SECTION 1 – MATERIAL IDENTIFICATION AND USE

Material Name: SULPHUR (LIQUID) / MOLTEN SULPHUR
Use: Process stream, chemical feedstock
WHMIS Classification: Class D, Div. 1, Subdiv. A
Fire: 4 **Reactivity**: 0 **Health**: 4
TDG: **UN**: 2448 **Class:** 4.1 **Packing Group:** III
Shipping Name: SULPHUR, MOLTEN

Manufacturer/Supplier: CENOVUS ENERGY INC.
421 - 7 Ave SW PO Box 766
Calgary, AB T2P 0M5
Emergency Telephone: 1-877-458-8080
Chemical Family: Elemental sulphur

SECTION 2 – HAZARDOUS INGREDIENTS OF MATERIAL

Hazardous Ingredients	Approximate Concentrations (%)	C.A.S. Nos.	LD50/LC50 Specify Species & Route	Exposure Limits
Sulphur	100	7704-34-9	N.Av.	10 mg/m3 (OEL)
Hydrogen Sulphide	<0.1	7783-06-4	LC50, rat, 4 hr, 444 ppm	10 ppm (OEL) 1 ppm (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: 1.8 – 1.96
Vapour Density (air=1): N.Av.
Percent Volatiles, by volume: N.Av.
pH: N.Av.
Vapour Pressure (mmHg): 1 @ 183 deg. C.
Odour Threshold (ppm): 0.13
Evaporation Rate: N.Av.
Boiling Pt. (deg.C): 444
Freezing Pt. **(deg.C)**: 119
Coefficient of Water/Oil Distribution: N.Av.
Odour & Appearance: Amber viscous liquid, sulphurous and rotten eggs odour
(N.AV. = not available N.App. = not applicable)

SECTION 4 – FIRE AND EXPLOSION

Flammability: Yes **Conditions**: Hydrogen sulphide gas will ignite at normal temperatures. Explosive accumulations can build up in tank headspaces and other poorly ventilated locations.
Means of Extinction: Foam, CO2, steam
Flash Point (deg. C): 168 - 207
Upper Explosive Limit (% by vol.): 46 (H2S)
Lower Explosive Limit (% by vol.): 4.3 (H2S)
Auto-Ignition Temp. (deg.C): 232
Hazardous Combustion Products: Sulphur oxides
Special Procedures: Use water spray to cool fire-exposed containers, and to disperse toxic gases.
Sensitivity to Impact: No
Sensitivity to Static Discharge: Yes, may ignite
TDG Flammability Classification: 4.1

SECTION 5 – REACTIVITY DATA

Chemical Stability: Yes **Conditions**: Heat
Incompatibility: Yes **Substances**: Oxidizing agents (reaction may be violent), halogens, mineral acids and alkalies, zinc, tin, copper and alloys
Reactivity: Yes **Conditions**: Heat
Hazardous Decomposition Products: Hydrogen sulphide, sulphur oxides.

SECTION 6 – TOXICOLOGICAL PROPERTIES OF PRODUCT

Routes of Entry:
Skin Absorption No **Skin Contact**: Yes **Eye Contact**: Yes
Inhalation: **Acute**: Yes **Chronic**: N.Av. **Ingestion**: Yes
Effects of Acute Exposure: Hydrogen sulphide and sulphur dioxide gases cause irritation of eyes, nose, throat and lungs, which may be severe at high concentrations. Caution: delayed pulmonary oedema may develop. Hydrogen sulphide may cause loss of sense of smell at 100 ppm. Unconsciousness and respiratory failure may happen without warning. Death may result if not promptly revived. Contact with skin and eyes causes severe burns and injury.
Effects of Chronic Exposure: N.Av.
Sensitization to Product: No.
Exposure Limits of Product: 10 ppm (OEL for hydrogen sulphide)
Irritancy: Yes
Synergistic Materials: None reported
Carcinogenicity: N.Av. **Reproductive Effects**: N.Av. **Teratogenicity**: N.Av. **Mutagenicity**: N.Av.

SECTION 7 – PREVENTIVE MEASURES

Personal Protective Equipment
Gloves: Heat resistant gloves
Respiratory Protection: Use positive pressure self-contained breathing apparatus or supplied air breathing apparatus where concentrations may exceed exposure limits. **Eye**: Full facepiece SCBA or SABA required.
Footwear: Fire resistant as per safety policy **Clothing**: Fire retardant clothing
Engineering Controls: Use only in well ventilated areas. Mechanical ventilation required in confined areas. Equipment must be explosion proof.
Leaks & Spills: Remove all ignition sources. Use respiratory and personal protective equipment. Stop leak if safe to do so. Dyke to contain. Use water spray to cool material. Provide explosion-proof clearing ventilation, if inside. When cool, drum for recycling or disposal. Notify appropriate regulatory authorities.
Waste Disposal: Contact appropriate regulatory authorities for disposal requirements.
Handling Procedures & Equipment: Avoid inhalation, skin and eye contact**. Caution: hydrogen sulphide hazard in tank headspaces.** Avoid contact with clothing. 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: TDG Special Provision 32.

SECTION 8 – FIRST AID MEASURES

Skin: Flush area with cold water. Contact burns may be covered with a thin layer of solidified sulphur. Cover burn area with dry dressing. Do not remove sulphur. Treat for shock. Get immediate medical attention.

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

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

Ingestion: Give 2-3 glasses of milk or water to drink. DO NOT INDUCE VOMITING. Keep warm and at rest. Get immediate medical attention.

SECTION 9 – PREPARATION DATE OF MSDS

Prepared By: Cenovus Energy Inc. Environment, Health and Safety (EHS)
Phone Number: 1-877-458-8080
Preparation Date: July 10, 2011 Expiry Date: July 10, 2014