ATTACHMENT A

This report is intended to serve as a technical resource for OPS and State pipeline safety inspectors evaluating operators' integrity management (IM) programs. Inspectors consider information from a number of sources in determining the adequacy of each IM program. Development of this report was funded via a Congressional appropriation specifically designated for implementation of IM oversight. This and other similar reports are separate and distinct from the work products associated with and funded via OPS's R&D Program.

NIOSH Pocket Guide to Chemical Hazards

FOR

AMMONIA

1,3-BUTADIENE

n-BUTANE

ETHYLENE OXIDE

ISOBUTANE

LIQUIFIED PETROLEUM GAS

PROPANE

PROPYLENE OXIDE

NIOSH Pocket Guide to Chemical Hazards

Ammonia	**CAS** 7664-41-7
NH_3	**RTECS** BO0875000
Synonyms & Trade Names Anhydrous ammonia, Aqua ammonia, Aqueous ammonia [Note: Often used in an aqueous solution.]	**DOT ID & Guide** 1005 125 (anhydrous) 2672 154 (10-35% solution) 2073 125 (>35-50% solution) 1005 125 (>50% solution)

Exposure Limits	NIOSH REL: TWA 25 ppm (18 mg/m^3) ST 35 ppm (27 mg/m^3)
	OSHA PEL†: TWA 50 ppm (35 mg/m^3)
IDLH 300 ppm See: 7664417	**Conversion** 1 ppm = 0.70 mg/m^3

Physical Description
Colorless gas with a pungent, suffocating odor. [Note: Shipped as a liquefied compressed gas. Easily liquefied under pressure.]

MW: 17.0	BP: -28°F	FRZ: -108°F	Sol: 34%
VP: 8.5 atm	IP: 10.18 eV	RGasD: 0.60	
Fl.P: NA (Gas)	UEL: 28%	LEL: 15%	

[Note: Although NH_3 does not meet the DOT definition of a Flammable Gas (for labeling purposes), it should be treated as one.]

Incompatibilities & Reactivities
Strong oxidizers, acids, halogens, salts of silver & zinc [Note: Corrosive to copper & galvanized surfaces.]

Measurement Methods
NIOSH 6015, 6016; OSHA ID188
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid** (See procedures)
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated (solution) Remove: When wet or contaminated (solution) Change: No recommendation Provide: Eyewash (>10%), Quick drench (>10%)	Eye: Irrigate immediately (solution/liquid) Skin: Water flush immediately (solution/liquid) Breathing: Respiratory support Swallow: Medical attention immediately (solution)

READ FIRST

Respirator Recommendations NIOSH
Up to 250 ppm: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern*/(APF = 10) Any supplied-air respirator*
Up to 300 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*/(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas

mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion (solution), skin and/or eye contact (solution/liquid)

Symptoms Irritation eyes, nose, throat; dyspnea (breathing difficulty), wheezing, chest pain; pulmonary edema; pink frothy sputum; skin burns, vesiculation; liquid: frostbite

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0414 See MEDICAL TESTS: 0013

NIOSH Pocket Guide to Chemical Hazards

1,3-Butadiene	CAS 106-99-0
CH_2=CHCH=CH_2	RTECS EI9275000
Synonyms & Trade Names Biethylene, Bivinyl, Butadiene, Divinyl, Erythrene, Vinylethylene	**DOT ID & Guide** 1010 116P (inhibited)

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL: [1910.1051] TWA 1 ppm ST 5 ppm
IDLH Ca [2000 ppm] [10%LEL] See: 106990	**Conversion** 1 ppm = 2.21 mg/m^3

Physical Description
Colorless gas with a mild aromatic or gasoline-like odor. [Note: A liquid below 24°F. Shipped as a liquefied compressed gas.]

MW: 54.1	BP: 24°F	FRZ: -164°F	Sol: Insoluble
VP: 2.4 atm	IP: 9.07 eV	RGasD: 1.88	Sp.Gr: 0.65 (Liquid at 24° F)
Fl.P: NA (Gas) -105°F (Liquid)	UEL: 12.0%	LEL: 2.0%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Phenol, chlorine dioxide, copper, crotonaldehyde [Note: May contain inhibitors (such as tributylcatechol) to prevent self-polymerization. May form explosive peroxides upon exposure to air.]

Measurement Methods
NIOSH 1024; OSHA 56
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Frostbite
Eyes: Frostbite
Wash skin: No recommendation
Remove: When wet (flammable)
Change: No recommendation
Provide: Frostbite

First Aid (See procedures)
Eye: Frostbite
Skin: Frostbite
Breathing: Respiratory support

READ FIRST

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Irritation eyes, nose, throat; drowsiness, dizziness; liquid: frostbite; teratogenic, reproductive effects; [potential occupational carcinogen]

Target Organs Eyes, respiratory system, central nervous system, reproductive system

Cancer Site [hematopoietic cancer]

See also: INTRODUCTION See ICSC CARD: 0017

NIOSH Pocket Guide to Chemical Hazards

n-Butane	**CAS** 106-97-8
$CH_3CH_2CH_2CH_3$	**RTECS** EJ4200000
Synonyms & Trade Names normal-Butane, Butyl hydride, Diethyl, Methylethylmethane [Note: Also see specific listing for Isobutane.]	**DOT ID & Guide** 1011 115 1075 115

Exposure Limits	NIOSH REL: TWA 800 ppm (1900 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.38 mg/m^3

Physical Description
Colorless gas with a gasoline-like or natural gas odor. [Note: Shipped as a liquefied compressed gas. A liquid below 31°F.]

MW: 58.1	BP: 31°F	FRZ: -217°F	Sol: Slight
VP: 2.05 atm	IP: 10.63 eV	RGasD: 2.11	Sp.Gr: 0.6 (Liquid at 31° F)
Fl.P: NA (Gas)	UEL: 8.4%	LEL: 1.6%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers (e.g., nitrates & perchlorates), chlorine, fluorine, (nickel carbonyl + oxygen)

Measurement Methods
OSHA 56
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	**First Aid** (See procedures) Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

READ FIRST
Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Drowsiness, narcosis, asphyxia; liquid: frostbite

Target Organs central nervous system

See also: INTRODUCTION See ICSC CARD: 0232

NIOSH Pocket Guide to Chemical Hazards

Ethylene oxide	**CAS** 75-21-8
C_2H_4O	**RTECS** KX2450000
Synonyms & Trade Names Dimethylene oxide; 1,2-Epoxy ethane; Oxirane	**DOT ID & Guide** 1040 119

Exposure Limits	NIOSH REL: Ca TWA <0.1 ppm (0.18 mg/m^3) C 5 ppm (9 mg/m^3) [10-min/day] See Appendix A
	OSHA PEL: [1910.1047] TWA 1 ppm 5 ppm [15-minute Excursion]
IDLH Ca [800 ppm] See: 75218	**Conversion** 1 ppm = 1.80 mg/m^3

Physical Description
Colorless gas or liquid (below 51°F) with an ether-like odor.

MW: 44.1	BP: 51°F	FRZ: -171°F	Sol: Miscible
VP: 1.46 atm	IP: 10.56 eV	RGasD: 1.49	Sp.Gr: 0.82 (Liquid at 50° F)
Fl.P: NA (Gas) -20°F (Liquid)	UEL: 100%	LEL: 3.0%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong acids, alkalis & oxidizers; chlorides of iron, aluminum & tin; oxides of iron & aluminum; water

Measurement Methods
NIOSH 1614, 3800; OSHA 30, 49, 50
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact (liquid)
Eyes: Prevent eye contact (liquid)
Wash skin: When contaminated (liquid)
Remove: When wet (flammable)
Change: No recommendation
Provide: Quick drench (liquid)

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately (liquid)

READ FIRST

Respirator Recommendations NIOSH
Up to 5 ppm: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-

mounted canister providing protection against the compound of concern†/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion (liquid), skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; peculiar taste; headache; nausea, vomiting, diarrhea; dyspnea (breathing difficulty), cyanosis, pulmonary edema; drowsiness, lassitude (weakness, exhaustion), incoordination; EKG abnormalities; eye, skin burns (liquid or high vapor concentration); liquid: frostbite; reproductive effects; [potential occupational carcinogen]; in animals: convulsions; liver, kidney damage

Target Organs Eyes, skin, respiratory system, liver, central nervous system, blood, kidneys, reproductive system

Cancer Site [peritoneal cancer, leukemia]

See also: INTRODUCTION See ICSC CARD: 0155 See MEDICAL TESTS: 0106

NIOSH Pocket Guide to Chemical Hazards

Isobutane	**CAS** 75-28-5
$CH_3CH(CH_3)_2$	**RTECS** TZ4300000
Synonyms & Trade Names 2-Methylpropane [Note: Also see specific listing for n-Butane.]	**DOT ID & Guide** 1075 115 1969 115

Exposure Limits	NIOSH REL: TWA 800 ppm (1900 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 2.38 mg/m^3

Physical Description
Colorless gas with a gasoline-like or natural gas odor. [Note: Shipped as a liquefied compressed gas. A liquid below 11°F.]

MW: 58.1	BP: 11°F	FRZ: -255°F	Sol: Slight
VP(70°F): 3.1 atm	IP: 10.74 eV	RGasD: 2.06	
Fl.P: NA (Gas)	UEL: 8.4%	LEL: 1.6%	

Flammable Gas Class IA Flammable Liquid

Incompatibilities & Reactivities
Strong oxidizers (e.g., nitrates & perchlorates), chlorine, fluorine, (nickel carbonyl + oxygen)

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	**First Aid** (See procedures) Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

READ FIRST

Respirator Recommendations To be added later

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Drowsiness, narcosis, asphyxia; liquid: frostbite

Target Organs central nervous system

See also: INTRODUCTION See ICSC CARD: 0901

Target Organs central nervous system

See also: INTRODUCTION See ICSC CARD: 0319

NIOSH Pocket Guide to Chemical Hazards

L.P.G.	**CAS** 68476-85-7
$C_3H_8/C_3H_6/C_4H_{10}/C_4H_8$	**RTECS** SE7545000
Synonyms & Trade Names Bottled gas, Compressed petroleum gas, Liquefied hydrocarbon gas, Liquefied petroleum gas, LPG [Note: A fuel mixture of propane, propylene, butanes & butylenes.]	**DOT ID & Guide** 1075 115

Exposure Limits	NIOSH REL: TWA 1000 ppm (1800 mg/m^3)
	OSHA PEL: TWA 1000 ppm (1800 mg/m^3)
IDLH 2000 ppm [10%LEL] See: 68476857	**Conversion** 1 ppm = 1.72-2.37 mg/m^3

Physical Description
Colorless, noncorrosive, odorless gas when pure. [Note: A foul-smelling odorant is usually added. Shipped as a liquefied compressed gas.]

MW: 42-58	BP: >-44°F	FRZ: ?	Sol: Insoluble
VP: >1 atm	IP: 10.95 eV	RGasD: 1.45-2.00	
Fl.P: NA (Gas)	UEL: 9.5% (Propane) 8.5% (Butane)	LEL: 2.1% (Propane) 1.9% (Butane)	

Flammable Gas

Incompatibilities & Reactivities
Strong oxidizers, chlorine dioxide

Measurement Methods
NIOSH S93 (II-2)
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite	**First Aid** (See procedures) Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support

READ FIRST

Respirator Recommendations NIOSH/OSHA
Up to 2000 ppm: (APF = 10) Any supplied-air respirator/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin and/or eye contact (liquid)

Symptoms Dizziness, drowsiness, asphyxia; liquid: frostbite

Target Organs respiratory system, central nervous system

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Propylene oxide	**CAS** 75-56-9
C_3H_6O	**RTECS** TZ2975000
Synonyms & Trade Names 1,2-Epoxy propane; Methyl ethylene oxide; Methyloxirane; Propene oxide; 1,2-Propylene oxide	**DOT ID & Guide** 1280 127P

Exposure Limits	NIOSH REL: Ca See Appendix A
	OSHA PEL†: TWA 100 ppm (240 mg/m^3)
IDLH Ca [400 ppm] See: 75569	**Conversion** 1 ppm = 2.38 mg/m^3

Physical Description
Colorless liquid with a benzene-like odor. [Note: A gas above 94°F.]

MW: 58.1	BP: 94°F	FRZ: -170°F	Sol: 41%
VP: 445 mmHg	IP: 9.81 eV		Sp.Gr: 0.83
Fl.P: -35°F	UEL: 36%	LEL: 2.3%	

Class IA Flammable Liquid: Fl.P. below 73°F and BP below 100°F.

Incompatibilities & Reactivities
Anhydrous metal chlorides; iron; strong acids, caustics & peroxides [Note: Polymerization may occur due to high temperatures or contamination with alkalis, aqueous acids, amines & acidic alcohols.]

Measurement Methods
NIOSH 1612; OSHA 88
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

READ FIRST

Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; skin blisters, burns; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system

Cancer Site [in animals: nasal tumors]

See also: INTRODUCTION See ICSC CARD: 0192

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **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.
- Vapors may travel to source of ignition and flash back.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

HEALTH

- 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.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- Isolate spill or leak area immediately for at least 50 to 100 meters (160 to 330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.

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.

EVACUATION

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.

EMERGENCY RESPONSE

FIRE

- **DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.**

Small Fires

- Dry chemical or CO_2.

Large Fires

- 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.

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.
- 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.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- 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.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **EXTREMELY FLAMMABLE.**
- Will be easily ignited by heat, sparks or flames.
- Will form explosive mixtures with air.
- Silane 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.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

HEALTH

- 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.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- Isolate spill or leak area immediately for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.

PROTECTIVE CLOTHING

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

EVACUATION

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.

EMERGENCY RESPONSE

FIRE

- **DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.**

Small Fires

- Dry chemical or CO_2.

Large Fires

- 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.

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.
- Stop leak if you can do it without risk.
- Do not touch or walk through spilled material.
- 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.
- 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.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

EMERGENCY RESPONSE

FIRE

- **DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.**

Small Fires

- Dry chemical, CO_2, water spray or alcohol-resistant foam.

Large Fires

- 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.

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.

FIRST AID

- Move victim to fresh air. • Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce 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.
- 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.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water.
- Keep victim warm and quiet. • Keep victim under observation.
- 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.

POTENTIAL HAZARDS

HEALTH

- **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.

FIRE OR EXPLOSION

- 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.
- Containers may explode when heated.
- Ruptured cylinders may rocket.
- Runoff may create fire or explosion hazard.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- Isolate spill or leak area immediately for at least 100 to 200 meters (330 to 660 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing which 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.

EVACUATION

Spill

- See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, 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.

POTENTIAL HAZARDS

HEALTH

- **TOXIC; may be fatal if inhaled.**
- Vapors are extremely irritating and corrosive.
- 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.

FIRE OR EXPLOSION

- 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.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- Isolate spill or leak area immediately for at least 100 to 200 meters (330 to 660 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Wear chemical protective clothing which 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.

EVACUATION

Spill

- See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, 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.

EMERGENCY RESPONSE

FIRE

Small Fires

- Dry chemical or CO_2.

Large Fires

- 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.

FIRST AID

- Move victim to fresh air. • Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce 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.
- 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.
- Keep victim warm and quiet. • Keep victim under observation.
- 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.

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **"P"** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

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

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 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.

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fires

- Dry chemical, CO_2, water spray or alcohol-resistant foam.

Large Fires

- Water spray, fog or alcohol-resistant foam.
- Use water spray or fog; do not use straight streams.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- 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.
- 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.

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.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spills

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- 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.
- Wash skin with soap and water.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.