

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: BOW RIVER CRUDE OIL (BR)
Synonyms: Bow River (BR) Alderson, Countess, Tide Lake
Chemical Description: A naturally occurring mixture of paraffins, naphthalenes, aromatic hydrocarbons and small amounts of sulphur and nitrogen compounds mixed with condensate
Product Use: Process stream, fuels and lubricants production
Manufacturer/Supplier: CENOVUS ENERGY INC.
 500 Centre Street SE, PO Box 766
 Calgary, AB T2P 0M5
Prepared By: Cenovus Energy Inc. Health and Safety
Phone Number: 1-403-766-2000
Emergency Telephone: Cenovus 1-877-458-8080, CANUTEC 1-613-996-6666 (Canada),
 CHEMTREC 1-800-424-9300

2. HAZARDS IDENTIFICATION

Hazard Classification:

| | |
|-------------------------------------|--|
| Flammable Liquids – Category 1 | Carcinogenicity – Category 1 |
| Acute Toxicity – Category 2 | Specific Target Organ Toxicity Single Exposure – Category 3 |
| Skin Irritation – Category 2 | Specific Target Organ Toxicity Repeat Exposure – Category 2 |
| Eye Irritation – Category 2A | Aspiration Hazard – Category 1 |
| Toxic to Reproduction – Category 2 | Aquatic Toxicant – Category 3 |
| Germ Cell Mutagenicity – Category 2 | |

Emergency Overview: Danger. Extremely flammable liquid and vapour. Harmful if swallowed or inhaled and enters airway. May cause respiratory and mild skin irritation. May cause serious eye irritation. May cause drowsiness or dizziness. May cause damage to organs (liver, kidneys, blood, nervous system and skin) through prolonged or repeated exposure. The benzene component of this material may cause cancer and is suspected of causing genetic effects. Harmful to aquatic life.

Sulfur compounds in this material may decompose to release hydrogen sulfide gas which may accumulate to potentially lethal concentrations in enclosed air spaces.



Prevention:

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Keep container tightly closed. Keep cool. Keep away from heat, sparks, open flames and hot surfaces. No smoking. Take precautionary measures against static discharge. Ground/bond container and receiving equipment. Use explosion-proof equipment and non-sparking tools where conditions may generate an explosive atmosphere. Wash exposed skin thoroughly after handling. Do not eat, drink or smoke when using this product. Do not breathe vapours. Use only outdoors or in a well-ventilated area. Wear personal protective equipment appropriate for the task: gloves, eyewear, and clothing. In case of inadequate ventilation wear respiratory protection. Avoid release to the environment.

Response: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a poison center or a doctor if you feel unwell.
 IF exposed (benzene) or concerned: Get medical advice/attention.
 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists get medical advice/attention.
 IF ON SKIN (or hair): Take off contaminated clothing immediately. Rinse skin with water/shower. Wash with plenty of soap and water. If skin irritation occurs, get medical advice/attention.
 In case of fire: Use water spray, fog or fire-fighting foam to extinguish.

Storage: Store locked up, in a cool, well-ventilated place. Keep container tightly closed.

Disposal: Dispose of contents/container in accordance with local/regional/national/international regulations.

3. COMPOSITION/INFORMATION ON INGREDIENTS

| Hazardous Ingredients | CAS Number | Approximate Concentration (w/w) |
|------------------------|------------|---------------------------------|
| Crude Oil, Petroleum | 8002-05-9 | 100% |
| Which contains: | | |
| Benzene | 71-43-2 | 0.03 – 0.3% |
| Hydrogen Sulfide | 7783-06-04 | <10 ppm |

4. FIRST-AID MEASURES

Inhalation: Remove person to fresh air. If person is not breathing, give artificial respiration. If necessary, give additional oxygen once breathing is restored if trained to do so. Get prompt medical attention.

Eye Contact: Remove contact lenses if present and easily done. Flush eyes with large amounts of lukewarm water for 15 minutes, lifting upper and lower lids at intervals. Seek medical attention if irritation, redness or swelling occurs.

Skin Contact: Remove contaminated clothing. Wash affected skin thoroughly with soap and water. Seek medical attention if irritation, redness or swelling occurs or large area of contact.

Ingestion: DO NOT INDUCE VOMITING. Do not swallow liquids. Get prompt medical attention. If spontaneous vomiting occurs, lean person forward to reduce risk of aspiration. Monitor for breathing difficulties. Rinse product out of mouth.

Most important symptoms and effects, both acute and delayed: Effects of overexposure may include irritation of the respiratory tract, digestive tract, skin and eyes. May cause nausea, vomiting and signs of nervous system depression (e.g., headaches, drowsiness, dizziness, loss of coordination, disorientation and fatigue). Overexposure to hydrogen sulfide gas can induce immediate collapse, with loss of breathing and a high probability of death.

5. FIREFIGHTING MEASURES

General Fire Hazards:

See [Section 9](#) for Physical and Chemical Properties related to flammability.

Vapours may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. When mixed with air and exposed to an ignition source, flammable vapours can burn in the open or explode in confined spaces. Being heavier than air, vapours may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

Hazardous Combustion Products:

Carbon monoxide, carbon dioxide, sulfur oxides, nitrogen oxides, smoke particles.

Extinguishing Media:

Foam, water fog or spray, carbon dioxide (CO₂), dry chemical. Use water spray to cool fire-exposed containers, and to disperse vapours if spill has not ignited. Water fog or spray may not extinguish the fire. Cut off fuel and allow flame to burn out.

Firefighting Equipment/Instructions:

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other firefighting equipment. Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing. Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied firefighting foam.

6. ACCIDENTAL RELEASE MEASURES

Notification Procedures

In the event of a spill or accidental release, notify relevant authorities in accordance with applicable regulations.

Personal precautions and Protective Equipment:

Avoid direct contact with material. Stay upwind of release; isolate the immediate hazard area; and keep unnecessary and unprotected people away. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see [Section 8](#)). Use water spray to cool containers. Eliminate all sources of ignition. Provide explosion-proof clearing ventilation, if possible.

Environmental precautions: Prevent material from entering soil, waterways, drains, sewers, or confined areas.

Cleanup measures: Stop leak if safe to do so. Dyke and vacuum or take up with sand or other oil absorbing materials. Carefully pump, shovel, scoop or sweep up into a waste container for recycling or disposal.

Contact appropriate regulatory authorities for disposal requirements (see [Section 13](#)). Notify the appropriate regulatory authorities of reportable releases (see [Section 15](#)).

7. HANDLING AND STORAGE

Handling: Handle as a flammable liquid. Keep away from heat, sparks, and open flame. Wear appropriate personal protective equipment. Avoid contact with liquid. Avoid inhalation. Do not enter storage areas or confined spaces unless adequately ventilated. Bond and ground all transfers. Avoid sparking conditions. Wash hands and face after handling and before eating, drinking or smoking.

Storage: Store material in a cool, well-ventilated area away from heat, hot metal surfaces and ignition sources. Use approved containers only. Empty product containers or vessels may contain explosive vapours. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition. Separate from incompatible material (see [Section 10](#)).

Caution: Hydrogen sulfide may accumulate in headspaces of tanks and other equipment, even when concentrations in the liquid product are low. Factors increasing this hazard potential include heating, agitation and contact of the liquid with acid or acid salts. Assess the exposure risk by gas monitoring. Wear air supplying breathing apparatus if necessary. Overexposure to hydrogen sulfide may cause dizziness, headache, nausea and possibly unconsciousness and death.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits (8 Hour)

| Hazardous Ingredient | Alberta | Saskatchewan | OSHA PEL | ACGIH TLV |
|----------------------|--------------------------------------|---|---|----------------------------------|
| Petroleum Crude Oil | 300 ppm; [as VM&P naphtha] | 300 ppm 500 ppm (15min) [as VM&P naphtha] | 500 ppm; [as petroleum distillates/naphtha] | -- |
| Benzene | 0.5 ppm; 2.5 ppm (15min), Skin | -- | 1 ppm; 5 ppm STEL; Petroleum Industry: 10 ppm; 25 ppm (C) | 0.5 ppm; 2.5 ppm STEL Skin |
| Hydrogen Sulfide | 10 ppm; 15 ppm (C) | 10 ppm; 15 ppm (15min) | 20 ppm (C) | 1 ppm, 5 ppm STEL |

Engineering Controls: Use only in well-ventilated areas. Local exhaust ventilation required in confined areas. Equipment must be explosion proof.

Hygiene Measures: Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Avoid repeated and/or prolonged skin exposure. Wash hands with soap and water before eating, drinking, smoking, or using toilet facilities. Waterless hand cleaners are effective. Promptly remove contaminated clothing and laundry before reuse. Use care when laundering to prevent the formation of flammable vapours which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

Personal Protection

Respirator: Where concentrations may exceed exposure limits, use full-face, positive pressure self-contained breathing apparatus; full-face, positive pressure supplied-air breathing apparatus; or cartridge air-purifying respirator approved for organic vapours (note: air-purifying respirator is not suitable for hydrogen sulfide, oxygen-deficient or IDLH situations).

Gloves: Chemical-resistant gloves: Viton (Nitrile or neoprene adequate for short exposure to liquid).

Eyewear: Chemical splash goggles. A face shield may also be necessary, depending on handling conditions.

Footwear: As per safety policy.

Clothing: As per fire protection policy.

9. PHYSICAL AND CHEMICAL PROPERTIES

| | | | |
|---------------------------------------|---------------------|---|------------------------------|
| Physical State: | Liquid | Appearance: | Brown/black liquid |
| Odour: | Hydrocarbon-like | Odour Threshold (ppm): | Not Available |
| Specific Gravity: | 0.85-0.95 | pH: | Not Available |
| Vapour Pressure (mmHg): | 200-350@ 38°C | RVP (kPa): | 27-47 |
| Vapour Density (air=1): | 2.5-5.0 (estimated) | Evaporation Rate: | Not Available |
| Boiling Range (°C): | -2-400+ | Initial Boiling Pt. (°C, D7169): | -2 – 23 |
| Flash Point (°C) & Method: | <-5 (PMCC, D93) | Freezing Pt. (°C): | <-60 |
| Upper Explosive Limit (% v/v): | 8 (estimated) | Lower Explosive Limit (% v/v): | 0.8 (estimated) |
| Auto-Ignition Temp. (°C): | 250 (estimated) | Sensitivity to Static Discharge: | Yes, at normal temperatures. |
| Sensitivity to Impact: | No | Solubility in Water: | Negligible |
| Octanol/Water Coefficient: | <0.1 | | |

10. STABILITY AND REACTIVITY

Chemical Stability: Stable under normal, ambient conditions.

Hazardous Reactions: Not known to occur.

Conditions to Avoid: High temperatures, open flames, sparks, welding, smoking and other ignition sources.

Incompatibility: Incompatible with strong oxidizing agents (e.g. chlorine, peroxide).

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide, sulfur oxides, smoke.

11. TOXICOLOGICAL INFORMATION

Acute Exposure

At concentrations above recommended exposure levels, vapour may cause irritation of eyes, nose and throat, dizziness and drowsiness. Contact with skin may cause irritation and possibly dermatitis. Contact of liquid with eyes may cause severe irritation or burns.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication.

In the case of over exposure to hydrogen sulfide by inhalation, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

Ingestion also presents the danger of aspirating (breathing) liquid drops into the lungs, particularly after vomiting.

| Hazardous Ingredients | Result | Species | Dose | Exposure |
|------------------------|-----------------|---------|---------------------|----------|
| Petroleum Crude Oil | LD50 Oral | Rat | >4300 mg/kg | - |
| | LD50 Dermal | Rabbit | >2000 mg/kg | - |
| Benzene | LD50 Oral | Rat | 1800 mg/kg | - |
| | LD50 Dermal | Rabbit | >8260 mg/kg | - |
| | LC50 Inhalation | Rat | 14000 ppm | 4 hours |
| Hydrogen Sulfide | LC50 Inhalation | Rat | 444 ppm/ 0.701 mg/L | 4 hours |
| | LC50 Inhalation | Mouse | 335 ppm | 4 hours |

Chronic Exposure

May cause damage to organs (liver, kidneys, blood, nervous system and skin) through prolonged or repeated exposure. Due to presence of benzene, long term exposure may increase the risk of anemia and leukemia.

Irritant: Yes

Skin Sensitization: No

Respiratory Sensitization: No

Carcinogenicity: Yes

Reproductive Toxicity: Possibly

Teratogenicity: Possibly

Mutagenicity: Possibly

Synergistic Materials/Products: None reported

Crude Oil

IARC – Crude oil is not classifiable as to its carcinogenicity to humans (Group 3).

ACGIH, OSHA, US NTP – not listed as a carcinogen.

Benzene

ACGIH A1-Confirmed Human Carcinogen

IARC, OSHA, US NTP – There is sufficient evidence that benzene is carcinogenic to man.

Hydrogen Sulfide

Hydrogen sulfide is not considered to be mutagenic or a reproductive or developmental toxicant.

ACGIH, IARC, OSHA, US NTP – Hydrogen sulfide is not listed as a carcinogen.

12. ECOLOGICAL INFORMATION

Ecotoxicity:

Expected to be harmful to aquatic organisms. May cause long-term adverse effects in the aquatic environment. Keep out of sewers, drainage areas and waterways. Report spills and releases, in accordance with current applicable laws and regulations

Biodegradation:

Low molecular weight component expected to be inherently biodegradable

High molecular weight component expected to biodegrade slowly.

Bioaccumulation: Has the potential to bioaccumulate.

Atmospheric Oxidation: More volatile component expected to degrade rapidly in air.

Photolysis:

More water soluble component expected to degrade at a moderate rate in water when exposed to sunlight.

Mobility:

More volatile component, highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

Less volatile component, low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

Empty containers or liners may retain a residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations.

US EPA Waste Numbers

D001 – Ignitability characteristic, D018 – Toxicity characteristic (Benzene) (Regulatory Level = 0.5 mg/L)

14. TRANSPORT INFORMATION

| Regulatory Information | UN Number | Proper Shipping Name | Class | PG | Label | Additional Information |
|------------------------|-----------|----------------------|-------|----|-------------------|----------------------------------|
| TDG | UN1267 | Petroleum Crude Oil | 3 | I | Flammable Liquids | |
| DOT | UN1267 | Petroleum Crude Oil | 3 | I | Flammable Liquid | 49 CFR 173.150; 173.202; 173.242 |
| IMDG | UN1267 | Petroleum Crude Oil | 3 | I | Flammable Liquid | 12°C, P001 EmS:F-E, S-E |
| ICAO/IATA | UN1267 | Petroleum Crude Oil | 3 | I | Flammable Liquid | MARPOL Annex I ERG Code: 3L |

North American Emergency Response Guide Number: 128

TDG Emergency Response Assistance Plan (For Rail Transport): ERP2-1933-006; 1-800-265-0212

Latest Proof of Classification: refer to <http://www.cenovus.com/contractor/msds.html>

15. REGULATORY INFORMATION

Canadian Classification

This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulation (HPR) and the SDS contains all of the information required by the HPR.

WHMIS Ingredient Disclosure List:

Meets criteria for disclosure at 0.1% or greater of benzene.

CEPA Domestic Substance List: All components are either listed or exempt.

US Federal and State Regulations

The contents of this MSDS comply with the OSHA Hazard Communication Standard 29 CFR 1910.1200.

CERCLA/SARA – Section 302 Extremely Hazardous Substances: Hydrogen sulfide: 500 lbs TPQ.

CERCLA/SARA 311-312 (Title III Hazard Categories):

Hydrogen Sulfide – Fire, Immediate (Acute),

Produced Hydrocarbons – Fire, Sudden Release of Pressure, Immediate (Acute), Delayed (Chronic).

CERCLA/SARA 313, Reportable Quantity: Hydrogen sulfide: 100 lbs ; Benzene: 10 lbs; RCRA Code U019.

Clean Air Act Section 112(b) Hazardous Air Pollutants: Exempt.

United States National Chemical Inventory: All components are listed or exempted.

California 65: This product contains benzene a chemical known to the State of California to cause cancer and developmental harm.

NFPA 704 Rating: Flammability:3, Instability/Reactivity:1, Health:2

16. OTHER INFORMATION

Guide to Abbreviations: 15min = 15 minutes; ACGIH = American Conference of Governmental Hygienists; C = Ceiling; CAS = Chemical Abstracts Service Registry; CEPA = Canadian Environmental Protection Act; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act cSt = centistokes; DOT = Department of Transport; EmS = Environmental Management System; ERG = Emergency Response Guide IARC = International Agency for Research on Cancer; ICAO/IATA = International Civil Aviation Organization/International Air Transport Association; IMDG = International Marine Dangerous Goods; GHS = Globally Harmonized System of Classification and Labeling of Chemicals; lbs = pounds; MARPOL = The International Convention for the Prevention of Pollution from Ships; mm²/sec = millimeters squared per second; OEL = Occupational Exposure Limit; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit; PG = Packing Group; Skin = danger of skin absorption; SARA = Superfund Amendments and Reauthorization Act; SDS = Safety Data Sheet; STEL = Short Term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TWA = Time-Weighted Average; TPQ = Threshold Planning Quantity; US NTP = United States National Toxicology Program; WHMIS = Workplace Hazardous Materials Information System