

FORT HILLS DILUTED BITUMEN SAFETY DATA SHEET



SECTION 1. IDENTIFICATION

Product Identity: FRB (Fort Hills Reduced Carbon Life Cycle Dilbit Blend)

Trade Names and Synonyms: Fort Hills Reduced Carbon Life Cycle Dilbit Blend, FRB, Fort Hills Dilbit, Blended Bitumen, Bitumen Blend.

Manufacturer:
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Product Use: A naturally-occurring bitumen blended with a light petroleum diluent to facilitate transportation and refining into a variety of petroleum products.

SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

Health		Physical	Environmental
Acute Toxicity (Oral, Inhalation)	– Does not meet criteria	Flammable Liquid – Category 1	Aquatic Toxicity – Long Term - Category 4
Skin Corrosion/Irritation	– Category 2		
Eye Damage/Eye Irritation	– Does not meet criteria		
Respiratory or Skin Sensitization	– Does not meet criteria		
Mutagenicity	– Category 1B		
Carcinogenicity	– Category 1A		
Reproductive Toxicity	– Category 2		
Specific Target Organ Toxicity			
Acute Exposure	– Category 3		
Chronic Exposure	– Category 1		

LABEL:

Symbols:   		Signal Word: DANGER
<p align="center"><u>Hazard Statements</u></p> <p>DANGER! Extremely flammable liquid and vapour. Inhalation of vapours may cause drowsiness or dizziness. Causes skin irritation. May cause genetic defects. May cause cancer through inhalation or skin contact. Suspected of damaging fertility or the unborn child. Causes damage to organs through prolonged or repeated exposure (CNS, Hematopoietic System) May cause long lasting harmful effects to aquatic life.</p>	<p align="center"><u>Precautionary Statements:</u></p> <p>NO SMOKING. Obtain special instructions before use. Do not handle until all safety precautions have been read & understood. Keep away from heat, hot surfaces, sparks, open flames, and other ignition sources. Ground and bond all containers and receiving equipment. Use explosion-proof electrical/lighting/ventilation equipment and non-sparking tools. Keep containers tightly closed and avoid all potential for static discharges. In case of fire, use foam, dry chemical or carbon dioxide (CO₂) to extinguish. Use only outdoors or in a well-ventilated place. Wear protective gloves, protective clothing, face protection and eye wear. Do not breathe vapour or spray/mist. Wash exposed skin thoroughly after handling. Do not eat, drink or smoke when using this product. Store in a cool, well ventilated place. Keep containers tightly closed. Dispose of contents/containers according to local regulations. Avoid release to the environment.</p> <p>IF ON SKIN: Take off immediately all contaminated clothing. Rinse skin with plenty of soap and water or shower. IF INHALED: Remove person to fresh air and keep comfortable for breathing. IF EXPOSED or concerned or you feel unwell, get medical advice/attention.</p>	

Emergency Overview: A black liquid material with a petroleum or solvent odour. It is highly flammable even at room temperature and can easily generate an explosion hazard, particularly in confined or enclosed spaces. Vapours are heavier than air and will spread along the ground and collect in low or confined spaces (sewers, basements, tanks). They may travel considerable distances to sources of ignition and then flash back. Hydrogen sulphide gas (H₂S) may be released from this material, particularly if heated. Exposure to very high concentrations of hydrogen sulphide (>500 ppm) will result in sudden unconsciousness and death without necessarily any warning odour being sensed. Firefighters responding to an accidental release should always wear a self-contained breathing apparatus and full protective clothing.

Potential Health Effects: Inhalation of high vapour concentrations may cause eye and respiratory irritation as well as central nervous system depression with dizziness, incoordination, headache, tiredness etc. Typically contains low levels of dissolved hydrogen sulphide which may accumulate in the head space above stored liquid. Exposure to high concentrations of H₂S can result in unconsciousness and death. Contains small amounts of n-hexane which can produce peripheral neuropathy when inhaled in high concentrations. Contains small amounts of benzene which is associated with higher risks of leukemia. Contains trace amounts of polycyclic aromatic hydrocarbons, some of which are suspected carcinogens.

Potential Environmental Effects: This material is expected to be toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment. The bitumens contain trace amounts of polycyclic aromatic hydrocarbons (PAHs), some of which are considered to be moderately toxic, e.g., pyrene, benzo(a)pyrene, chrysene, phenanthrene. Most PAHs are relatively insoluble in water; they adhere to solid particles such as river and lake sediments. Microorganisms break down PAHs in soil or water after a period of weeks to months. These PAHs are bioaccumulative, in that their concentrations in plants and animals can be much higher than their concentrations in the soil or water they inhabit. Elevated PAH concentrations can be assumed to be significant toxicants to aquatic and terrestrial organisms. (See Ecological Information, Section 12).

SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS	CAS Registry No.	CONCENTRATION (% vol/vol)
Bitumens (Asphalt)	128683-24-9 / (8052-42-4)	60 – 90%
Natural Gas Condensates	68919-39-1	10 – 40%
n-Hexane	110-54-3	1 – 5%
Benzene	71-43-2	0 – 0.7%
Toluene	108-88-3	0 – 0.5%

Note: This product typically contains 0 – 10 ppm hydrogen sulphide in the liquid phase, but may contain up to 100 ppm especially in the enclosed head space above the liquid phase. This product also contains trace amounts of polycyclic aromatic hydrocarbons, some of which are suspected carcinogens.

See Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Possible eye irritation. Rinse the eye(s) cautiously with lukewarm, gently flowing water, for several minutes, while holding the eyelid(s) open. Remove contact lens if present and easy to do but do not delay irrigation in order to attempt to remove the lens. Continue rinsing for 15 – 20 minutes. Take care not to rinse contaminated water into the unaffected eye or onto the face. If eye irritation persists, get medical advice/attention.

Skin Contact: *Symptoms:* Possible skin irritation. Gently blot away excess product. Take off contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Wash with plenty of lukewarm gently flowing water and mild soap for up to 15 – 20 minutes as needed. If skin irritation occurs, get medical advice/attention. Wash contaminated clothing before reuse or else discard.

Inhalation: *Symptoms:* Headache, dizziness, tiredness, nausea, vomiting. Exposure to very high concentrations of hydrogen sulphide (>500 ppm) will result in unconsciousness and death. Take precautions to ensure your own safety before attempting rescue (e.g., wear appropriate respiratory protection). Remove source of exposure or move person to fresh air and keep comfortable for breathing. If breathing is difficult, trained personnel should administer emergency oxygen if advised to do so by the Poison Control Centre/Doctor. Get medical advice/attention.

Ingestion: *Symptoms:* Gastrointestinal irritation, nausea, vomiting and diarrhoea. NEVER give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. If vomiting occurs naturally, have victim rinse mouth with water again. Obtain medical advice and bring a copy of this SDS.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Extremely flammable. Easily ignites under almost all normal temperature conditions. May release vapours that form flammable or explosive mixtures, especially in areas of poor ventilation. Vapours are heavier than air and will spread along the ground and collect in low or confined spaces (sewers, basements, tanks). Such vapours may travel considerable distances to sources of ignition and then flash back.

Extinguishing Media: Carbon Dioxide (CO₂), Dry Chemical, Foam. Do not use flooding quantities of water.

Fire Fighting: Fire fighters must be fully trained and wear full protective clothing including an approved, self-contained breathing apparatus which supplies a positive air pressure within a full face-piece mask. If a leak or spill has not ignited, use water spray to disperse the vapours and to protect personnel attempting to stop a leak. Use dry chemical or carbon dioxide extinguishers to extinguish small fires. Use aqueous fire-fighting foam (AFFF) or water spray or fog to knock down large fires or to cool fire-exposed containers. Do not use flooding quantities of water as the burning material will float and this may act to spread the fire further. Do not release runoff from fire control methods to sewers or waterways. Cool any containers that are exposed to heat or flames by the application of water streams until well after the fire has been extinguished.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of spillage if possible to do so safely. Warn or evacuate occupants in surrounding and downwind areas if required, due to toxicity and flammability of the material. Remove all potential sources of ignition. Clean up spilled material immediately, observing precautions outlined below. Restrict access to the area until completion of clean up. Dike area around spill and pump up uncontaminated material if possible, and then absorb any remaining liquid in solid absorbent such as vermiculite or clay absorbents. Non-sparking tools should be used for all clean-up operations. Treat or dispose of waste spilled material in accordance with all local, regional and national regulations.

Personal Precautions: Use personal protective equipment (see also Section 8). Ensure adequate ventilation.

Environmental Precautions: If the product contaminates rivers or lakes or other surface waters, inform the appropriate authorities immediately.

SECTION 7. HANDLING AND STORAGE

Precautions for Safe Handling: Avoid all personal contact with skin, eyes and clothing. Prevent exposure to all ignition sources, including accumulated static electricity in the liquid itself through proper bonding practices. Do not eat, drink or smoke in areas where this material is present. Keep containers tightly closed when not in use. Prevent small spills to floor surfaces as this material can create slippery conditions. Open tank car hatches and other containers with caution as hydrogen sulphide may accumulate to dangerous concentrations in the enclosed space. In the event of inadequate ventilation, wear suitable respiratory protection.

Conditions for Safe Storage: Store in original container that is properly labelled. Open containers slowly in order to control possible pressure release as hydrogen sulphide may have accumulated to high concentrations in the vapour space of storage vessels. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Store in a cool, well-ventilated area. To maintain product quality, do not store in heat or direct sunlight. Outside or detached storage is preferred. Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Guidelines: (*Time-Weighted Average (TWA) concentration over 8 hr unless otherwise indicated*)

<u>Component</u>	<u>ACGIH TLV®</u>	<u>OSHA PEL</u>	<u>NIOSH REL</u>
Bitumens (Asphalt)	No TLV specified ⁽¹⁾	No PEL specified	2 mg/m ³ (Suncor Energy recommendation)
n-Hexane	50 ppm	500 ppm	50 ppm
Benzene	0.5 ppm TWA/2.5 ppm STEL	1 ppm TWA/5 ppm STEL	0.1 ppm TWA/1 ppm STEL
Toluene	20 ppm	200 ppm	100 ppm TWA/150 ppm STEL
Hydrogen Sulphide	1 ppm TWA/5 ppm STEL	20 ppm CEILING	10 ppm CEILING

NOTE: OEGs for individual jurisdictions may differ from those given above. Check with local authorities for the applicable OEGs in your jurisdiction.

ACGIH - American Conference of Governmental Industrial Hygienists; OSHA - Occupational Safety and Health Administration; NIOSH - National Institute for Occupational Safety and Health. TLV – Threshold Limit Value, PEL – Permissible Exposure Limit, REL – Recommended Exposure Limit.

⁽¹⁾- Although there is no TLV® specified for Bitumen or Asphalt as such, there is a TLV® for Asphalt Fume of 0.5 mg/m³ as the benzene-soluble fraction of the inhalable asphalt fume.

Biological Exposure Index (ACGIH BEI®):

<u>Component</u>	<u>Determinant</u>	<u>Sampling Time</u>	<u>Exposure Index</u>
Benzene	s-Phenylmercapturic Acid in urine	End of shift	25 ug/g Creatinine
	t,t-Muconic Acid in urine	End of shift	500 ug/g Creatinine
Toluene	Toluene in blood	Prior to last shift of work week	0.02 mg/L
	Toluene in urine	End of shift	0.03 mg/L
n-Hexane	2,5-Hexanedione in urine	End of shift at end of work week	0.4 mg/L

NOTE: The selection of the necessary level of engineering controls and personal protective equipment will vary depending upon the conditions of use and the potential for exposure. The following are therefore only general guidelines that may not fit all circumstances. Control measures to consider include:

Ventilation: Use adequate local or general ventilation to maintain the concentrations of hydrocarbons, aerosol mists and especially hydrogen sulphide well below recommended occupational exposure limits, particularly in confined spaces.

Protective Clothing: The recommendation for protective equipment contained within this data sheet is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

The level of protective clothing required will depend greatly on how the material is used and the potential for skin and eye contact. In general, chemical resistant gloves, safety glasses and coveralls, lab coat or other work clothing with long sleeves are recommended to prevent prolonged or repeated direct skin contact. A higher level of protective clothing may be required if there is a significant risk of direct skin contact. A full-face shield and/or close-fitting safety goggles may also be necessary in some circumstances to prevent direct eye contact. Wash contaminated clothing before reuse.

Respirators: Where hydrocarbon vapours or liquid aerosol mists are generated and cannot be controlled to within acceptable levels, use appropriate NIOSH-approved respiratory protection equipment (combined 42 CFR 84 Class N or P-100 particulate filter and acid gas/organic vapour cartridges). Where hydrogen sulfide is present or possibly present in confined spaces at potentially hazardous levels, a NIOSH-approved supplied air respirator or self-contained breathing apparatus (SCBA) is necessary. Selection of a specific respirator must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the respirator under consideration.

General Hygiene Considerations: Always practice good personal hygiene. Smoking must be strictly prohibited in all work areas. Refrain from eating or drinking in work areas. Thoroughly wash hands after handling and before eating, drinking, or smoking in appropriate, designated areas only.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Black oily liquid	Odour: Hydrocarbon/solvent odour †	Odour Threshold: No Data Available	pH: Not Applicable
Freezing Point/Range: No Data Available	Boiling Point/Range: 34.7 - >715°C (94.5 - >1319°F)	Vapour Pressure: 50 – 60 kPa (7.9 PSI Reid VP)	Vapour Density: No Data Available
Relative Density (Water = 1): 0.9262 (60°/60°F)	Evaporation Rate: No Data Available	Partition Distribution (n-octanol/water): >1 (estimated)	Solubility (in water): Negligible
Flash Point: <1°C (ASTM D7094 Closed Cup)	Flammable Limits (LEL/UEL): No Data Available	Auto-ignition Temperature: No Data Available	Decomposition Temperature: No Data Available
Viscosity (Kinematic): 68 mm ² /s (68 cSt) @ 40°C 277 mm ² /s @ 15.5°C	Pour Point: -36°C (-33°F)		

† - May also have a “rotten egg” odour if hydrogen sulphide (H₂S) is present, but odour is an unreliable warning, since H₂S may deaden the sense of smell.

SECTION 10. STABILITY AND REACTIVITY

Stability & Reactivity: This material is stable and not considered reactive under normal temperatures and pressures. Hazardous polymerization or runaway reactions will not occur.

Conditions to avoid: Avoid heat, sparks, static discharge, open flames and other ignition sources. Avoid exposure to sunlight.

Incompatibilities: Incompatible with strong oxidizing agents.

Hazardous Decomposition Products: May release carbon dioxide/carbon monoxide, sulphur dioxide or hydrogen sulphide, hydrocarbon vapours, smoke and irritating vapours when heated to decomposition.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute:

Skin/Eye: Liquid contact with the eyes may cause local irritation but is not expected to cause tissue damage. High vapour concentrations or high H₂S concentrations may also produce mild eye irritation. Direct contact with the skin may cause heavy soiling and some irritation to the skin.

Inhalation: Acute inhalation of high vapour or mist concentrations may result in irritation of the nose, throat and upper respiratory passages as well as central nervous system (CNS) depression. Symptoms may include headache, dizziness, tiredness, incoordination, nausea, vomiting. Inhalation of high concentrations of hydrogen sulphide (>500 – 1000 ppm H₂S) can result in irregular heartbeat, sudden collapse and death from respiratory paralysis. While it is highly odorous (“rotten egg” smell) the ability to smell H₂S can begin to dull above 50 ppm or can be completely lost, eliminating warning of exposure.

Ingestion: Ingestion is not a typical route of occupational exposure and this material is not likely to be hazardous by ingestion, except under the most extreme circumstances. However, if large volumes of the liquid are ingested and irritation or discomfort occurs, obtain medical advice.

Chronic: Prolonged or repeated skin contact may result in drying and cracking due to the defatting nature of the diluent hydrocarbons. This product contains some benzene and n-hexane, both known to produce chronic effects upon prolonged exposure. Benzene causes depression of the hematopoietic system and is associated with an increased incidence of leukemia. Prolonged or repeated exposure to n-hexane can cause damage to the peripheral nervous system (the hands, arms, legs and feet) known as peripheral neuropathy with progressive weakness and numbness in the extremities. Lifetime skin painting studies

in animals with whole crude oils and crude oil fractions have produced tumours in some animals but not in others following prolonged and repeated skin contact. IARC has concluded that there is limited evidence for carcinogenicity in experimental animals and inadequate evidence for carcinogenicity of crude petroleum oils in humans.

Animal Toxicity:

<u>Hazardous Ingredient:</u>	<u>Acute Oral Toxicity:</u>	<u>Acute Dermal Toxicity:</u>	<u>Acute Inhalation Toxicity:</u>
Bitumens (Asphalt)	>5,000 mg/kg†	>2,000 mg/kg*	>0.095 mg/L‡
Natural Gas Condensates	14,000 mg/kg†	>2,000 mg/kg*	>5.2 mg/L‡
n-Hexane	15,840 mg/kg†	>3,295mg/kg*	48,000 ppm‡
Benzene	2,990 mg/kg†	>8,240 mg/kg*	13,700 ppm‡
Toluene	5,580 mg/kg†	12,125 mg/kg*	7,585 ppm‡

† LD₅₀, Rat, Oral, * LD₅₀, Rabbit, Dermal ‡ LC₅₀, Rat, Inhalation, 4 hour

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity: No data available on product as a whole. For n-hexane the LC₅₀ (Fish) = 4.12 mg/L (96 hr.) and for Daphnia and other aquatic invertebrates the EC₅₀ = 3.87 mg/l (48 hr.)

Persistence/Degradability: No data available on this product. The low molecular weight components are expected to be inherently biodegradable while the high molecular weight bitumen components are expected to be persistent.

Bioaccumulation Potential: No data available for this product. It is expected that the majority of components will have the potential to bioaccumulate; however, metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

Mobility: No data available on this product. It is expected that the low molecular weight components will be highly volatile and will partition rapidly to air. The high molecular weight components are expected to sink and migrate into the sediment.

SECTION 13. DISPOSAL CONSIDERATIONS

This product should not be allowed to enter drains, water courses or soil. Offer surplus and non-recyclable material to a licensed disposal company. Waste material meets the requirements of a hazardous waste in most jurisdictions and must be classified and labelled prior to recycling or disposal through a licensed waste management company. Disposal should be in accordance with applicable national, regional and local laws and regulations.

Empty containers may contain residue and can be dangerous. Empty and thoroughly clean all residues from containers before reuse or disposal. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death.

SECTION 14. TRANSPORT INFORMATION

PROPER SHIPPING NAME TRANSPORT CANADA and U.S. DOT Petroleum Crude Oil
 TRANSPORT CANADA, U.S. DOT CLASSIFICATION and IMDG Class 3, PG I
 PRODUCT IDENTIFICATION NUMBER UN 1267
 MARINE POLLUTANT Yes
 PROPER SHIPPING NAME IMDG Petroleum Crude Oil (-35°C)

SECTION 15. REGULATORY INFORMATION

U.S.
 INGREDIENTS LISTED ON TSCA INVENTORY Yes, including Asphalt (CAS 8052-42-4).
 Bitumens CAS 128683-24-9 is not on TSCA Chemical Inventory
 HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD..... Yes
 CERCLA SECTION 103 HAZARDOUS SUBSTANCES n-Hexane Yes.....RQ: 5,000 lb.

Benzene..... Yes.....RQ: 10 lb.
Toluene..... Yes.....RQ: 1,000 lb.

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE No ingredients qualify.

EPCRA SECTION 311/312 HAZARD CATEGORIES..... Delayed (Chronic) Health Hazard – Mutagen
Delayed (Chronic) Health Hazard – Carcinogen
Delayed (Chronic) Health Hazard – Reproductive Toxin
Delayed (Chronic) Health Hazard – Specific Target Organ Toxin
Immediate (Acute) Health Hazard – Skin Irritant
Immediate (Acute) Health Hazard – Specific Target Organ Toxin
Immediate Physical Hazard - Flammable

EPCRA SECTION 313 TOXIC RELEASE INVENTORY:..... n-Hexane CAS No. 110-54-3
Percent by Weight 1-5%

Benzene..... CAS No. 71-43-2
Percent by Weight: 0-0.7%

Toluene..... CAS No. 108-88-3
Percent by Weight 0-0.5%

SECTION 16. OTHER INFORMATION

Date of Original Issue: November 22, 2017 **Version:** 01
Date of Last Revision: November 17, 2020 **Version:** 02

The information in this Safety Data Sheet is based on the following references:

- American Conference of Governmental Industrial Hygienists, 2020, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- Canadian Centre for Occupational Health and Safety (CCOHS) CHEMINFO Chemical Substance Data Base (Records 67 – n-Hexane, 313- Hydrogen Sulphide, 179 – Benzene, 243 – Toluene, 5136 – Asphalt (Bitumen) Fume)
- Chemical Hazards of the Workplace: Nick H. Proctor & James P Hughes, J. B. Lippincott Company, Philadelphia 1978.
- Health Canada, SOR/2015-17, Hazardous Products Regulations, 30 January 2015.
- U.S. Occupational Safety and Health Administration, Code of Federal Regulations, Title 29, Part 1910.1000 & 1910.1200.

Acronyms not spelled out elsewhere in the SDS:

CAS: Chemical Abstracts Service
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act
DOT: Department of Transportation
EPCRA: Emergency Planning and Community Right- to-Know Act
IMO: International Maritime Organization
LD50, LC50: Lethal Dose 50%, Lethal Concentration 50%
OEGs: Occupational Exposure Guidelines
TSCA: Toxic Substances Control Act

Notice to Reader

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