with lukewarm water.  
• In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.  
• In case of contact with Hydrogen fluoride, anhydrous (UN1052), flush with large amounts of water.  
For skin contact, if calcium gluconate gel is available, rinse 5 minutes, then apply gel. Otherwise, continue rinsing until medical treatment is available. For eyes, flush with water or a saline solution for 15 minutes. |