Section 1: IDENTIFICATION

Product Name:	Carbon Dioxide
Synonyms:	CO2; Lloydminster CO2.
Product Use:	Enhance Oil Recovery, petrochemical industry, fire suppressant.
Restrictions on Use:	Not available.
Manufacturer/Supplier:	Husky Oil Operations Ltd. PO Box 6525 Station 'D' Calgary, Alberta T2P 3G7
Phone Number:	403-298-6111
Emergency Phone:	403-262-2111
Date of Preparation of SDS:	March 12, 2015

Section 2: HAZARD(S) IDENTIFICATION

GHS INFORMATION

Classification: Gases Under Pressure - Refrigerated Liquefied Gas
Simple Asphyxiant

LABEL ELEMENTS

Hazard Pictogram(s):

Signal Word: Warning

Hazard Statements: Contains refrigerated gas; may cause cryogenic burns or injury.
May displace oxygen and cause rapid suffocation.

Precautionary Statements

Prevention: Wear cold insulating gloves, face shield and eye protection.

Response: Get immediate medical advice/attention.
Thaw frosted parts with lukewarm water. Do not rub affected area.

Storage: Store in a well-ventilated place.

Disposal: Not applicable.

Hazards Not Otherwise Classified: Not applicable.

Ingredients with Unknown Toxicity: None.

This material is considered hazardous by the OSHA Hazard Communication Standard, (29 CFR 1910.1200).

Section 3: COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient(s)	Common name / Synonyms	CAS No.	% vol./vol.
Carbon dioxide	Not available.	124-38-9	99 - 100
Nitrogen	Not available.	7727-37-9	< 1
Oxygen	Not available.	7782-44-7	< 1
Benzene	Not available.	71-43-2	< 0.01
Benzene, methyl-	Toluene	108-88-3	< 0.01
Benzene, ethyl-	Ethylbenzene	100-41-4	< 0.01
Benzene, dimethyl-	Xylene	1330-20-7	< 0.01

Section 4: FIRST-AID MEASURES

Inhalation:

If inhaled: Call a poison center or doctor if you feel unwell.

Acute and delayed symptoms and effects: May displace oxygen and cause rapid suffocation. Central nervous system depression can occur if product is present in concentrations that will reduce the oxygen content of air below 18 % (vol). Symptoms may include headache, lightheadedness, drowsiness, disorientation, vomiting and seizures. Unconsciousness and death may occur with severe oxygen deprivation. May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Eye Contact:

If in eyes: Rinse cautiously with water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center or doctor.

Acute and delayed symptoms and effects: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. The pain after contact with liquid can quickly subside. Permanent eye damage or blindness could result. May cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Skin Contact:

Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. If on skin: Wash with plenty of water. Get immediate medical advice/attention. Thaw frosted parts with lukewarm water. Do not rub affected area. Remove non-adhering contaminated clothing. Do not remove adherent material or clothing.

Acute and delayed symptoms and effects: Contains refrigerated gas; may cause cryogenic burns or injury. Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside. May cause skin irritation. Signs/symptoms may include localized redness, swelling, and itching.

Ingestion:

Not a normal route of exposure.

Acute and delayed symptoms and effects: Not a normal route of exposure.

General Advice: In case of accident or if you feel unwell, seek medical advice immediately (show the label or SDS where possible).

Note to Physicians: Symptoms may not appear immediately.

Section 5: FIRE-FIGHTING MEASURES

FLAMMABILITY AND EXPLOSION INFORMATION

Contains refrigerated gas; may cause cryogenic burns or injury. Not flammable or combustible by OSHA/WHMIS criteria. Ruptured cylinders may rocket. Move containers from fire area if you can do it without risk. Damaged cylinders should be handled only by specialists.

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.

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.

Sensitivity to Mechanical Impact: This material is not sensitive to mechanical impact.
Sensitivity to Static Discharge: This material is not sensitive to static discharge.

MEANS OF EXTINCTION

Suitable Extinguishing Media: Use extinguishing agent suitable for type of surrounding fire.

Unsuitable Extinguishing Media: Not available.

Products of Combustion: Not available.

Protection of Firefighters: 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. 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.

Section 6: ACCIDENTAL RELEASE MEASURES

Emergency Procedures: 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. 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.

Personal Precautions: Do not touch or walk through spilled material. Use personal protection recommended in Section 8.

Environmental Precautions: Prevent entry into waterways, sewers, basements or confined areas.

Methods for Containment: 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.

Methods for Clean-Up: Allow substance to evaporate. Ventilate the area. CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

Other Information: See Section 13 for disposal considerations.

Section 7: HANDLING AND STORAGE

Handling:
Avoid breathing gas. Keep away from heat, sparks, open flames, and hot surfaces. – No smoking. Pressurized container: Do not pierce or burn, even after use. See Section 8 for information on Personal Protective Equipment.

Storage:
Store in a well-ventilated place. Protect from sunlight. Store away from incompatible materials. See Section 10 for information on Incompatible Materials. Keep out of the reach of children.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines
Component

Carbon dioxide [CAS No. 124-38-9]
ACGIH: 5000 ppm (TWA); 30000 ppm (STEL); (1983)
OSHA: 5000 ppm (TWA), 9000 mg/m³ (TWA);

Nitrogen [CAS No. 7727-37-9]
ACGIH: Simple asphyxiant
OSHA: No PEL established.

Oxygen [CAS No. 7782-44-7]
ACGIH: No TLV established.
OSHA: No PEL established.

Benzene [CAS No. 71-43-2]
ACGIH: 0.5 ppm (TWA); 2.5 ppm (STEL); Skin; A1; BEI (1996)
OSHA: 1 ppm (TWA); 5 ppm (STEL);

Toluene [CAS No. 108-88-3]
ACGIH: 20 ppm (TWA); A4; BEI (2006)
OSHA: 200 ppm (TWA); 300 ppm (C); 500 ppm (Peak) (Maximum duration: 10 minutes.)
100 ppm (TWA); 150 ppm (STEL) [Vacated];

Ethylbenzene [CAS No. 100-41-4]
ACGIH: 20 ppm (TWA); A3; BEI (2010)
OSHA: 100 ppm (TWA), 435 mg/m³ (TWA);
125 ppm (STEL) [Vacated];

Xylene [CAS No. 1330-20-7]

ACGIH: 100 ppm (TWA); 150 ppm (STEL); A4; BEI (1992)
OSHA: 100 ppm (TWA), 435 mg/m³ (TWA);
150 ppm (STEL) [Vacated];

PEL: Permissible Exposure Limit
TLV: Threshold Limit Value
TWA: Time-Weighted Average
STEL: Short-Term Exposure Limit
C: Ceiling

Engineering Controls: Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapour, gas, etc.) below recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Eye/Face Protection: Wear face shield and eye protection. Use equipment for eye protection that meets the standards referenced by CSA Standard CAN/CSA-Z94.3-92 and OSHA regulations in 29 CFR 1910.133 for Personal Protective Equipment.

Hand Protection: Wear protective gloves. Wear cold insulating gloves. Consult glove manufacturer specifications for further information.

Skin and Body Protection: Wear protective clothing.

Respiratory Protection: If engineering controls and ventilation are not sufficient to control exposure to below the allowable limits then an appropriate NIOSH/MSHA approved air-purifying respirator that meets the requirements of CSA Standard CAN/CSA-Z94.4-11, or self-contained breathing apparatus must be used. Supplied air breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air-purifying respirators.

General Hygiene Considerations: Handle according to established industrial hygiene and safety practices. Consult a competent industrial hygienist to determine hazard potential and/or the PPE manufacturers to ensure adequate protection.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Clear gas.

Colour: Colourless.

Odour: Slight fermentation.

Odour Threshold: Not available.

Physical State:	Gas.
pH:	Not available.
Melting Point / Freezing Point:	Not available.
Initial Boiling Point:	Not available.
Boiling Range:	Not available.
Flash Point:	Not available.
Evaporation Rate:	Not available.
Flammability (solid, gas):	See Section 5.
Lower Flammability Limit:	Not available.
Upper Flammability Limit:	Not available.
Vapor Pressure:	Not available.
Vapor Density:	1.5 (Air = 1) (Carbon dioxide)
Relative Density:	Not available.
Solubilities:	Slightly soluble in water.
Partition Coefficient: n-Octanol/Water:	log Pow: 0.83
Auto-ignition Temperature:	Not available.
Decomposition Temperature:	Not available.
Viscosity:	Not available.
Percent Volatile, wt. %:	100
VOC content, wt. %:	Not available.
Density:	1.842 kg/m^3
Coefficient of Water/Oil Distribution:	Not available.

Section 10: STABILITY AND REACTIVITY

Reactivity:	Contact with incompatible materials. Sources of ignition. Exposure to heat.
Chemical Stability:	Stable under normal storage conditions.
Possibility of Hazardous Reactions:	Dusts of various metals, such as magnesium, zirconium, titanium, aluminum, chromium & manganese are ignitable and explosive when suspended in Carbon dioxide. Forms carbonic acid in water.
Conditions to Avoid:	Contact with incompatible materials. Sources of ignition. Exposure to heat.

Incompatible Materials: Powdered metals.

Hazardous Decomposition Products: Not available.

Section 11: TOXICOLOGICAL INFORMATION

EFFECTS OF ACUTE EXPOSURE

Product Toxicity

Oral: Not available.

Dermal: Not available.

Inhalation: Not available.

Component Toxicity

Component	CAS No.	LD_{50} oral	LD_{50} dermal	LC_{50}
Carbon dioxide	124-38-9	Not available.	Not available.	Not available.
Nitrogen	7727-37-9	Not available.	Not available.	Not available.
Oxygen	7782-44-7	Not available.	Not available.	Not available.
Benzene	71-43-2	930 mg/kg (rat)	> 9400 µL/kg (rabbit)	10000 ppm (rat); 7H
Toluene	108-88-3	2600 mg/kg (rat)	14.1 mL/kg (rabbit)	49000 mg/m³ (rat); 4H
Ethylbenzene	100-41-4	3500 mg/kg (rat)	17800 µL/kg (rabbit)	Not available.
Xylene	1330-20-7	4300 mg/kg (rat)	> 1700 mg/kg (rabbit)	5000 ppm (rat); 4H

Likely Routes of Exposure: Eye contact. Skin contact. Inhalation. Skin absorption.

Target Organs: Skin. Eyes. Respiratory system. Lungs. Cardiovascular system. Bone marrow. Central nervous system.

Symptoms (including delayed and immediate effects)

Inhalation: May displace oxygen and cause rapid suffocation. Central nervous system depression can occur if product is present in concentrations that will reduce the oxygen content of air below 18 % (vol). Symptoms may include headache, lightheadedness, drowsiness, disorientation, vomiting and seizures. Unconsciousness and death may occur with severe oxygen deprivation. May cause respiratory irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Eye: Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. The pain after contact with liquid can quickly subside. Permanent eye damage or blindness could result. May cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Skin: Contains refrigerated gas; may cause cryogenic burns or injury. Contact with rapidly expanding or liquefied gas may cause irritation and/or frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can quickly subside. May cause skin irritation. Signs/symptoms may include localized redness, swelling, and itching.

Ingestion: Not a normal route of exposure.

Skin Sensitization: Not available.

Respiratory Sensitization: Not available.

Medical Conditions Aggravated By Exposure: Not available.

EFFECTS OF CHRONIC EXPOSURE (from short and long-term exposure)

Target Organs: Skin. Eyes. Respiratory system. Lungs. Blood. Cardiovascular system. Bone marrow. Liver. Kidneys. Central nervous system.

Chronic Effects: This product may contain trace amounts of Benzene, Toluene, Ethylbenzene and/or Xylene. Reports of chronic poisoning with Benzene, Toluene, Ethylbenzene or Xylene describe anemia, decreased blood cell count and bone marrow hypoplasia. Liver and kidney damage may occur. Repeated exposure of the eyes to high concentrations of Xylenes vapour may cause reversible eye damage. Chronic inhalation exposure to xylene causes mid-frequency hearing loss in laboratory animals. Xylene reacts synergistically with n-hexane to enhance hearing loss. Immunodepressive effects have also been reported for Benzene.

Carcinogenicity: Product is not classified as a carcinogen. See Component Carcinogenicity table below for information on individual components. Chronic exposure to benzene has been associated with an increased incidence of leukemia and multiple myeloma (tumour composed of cells of the type normally found in the bone marrow).

Component Carcinogenicity

Component	ACGIH	IARC	NTP	OSHA	Prop 65
Benzene	A1	Group 1	List 1	OSHA Carcinogen.	Listed.
Toluene	A4	Group 3	Not listed.	Not listed.	Not listed.
Ethylbenzene	A3	Group 2B	Not listed.	OSHA Carcinogen.	Listed.
Xylene	A4	Group 3	Not listed.	Not listed.	Not listed.

Mutagenicity: Not available.

Reproductive Effects: Not available.

Developmental Effects

Teratogenicity: Not available.

Embryotoxicity: Benzene and Xylene have caused adverse fetal effects in laboratory animals. Exposure to Toluene may affect the developing fetus.

Toxicologically Synergistic Materials: Xylene reacts synergistically with n-hexane to enhance hearing loss.

Section 12: ECOLOGICAL INFORMATION

Ecotoxicity: Not available.

Persistence / Degradability: Not available.

Bioaccumulation / Accumulation: Not available.

Mobility in Environment: Not available.

Other Adverse Effects: Not available.

Section 13: DISPOSAL CONSIDERATIONS

Disposal Instructions: Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

Section 14: TRANSPORT INFORMATION

U.S. Department of Transportation (DOT)

Proper Shipping Name: UN2187, CARBON DIOXIDE, REFRIGERATED LIQUID, 2.2

Class: 2.2

UN Number: UN2187

Packing Group: Not applicable.

Label Code:

Canada Transportation of Dangerous Goods (TDG)

Proper Shipping Name: UN2187, CARBON DIOXIDE, REFRIGERATED LIQUID, 2.2

Class: 2.2

UN Number: UN2187

Packing Group: Not applicable.

Label Code:

Section 15: REGULATORY INFORMATION

Chemical Inventories

US (TSCA)
The components of this product are in compliance with the chemical notification requirements of TSCA.

Canada (DSL)
The components of this product are in compliance with the chemical notification requirements of the NSN Regulations under CEPA, 1999.

Federal Regulations

Canada
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

WHMIS Classification: Class A - Compressed Gas.

Hazard Symbols:

United States
This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SARA Title III

Component	Section 302 (EHS) TPQ (lbs.)	Section 304 EHS RQ (lbs.)	CERCLA RQ (lbs.)	Section 313	RCRA CODE	CAA 112(r) TQ (lbs.)
Benzene	Not listed.	Not listed.	10	313	U019	Not listed.
Toluene	Not listed.	Not listed.	1000	313	U220	Not listed.
Ethylbenzene	Not listed.	Not listed.	1000	313	Not listed.	Not listed.
Xylene	Not listed.	Not listed.	100	313	U239	Not listed.

State Regulations
Massachusetts
US Massachusetts Commonwealth's Right-to-Know Law (Appendix A to 105 Code of Massachusetts Regulations Section 670.000)

Component	CAS No.	RTK List
Carbon dioxide	124-38-9	Listed.
Nitrogen	7727-37-9	Listed.
Oxygen	7782-44-7	Listed.
Benzene	71-43-2	E
Toluene	108-88-3	Listed.
Ethylbenzene	100-41-4	Listed.
Xylene	1330-20-7	Listed.

Note: E = Extraordinarily Hazardous Substance

New Jersey
US New Jersey Worker and Community Right-to-Know Act (New Jersey Statute Annotated Section 34:5A-5)

Component	CAS No.	RTK List
Carbon dioxide	124-38-9	Listed.
Nitrogen	7727-37-9	Listed.
Oxygen	7782-44-7	Listed.
Benzene	71-43-2	SHHS
Toluene	108-88-3	SHHS
Ethylbenzene	100-41-4	SHHS
Xylene	1330-20-7	SHHS

Note: SHHS = Special Health Hazard Substance

Pennsylvania

US Pennsylvania Worker and Community Right-to-Know Law (34 Pa. Code Chap. 301-323)

Component	CAS No.	RTK List
Carbon dioxide	124-38-9	Listed.
Nitrogen	7727-37-9	Listed.
Oxygen	7782-44-7	Listed.
Benzene	71-43-2	ES
Toluene	108-88-3	E
Ethylbenzene	100-41-4	E
Xylene	1330-20-7	E

Note: E = Environmental Hazard; S = Special Hazardous Substance

California

California Prop 65: WARNING: This product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Component	Type of Toxicity
Benzene	cancer; developmental, male
Toluene	developmental
Ethylbenzene	cancer

Section 16: OTHER INFORMATION

Disclaimer:

The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for their own particular use.

Date of Preparation of SDS: March 12, 2015

SDS Expiry Date (Canada): March 11, 2018

Version: 1.0

GHS SDS Prepared by: **Deerfoot Consulting Inc.**

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