Safety Data Sheet

Section 1: Identification

Product identifier

Product Name • **Sulfur**

Synonyms • Crushed Bulk Sulfur; Elemental Sulfur; Flower Sulfur; Pelletized Sulfur; Powdered Sulfur; Prilled Sulfur; Solid Sulfur; Sulphur

CAS Number • 7704-34-9

SDS Number/Grade • 0017NOR001

Molecular Formula • S or S8

Relevant identified uses of the substance or mixture and uses advised against

Recommended use • Consult manufacturer

Details of the supplier of the safety data sheet

Manufacturer • Northern Tier Energy

301 St. Paul Park Road
St. Paul Park, MN 55071
United States
www.ntenergy.com

Telephone (General) • 651-459-9771

Emergency telephone number

Chemtrec • 800-424-9300

Section 2: Hazard Identification

United States (US)

According to: OSHA 29 CFR 1910.1200 HCS

Classification of the substance or mixture

OSHA HCS 2012 • Flammable Solids 1
Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
Specific Target Organ Toxicity Repeated Exposure 1
Combustible Dust

Label elements

OSHA HCS 2012

DANGER

Hazard statements • Flammable solid

May cause respiratory irritation
Causes damage to organs through prolonged or repeated exposure.
May form combustible dust concentrations in air.

Precautionary statements

Prevention
- Keep away from heat, sparks, open flames and/or hot surfaces. - No smoking.
Ground and/or bond container and receiving equipment.
Use explosion-proof electrical/ventilating/lighting/equipment.
Do not breathe dust, fume, gas, mist, vapours and/or spray.
Wash thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/protective clothing/eye protection/face protection.

Response
- In case of fire: Use appropriate media for extinction.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
Call a POISON CENTER or doctor/physician if you feel unwell.
Get medical advice/attention if you feel unwell.

Storage/Disposal
- Store in a well-ventilated place. Keep container tightly closed.
Store locked up.
Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Other hazards

OSHA HCS 2012
- Under United States Regulations (29 CFR 1910.1200 - Hazard Communication Standard), this product is considered hazardous.

Canada

According to: WHMIS

Classification of the substance or mixture

WHMIS
- Flammable Solids - B4
Other Toxic Effects - D2A

Label elements

WHMIS

- Flammable Solids - B4
Other Toxic Effects - D2A

Other hazards

WHMIS
- May form combustible dust concentrations in air.
In Canada, the product mentioned above is considered hazardous under the Workplace Hazardous Materials Information System (WHMIS).

Section 3 - Composition/Information on Ingredients

Substances

Composition					
Chemical Name	Identifiers	%	LD50/LC50	Classifications According to Regulation/Directive	Comments

Sulfur	**CAS:**7704-34-9	100%	NDA	**OSHA HCS 2012:** Flam. Sol. 1; STOT SE 3: Resp. Irrit.; STOT RE 1 (Kidney, Lungs, Liver)	NDA
Hydrogen sulfide	**CAS:**7783-06-4	0% TO 0.01%	Inhalation-Rat LC50 • 470 mg/m³ 6 Hour(s)	**OSHA HCS 2012:** Exposure limit(s)	NDA

Mixtures

- Material does not meet the criteria of a mixture.

Section 4: First-Aid Measures

Description of first aid measures

Inhalation
- Move victim to fresh air. Administer oxygen if breathing is difficult. Give artificial respiration if victim is not breathing. If signs/symptoms continue, get medical attention.

Skin
- In case of contact with substance, immediately flush skin with running water for at least 20 minutes. Removal of solidified molten material from skin requires medical assistance. Remove and isolate contaminated clothing. If irritation develops and persists, get medical attention.

Eye
- In case of contact with substance, immediately flush eyes with running water for at least 20 minutes. If eye irritation persists: Get medical advice/attention.

Ingestion
- Ingestion not likely. If large amounts are swallowed, immediately call a physician.

Most important symptoms and effects, both acute and delayed

- Refer to Section 11 - Toxicological Information.

Indication of any immediate medical attention and special treatment needed

Notes to Physician
- All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

Section 5: Fire-Fighting Measures

Extinguishing media

Suitable Extinguishing Media
- LARGE FIRE: Water spray, fog or regular foam.
  SMALL FIRES: Dry chemical, CO2, sand, earth, water spray or regular foam.

Unsuitable Extinguishing Media
- No data available

Special hazards arising from the substance or mixture

Unusual Fire and Explosion Hazards
- Flammable/combustible material.
  May be ignited by friction, heat, sparks or flames.
  May be re-ignited after fire is extinguished.
  Powders, dusts, shavings, borings, turnings or cuttings may explode or burn with explosive violence.
  Some may burn rapidly with flare burning effect.
  May be transported above flash point.

Hazardous Combustion Products
- No data available

Advice for firefighters

- Structural firefighters' protective clothing will only provide limited protection.
  Wear positive pressure self-contained breathing apparatus (SCBA).
  FIRE INVOLVING TANKS AND CAR/TRAILER LOADS: Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
  FIRE INVOLVING TANKS AND CAR/TRAILER LOADS: ALWAYS stay away from

tanks engulfed in fire.
FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
LARGE FIRES: Move containers from fire area if you can do it without risk.
FIRE: 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.

Section 6 - Accidental Release Measures

Personal precautions, protective equipment and emergency procedures

Personal Precautions

- Ventilate enclosed areas. Do not walk through spilled material. Wear appropriate personal protective equipment, avoid direct contact. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Emergency Procedures

- 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. LARGE SPILL: Consider initial downwind evacuation for at least 100 meters (330 feet) As an immediate precautionary measure, isolate spill or leak area for at least 25 meters (75 feet) in all directions. Keep out of low areas. Keep unauthorized personnel away. Stay upwind. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).

Environmental precautions

- Prevent entry into waterways, sewers, basements or confined areas.

Methods and material for containment and cleaning up

Containment/Clean-up Measures

- Stop leak if you can do it without risk.
Avoid generating dust.
Contain molten material by diking or impounding. After cooling, cold product may be collected for disposal.
Carefully shovel or sweep up spilled material and place in suitable container.
Use clean nonsparking tools to collect material.
All equipment used when handling the product must be grounded.

Section 7 - Handling and Storage

Precautions for safe handling

Handling

- Use only in well ventilated areas. Do not expose to heat, open flames, strong oxidizers or other sources of ignition. Do not use sparking tools. All equipment used when handling the product must be grounded. Take precautionary measures against static charges. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres. Do not cut, drill, grind or weld on empty containers since they may contain explosive residues. Wear appropriate personal protective equipment, avoid direct contact. Do not breathe dust. Avoid contact with skin, eyes, and clothing. Wash thoroughly with soap and water after handling and before eating, drinking, or using tobacco. Harmful concentrations of hydrogen sulfide (H2S) gas can accumulate in excavations and low-lying areas as well as the vapor space of storage and bulk transport compartments. Stay upwind and vent open hatches before unloading.

Conditions for safe storage, including any incompatibilities

Storage

- Keep container tightly closed. Store in a cool/low-temperature, well-ventilated dry place away from heat and ignition sources.

Section 8 - Exposure Controls/Personal Protection

Control parameters

Exposure Limits/Guidelines				
	Result	ACGIH	NIOSH	OSHA
Hydrogen sulfide (7783-06-4)	Ceilings	Not established	10 ppm Ceiling (10 min); 15 mg/m3 Ceiling (10 min)	20 ppm Ceiling
	STELs	5 ppm STEL	Not established	Not established
	TWAs	1 ppm TWA	Not established	Not established

Exposure controls

Engineering Measures/Controls

- Ensure that dust handling systems (such as exhaust ducts, dust collectors, vessels and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is not leakage from the equipment). It is recommended that dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion supression system or an oxygen-deficient environment. Use explosion-proof electrical/ventilating/lighting/equipment.

Personal Protective Equipment

Respiratory

- For limited exposure use an N95 dust mask. For prolonged exposure use an air-purifying respirator with high efficiency particulate air (HEPA) filters. Follow the OSHA respirator regulations found in 29 CFR 1910.134. Use a NIOSH/MSHA approved respirator if exposure limits are exceeded or symptoms are experienced.

Eye/Face

- Goggles and faceshield when handling hot material. Dust goggles if use produces excessive dust/fume concentrations.

Skin/Body

- Wear appropriate gloves.

Environmental Exposure Controls

- Follow best practice for site management and disposal of waste. Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

Key to abbreviations

ACGIH = American Conference of Governmental Industrial Hygiene
NIOSH = National Institute of Occupational Safety and Health
OSHA = Occupational Safety and Health Administration
STEL = Short Term Exposure Limits are based on 15-minute exposures
TWA = Time-Weighted Averages are based on 8h/day, 40h/week exposures

Section 9 - Physical and Chemical Properties

Information on Physical and Chemical Properties

Material Description			
Physical Form	Solid	Appearance/Description	Yellow powder or amber Liquid with a slight hydrocarbon rotten-egg.
Color	Yellow	Odor	Slight Hydrocarbon Rotten-egg.
Odor Threshold	No data available		
General Properties			
Boiling Point	832 F(444.4444 C)	Melting Point/Freezing Point	233 F(111.6667 C)
Decomposition Temperature	No data available	pH	No data available
Specific Gravity/Relative Density	= 2.06 Water=1 liquid	Water Solubility	Negligible
Viscosity	No data available		
Volatility			
Vapor Pressure	1 mmHg (torr) @ 362 F(183.3333 C)	Vapor Density	No data available
Evaporation Rate	No data available		

Flammability			
Flash Point	403 F(206.1111 C)	UEL	No data available
LEL	No data available	Flame Height	450 Fahrenheit
Flammability (solid, gas)	Flammable Solid.		
Environmental			
Octanol/Water Partition coefficient	No data available		

Section 10: Stability and Reactivity

Reactivity

- No dangerous reaction known under conditions of normal use.

Chemical stability

- Stable under normal temperatures and pressures.

Possibility of hazardous reactions

- Hazardous polymerization will not occur.

Conditions to avoid

- Excessive heat, sources of ignition and open flames.

Incompatible materials

- Strong oxidizers such as nitrates, chlorates, peroxides.

Hazardous decomposition products

- Combustion produces toxic oxides of sulfur, carbon monoxide, sulfur dioxide, hydrogen sulfide and hydrocarbons.

Section 11 - Toxicological Information

Information on toxicological effects

Components		
Sulfur (100%)	7704-34-9	**Acute Toxicity:** Inhalation-Mammal LC50 • 1660 mg/m³; **Irritation:** Eye-Human • 8 ppm; **Multi-dose Toxicity:** Inhalation-Rat TCLo • 1.76 mg/m³ 4 Hour(s) 30 Day(s)-Intermittent; *Liver*:**Hepatitis (hepatocellular necrosis), diffuse**; *Kidney, Ureter, and Bladder*:**Changes in tubules (including acute renal failure, acute tubular necrosis)**

GHS Properties	Classification
Respiratory sensitization	**OSHA HCS 2012** • No data available
Serious eye damage/Irritation	**OSHA HCS 2012** • No data available
Acute toxicity	**OSHA HCS 2012** • No data available
Aspiration Hazard	**OSHA HCS 2012** • No data available
Carcinogenicity	**OSHA HCS 2012** • No data available
Skin corrosion/Irritation	**OSHA HCS 2012** • No data available
Skin sensitization	**OSHA HCS 2012** • No data available
STOT-RE	**OSHA HCS 2012** • Specific Target Organ Toxicity Repeated Exposure 1

STOT-SE	**OSHA HCS 2012** • Specific Target Organ Toxicity Single Exposure 3: Respiratory Tract Irritation
Toxicity for Reproduction	**OSHA HCS 2012** • No data available
Germ Cell Mutagenicity	**OSHA HCS 2012** • No data available

Potential Health Effects

Inhalation

Acute (Immediate)
- May cause respiratory irritation.

Chronic (Delayed)
- No data available

Skin

Acute (Immediate)
- Exposure to dust may cause mechanical irritation. Exposure to hot melted material can cause thermal burns.

Chronic (Delayed)
- No data available

Eye

Acute (Immediate)
- Exposure to dust may cause mechanical irritation. Excessive concentrations of nuisance dust in the workplace may reduce visibility and may cause unpleasant deposits in eyes.

Chronic (Delayed)
- No data available

Ingestion

Acute (Immediate)
- May cause irritation of the mouth, throat and gastrointestinal tract. Symptoms may include salivation, pain, nausea, vomiting and diarrhea.

Chronic (Delayed)
- No data available

Other

Chronic (Delayed)
- Repeated and prolonged exposure may cause damage to the lungs, liver, kidney.

Key to abbreviations
LC = Lethal Concentration
TC = Toxic Concentration

Section 12 - Ecological Information

Toxicity

- Non-mandatory section - information about this substance not complied for this reason.

Persistence and degradability

- Non-mandatory section - information about this substance not complied for this reason.

Bioaccumulative potential

- Non-mandatory section - information about this substance not complied for this reason.

Mobility in Soil

- Non-mandatory section - information about this substance not complied for this reason.

Other adverse effects

- Non-mandatory section - information about this substance not complied for this reason.

Section 13 - Disposal Considerations

Waste treatment methods

Product waste
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Packaging waste
- Dispose of content and/or container in accordance with local, regional, national, and/or international regulations.

Section 14 - Transport Information

	UN number	UN proper shipping name	Transport hazard class(es)	Packing group	Environmental hazards
DOT	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA
TDG	Not Applicable	Not Regulated	Not Applicable	Not Applicable	NDA

Special precautions for user
- None specified.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
- No data available

Section 15 - Regulatory Information

Safety, health and environmental regulations/legislation specific for the substance or mixture

SARA Hazard Classifications
- Acute, Chronic, Fire

Inventory				
Component	CAS	Canada DSL	Canada NDSL	TSCA
Hydrogen sulfide	7783-06-4	Yes	No	Yes
Sulfur	7704-34-9	Yes	No	Yes

Canada

Labor

Canada - WHMIS - Classifications of Substances

• Hydrogen sulfide	7783-06-4	A, B1, D1A, D2B
• Sulfur	7704-34-9	B4

Canada - WHMIS - Ingredient Disclosure List

• Hydrogen sulfide	7783-06-4	1 %
• Sulfur	7704-34-9	Not Listed

Environment

Canada - CEPA - Priority Substances List

• Hydrogen sulfide	7783-06-4	Not Listed
• Sulfur	7704-34-9	Not Listed

United States

Labor

U.S. - OSHA - Process Safety Management - Highly Hazardous Chemicals

• Hydrogen sulfide	7783-06-4	1500 lb TQ
• Sulfur	7704-34-9	Not Listed

U.S. - OSHA - Specifically Regulated Chemicals

• Hydrogen sulfide	7783-06-4	Not Listed
• Sulfur	7704-34-9	Not Listed

Environment

U.S. - CAA (Clean Air Act) - 1990 Hazardous Air Pollutants

• Hydrogen sulfide	7783-06-4	Not Listed
• Sulfur	7704-34-9	Not Listed

U.S. - CERCLA/SARA - Hazardous Substances and their Reportable Quantities

• Hydrogen sulfide	7783-06-4	100 lb final RQ; 45.4 kg final RQ
• Sulfur	7704-34-9	Not Listed

U.S. - CERCLA/SARA - Radionuclides and Their Reportable Quantities

• Hydrogen sulfide	7783-06-4	Not Listed
• Sulfur	7704-34-9	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances EPCRA RQs

• Hydrogen sulfide	7783-06-4	100 lb EPCRA RQ
• Sulfur	7704-34-9	Not Listed

U.S. - CERCLA/SARA - Section 302 Extremely Hazardous Substances TPQs

• Hydrogen sulfide	7783-06-4	500 lb TPQ
• Sulfur	7704-34-9	Not Listed

U.S. - CERCLA/SARA - Section 313 - Emission Reporting

• Hydrogen sulfide	7783-06-4	1.0 % de minimis concentration
• Sulfur	7704-34-9	Not Listed

U.S. - CERCLA/SARA - Section 313 - PBT Chemical Listing

• Hydrogen sulfide	7783-06-4	Not Listed
• Sulfur	7704-34-9	Not Listed

United States - California

Environment

U.S. - California - Proposition 65 - Carcinogens List

• Hydrogen sulfide	7783-06-4	Not Listed
• Sulfur	7704-34-9	Not Listed

U.S. - California - Proposition 65 - Developmental Toxicity

• Hydrogen sulfide	7783-06-4	Not Listed
• Sulfur	7704-34-9	Not Listed

U.S. - California - Proposition 65 - Maximum Allowable Dose Levels (MADL)

• Hydrogen sulfide	7783-06-4	Not Listed
• Sulfur	7704-34-9	Not Listed

U.S. - California - Proposition 65 - No Significant Risk Levels (NSRL)

• Hydrogen sulfide	7783-06-4	Not Listed
• Sulfur	7704-34-9	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Female

• Hydrogen sulfide	7783-06-4	Not Listed

• Sulfur	7704-34-9	Not Listed

U.S. - California - Proposition 65 - Reproductive Toxicity - Male

• Hydrogen sulfide	7783-06-4	Not Listed
• Sulfur	7704-34-9	Not Listed

Section 16 - Other Information

Revision Date
- 09/September/2015

Preparation Date
- 30/November/2010

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Key to abbreviations

NDA = No Data Available