

MATERIAL SAFETY DATA SHEET

Cenovus Energy Inc. Produced Water (Sweet - From Crude Oil or Deep Gas Production)

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SECTION 1 – MATERIAL IDENTIFICATION AND USE

Material Name: PRODUCED WATER (SWEET - FROM CRUDE OIL OR DEEP GAS PRODUCTION)

Use: Process stream, waste

WHMIS Classification: Class B, Div. 2; Class D, Div. 2, Sub-Div. A and B

NFPA: Fire: 3 Reactivity: 0 Health: 2

TDG:

If transported in a clean tank: Not a dangerous good as defined by TDG

If transported in a tank that last carried crude oil or condensate: use TDG classification of residue

Manufacturer/Supplier: CENOVUS ENERGY INC.

500 Centre Street SE, PO Box 766

Calgary, AB T2P 0M5

Emergency Telephone: 1-877-458-8080, CANUTEC 1-613-996-6666 (Canada)

Chemical Family: Water with C5+ aliphatic and aromatic hydrocarbons.

SECTION 2 – HAZARDOUS INGREDIENTS OF MATERIAL

Hazardous Ingredients	Approximate Concentrations (%)	C.A.S. Nos.	LD50/LC50 (Incl. Species & Route)	Exposure Limits
Sodium chloride	5-20	7647-14-05	N.Av.	N.Av.
n-Hexane	0.1-1	110-54-3	LD50, rat, oral, 28.7 g/kg	50 ppm (OEL, TLV)
Benzene	0.1-1	71-43-2	LD50, rat, oral, 930 mg/kg LC50, rat, 4 hr, 13200 ppm	0.5 ppm (OEL, TLV)

OEL = 8 hr. Alberta Occupational Exposure Limit; TLV = Threshold Limit Value (8 hrs)

SECTION 3 – PHYSICAL DATA FOR MATERIAL

Physical State: Liquid

Specific Gravity: 1.0 - 1.1 @ 20 degrees C

Vapour Density (air=1): 2.5-3.0

Percent Volatiles, by volume: 100

pH: N.Av.

Coefficient of Water/Oil Distribution: N.Av.

Odour & Appearance: colorless/straw coloured liquid, hydrocarbon odour
(N.Av. = not available N.App. = not applicable)

Vapour Pressure (mmHg): 42-350 @ 38 deg. C.

Odour Threshold (ppm): N.Av.

Evaporation Rate: N.Av.

Boiling Pt. (deg.C): 50 to 100

Freezing Pt. (deg.C): -10 to 0 (estimate)

SECTION 4 – FIRE AND EXPLOSION

Flammability: Yes **Conditions:** Bulk of material is water, and will not ignite. However, sufficient hydrocarbon vapour may be present to cause flash fire at normal temperatures*.

Means of Extinction: Foam, CO2, dry chemical. Explosive accumulations can build up in areas of poor ventilation*.

Special Procedures: Use water spray to cool fire-exposed containers, and to disperse vapors if spill has not ignited. If safe to do so, cut off supply and allow flame to burn out*.

Flash Point (deg.C) & Method: <-35 (PMCC) (hydrocarbons)*

Upper Explosive Limit (% by vol.): 8*

Lower Explosive Limit (% by vol.): 1*

Auto Ignition Temp. (deg.C): 260*

Hazardous Combustion Products: Carbon monoxide, carbon dioxide*

Sensitivity to Impact: No

Sensitivity to Static Discharge: Yes, may ignite*

TDG Flammability Classification: Class 3*

*Assuming hydrocarbon content is high enough to ignite. Hydrocarbons may derive from the original produced water or contamination through transportation in a tank that had previously contained crude oil.

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SECTION 5 – REACTIVITY DATA

Chemical Stability: Yes **Conditions:** Heat

Incompatibility: Yes **Substances:** Oxidizing agents (e.g. chlorine, compressed oxygen)

Reactivity: Yes **Conditions:** Heat, strong sunlight

Hazardous Decomposition Products: Carbon monoxide, carbon dioxide

SECTION 6 – TOXICOLOGICAL PROPERTIES OF PRODUCT

Routes of Entry:

Skin Absorption: Yes

Skin Contact: Yes (liquid)

Eye Contact: Yes

Inhalation: Acute: Yes

Chronic: Yes

Ingestion: Yes

Effects of Acute Exposure: Vapour may cause irritation of eyes, nose and throat, dizziness and drowsiness. Contact with skin may cause irritation and possibly dermatitis. Hydrocarbons absorbed through intact skin. Contact of liquid with eyes may cause severe irritation.

Effects of Chronic Exposure: Due to presence of benzene and n-hexane, long term exposure may increase the risk of anaemia, leukaemia and nervous system damage.

Sensitization to Product: N.Av.

Exposure Limits of Product: 0.5 ppm (OEL for benzene)

Irritancy: Yes

Synergistic Materials: None reported

Carcinogenicity: Yes **Reproductive Effects:** Possibly **Teratogenicity:** Possibly **Mutagenicity:** Possibly

SECTION 7 – PREVENTIVE MEASURES

Personal Protective Equipment: Use positive pressure self-contained breathing apparatus, supplied air breathing apparatus, or cartridge respirator approved for organic vapours where concentrations may exceed exposure limits.

Gloves: Viton (nitrile adequate for short exposure to liquid)

Respiratory: SCBA, SABA or cartridge respirator approved for organic vapours.

Eye: Chemical splash goggles

Footwear: As per safety policy. **Clothing:** As per fire protection policy.

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

Leaks & Spills: Stop leak if safe to do so. Use personal protective equipment. Use water spray to cool containers. Remove all ignition sources. Provide explosion-proof clearing ventilation, if possible. Prevent from entering confined spaces, or from contaminating land and water courses. Dyke and pump into containers for recycling or disposal. Notify appropriate regulatory authorities.

Waste Disposal: Contact appropriate regulatory authorities for disposal requirements.

Handling Procedures & Equipment: Avoid contact with liquid. Avoid inhalation. Bond and ground all transfers. Avoid sparking conditions.

Storage Requirements: Store in a cool, dry, well ventilated area away from heat, strong sunlight, and ignition sources.

Special Shipping Information: N.Av.

SECTION 8 – FIRST AID MEASURES

Skin: Flush skin with water, removing contaminated clothing. Get medical attention if irritation persists or large areas of contact.

Eye: Immediately flush with large amounts of luke warm water for 15 minutes, lifting upper and lower lids at intervals. Get medical attention if irritation persists.

Inhalation: Ensure own safety. Remove victim to fresh air. Give oxygen, artificial respiration, or CPR if needed. Get immediate medical attention.

Ingestion: DO NOT INDUCE VOMITING. Keep warm and at rest. Get immediate medical attention.

SECTION 9 – PREPARATION DATE OF MSDS

Prepared By: Cenovus Energy Inc. Health and Safety

Phone Number: 1-403-766-2000

Preparation Date: 24 January 2017