



FIELD APPLICATORS SAFETY ORIENTATION



Introduction	3
Disclaimer.....	3
Sulphur.....	4
BIO-SUL PREMIUM PLUS.....	4
Safe Handling Procedures	4
Training Requirements.....	4
Personal Protective Equipment (PPE) Requirements	4/5
Transportation Requirements.....	5
Dumping Requirements	5
Field Application Requirements.....	5
Fire Prevention.....	5
Emergency Contacts	6
Emergency Preparedness.....	6
Fire	6
Trucking Collision	7
Spills	7
First Aid	8
Eyes	8
Inhalation	8
Ingestion.....	8
Skin.....	8



Introduction

This specific safety information package, has been developed on behalf of Bio-Cycle Solutions specifically for our third party Field Applicators. This documents intent, is to provide necessary information on the safe handling of *BIO-SUL PREMIUM PLUS* and in the event of an emergency, the guidance on how to react safely and in a timely manner.

For further reference please review the MSDS for *BIO-SUL PREMIUM PLUS* enclosed at the end of this document.

Disclaimer

Before we continue with the review of *BIO-SUL PREMIUM PLUS*. Please keep in mind that at no time does our program take precedence over applicable legislation. The required safe handling procedures, is taken from Occupational Health and Safety Legislation, and requirements from Provincial, Municipal and the Transpiration of Dangerous Goods legislated documentation as well as from our own experts within this industry.

As a responsible employer, we want to ensure that all governing legislation is followed within our daily operations and that we're conducting ourselves with integrity, protecting our people and the environment in which we operate.



Sulphur

Sulfur (S) is the 16th element on the periodic table. It is a pale yellow, odorless, and a brittle material that has been known and used in a wide variety of products since ancient times. 85% of today's produced sulfur is recovered from the petroleum refining process.

Sulphur is an important element, essential for life. Sulphur is used in a vast selection of products from creams, lotions to animal feed, and aids to preserve many foods. However, the majority of the world's Sulphur is used in the production of Sulphuric Acid. The acid is then used in the production of Phosphate Fertilizer.

Canadian recovered Sulphur is typically shipped at greater than 99.9% purity. It is this exceptional purity which gives Canadian producers a significant advantage in selling their product to end users all over the world for multiple applications.

Elemental Sulphur is relatively harmless however poses serious risk if not handled with caution.

BIO-SUL PREMIUM PLUS

Bio-Sul Premium Plus is a valued added fertilizer. The product is made by combining "category A compost" with Elemental Sulphur.

Sulphur is naturally a very brittle product that produces dust, but by introducing compost with its moisture content it mitigates the issues with dust and provides a much safer means of spreading the Sulphur back into the earth.

Safe Handling Procedures

In order to ensure Field Applicators are protected as well as the environment in which we operate; the following Safe Handling Procedures for *Bio-Sul Premium Plus* must be adhered to.

Training Required

Although there is no formal certification given on the safe handling of *Bio-Sul Premium Plus*, it is required that all Field Applicators go through Bio-Cycle Solutions orientation prior to conducting any work on behalf of Bio-Cycle Solutions.

Operator Equipment Certification and WHMIS are mandatory and will be requested from the Sub-Contractor prior to orientation, ensuring only those certified are operating on behalf of Bio-Cycle Solutions.

Additional training may be offered by their employer on the use of air quality monitors, H₂S Alive and SCBA Awareness but is at the discretion of the employer and where the product is unloaded.

PPE Required

When handling *Bio-Sul Premium Plus* on behalf of Bio-Cycle Solutions, Field Applicators are required to wear the following PPE to act as a barrier between potential hazards and themselves.



- CSA Approved Steel Toed Boots
- CSA Approved Coveralls (Preferred with Hi-Viz Reflectors)
- CSA Approved Safety Glasses (Preferred Seismic Glasses)
- Leather Palmed Work Gloves

Additional recommended PPE may include, Air Quality Monitors that can detect higher exposure levels of H₂S and SO₂ for shed storage. For emergency preparedness it is also recommended to have access to a SCBA (Supplied Air Breathing Apparatus) to aid in an emergency evacuation when exposure levels are high and within a confined space.

All PPE (Personal Protective Equipment) must be inspected prior to use, any items with observed deficiencies be removed from service.

Sub-Contractors as legislated, must provide their employees with the required PPE (Exclusion of boots), as well as the training on its use and how to effectively inspect the PPE.

Transportation Requirements

Solid Elemental Sulphur is listed in Transport of Dangerous Goods regulations as a Class 4.1. Placards featuring the flammable symbol will be placed upon all trailers prior to leaving the Compost Facility.

All Carriers, prior to transporting the fertilizer will take with them a copy of the Bill of Lading prepared by the facility's Field Supervisor as well as a copy of the pertaining MSDS/SDS. Carriers are required to keep a copy of the Bill of Lading within arm's reach and if leaving their cab for any length of time they must leave the copies provided within the side pouch of the cab.

Dumping Requirements

If unloading *Bio-Sul Premium Plus* for future application, ensure you are aware of the surroundings prior to unloading the product. You need to be aware and avoid at all costs unloading the product on top of loose, rocky landscapes as well as unloading on top of, or nearby any flammable or oxidizing materials or materials that may generate sparks.

Initiate a Fire Watch for 30 minutes by walking and visually inspecting the surrounding area looking for fires and/or hot spots. If a fire is detected follow the emergency response practice provided.

Field Application Requirements

When applying the product directly to fields, be aware of surroundings ensuring you remain within a safe distance from others as well as spraying near flammable and oxidizing materials and materials which may create a spark.

Fire Prevention

Prior to leaving a site where the product has been unloaded, conduct a thorough 30 minute "Fire Watch" by walking the perimeter being aware of "black marks" on top of the Sulphur pile(s). While conducting a Fire Watch it is recommended to stay upwind at all times in case of SO₂/H₂S omissions.

Emergency Contacts

Service Name:	Phone Number:	Service Name:	Phone Number:
Environmental Emergency	1 800-222-6514	OH&S 24 HR Line	1 866-415-8690
Dangerous Goods	1 800-272-9600	Poison Control Centre	1 800-332-1414
Saskatchewan Health Link	811	For any EMERGENCY call 9-1-1	

Bio-Cycle Emergency Contacts:

Name:	Title:	Cell:	Email:
Mark Grunert	VP of Operations	403-620-7227	markgrunert@transformingwaste.ca
Neil Wiens	Compost Pad Operator	403-803-2549	neil@bio-cycle.ca
Calvin Allin	VP of Safety	403-585-4612	callin@transformingwaste.ca
Adrina Walker	HSE Coordinator	403-819-4777	adrinawalker@transformingwaste.ca

(ALWAYS contact safety first, when any incident occurs)

Emergency Preparedness - Fires

Fires from *Bio-Sul Premium Plus* are quite rare because of the introduction of the moisture rich compost. However, in the event of a fire you should know that Sulphur fires are not easily ignited and provide a very slow burning pale flame. The concern is not with the spread of the fire but with the toxicity that is released when there is a fire.

Sulphur dioxide (SO₂), is a highly toxic suffocating gas that derives from Sulphur fires. The SO₂ irritates airways due in part to its acidity. All individuals react and are sensitive to low concentrations of Sulphur Dioxide. Initial reaction is usually coughing followed by extreme shortness of breath and rapid collapse if the individual is not removed from the affected area and into fresh air. Sensitivity to Sulphur Dioxide is significantly greater than sensitivity to Sulphur or even Sulphur dust.

In the case of a fire, no matter the size detected; remain upwind.

Small/Medium Fires:

- Smaller fires are easily extinguished by adding more product to smother the flame by depleting the oxygen levels.

Larger Fires:

- If a larger fire is detected, extinguish the fire with use of a light water fog or ABC Dry Chemical Fire Extinguisher. Do not use heavy streams which may encourage fire to spread.



Emergency Preparedness - Trucking Collision

In the event of a collision, initiate your Company's Procedures which should include the following steps:

- Check for injured persons and lend assistance if safe to do so.
- Phone Emergency Medical Services (911) and Police/Fire.
- Emergency Response Manager will report the spill as per the Saskatchewan Environmental Spill Control Regulations **1-800-667-7525**

Be prepared to provide:

1. Name and Company (and who you are hauling for)
 2. Location and time of release
 3. A description of the circumstances leading to the release
 4. The type and quantity of the material released
- Remove manifest from truck and retain to give to the attending emergency authorities.
 - Keep unauthorized people away from area and remain upwind.
 - Keep open flames and sources of ignition away from spill area.
 - Set up traffic warning devices.
 - Do not attempt to handle the material.
 - Await arrival of Police and emergency spill response.

Emergency Procedures - Spills

Use extreme caution when cleaning up spilt product.

Ensure area in which spilt product was dumped is secured from additional traffic (if on road way), people, wildlife, source of heat or flame. Inspect for exposed rock in asphalt, this could potentially create sparks when made in contact with shovels, skid steers, bobcats etc.

It is recommended to use brass coated shovels, buckets or use of a more cost effective tool such as plastic shovels and brooms.

If a fire is ignited, again, do not be alarmed as *Bio-Sul Premium Plus* burns extremely slowly. In this case remember to stay upwind and smother the fire with additional product. You may consider the utilization of your ABC Dry Chemical Fire Extinguisher or water to extinguish if means of smothering the fire with additional product is not practical.

Complete a Fire Watch by remaining within the area and conducting a walk through for an additional 30 minutes post clean up to visually monitor the area for burnt marks. Remember throughout the Fire Watch to remain up wind from potential harmful gases and smoke.

If there is no sign of fire observed or hot spots detected with use of Heat Gun, take the time to inspect the load to ensure there is no material within the trailer in which had ignited.



Emergency Preparedness - First Aid

For injuries/incidents where first aid is required ensure you follow your Company's First Aid reporting procedures.

Eyes:

Irritation can result from fine particulate contact with the eye. If a particle of Sulphur enters the eye (there is often a time delay of minutes to an hour) the irritation by the foreign body of the sensitive eye tissue and fluid is usually experienced. This often leads to involuntary rubbing of the eye which, almost inevitably, makes the situation worse by forcing more particulate into the eye socket area. These fine particulates may then undergo slow chemical reaction with the eye fluids to produce acidic conditions which can lead to profuse tear formation - natural defense mechanism.

First Aid measures for eyes exposed to *Bio-Sul Premium Plus* is to thoroughly wash the infected eye(s) out with an eye wash kit and repeat as often as needed. Avoid rubbing the eye(s) and keeps hands clean. If conditions worsen, or lasts for more than several days, medical attention is required.

Inhalation:

Affected persons should be removed from dusty area to a dust free area as soon as possible. Caution should also be exercised in determining whether effects are due to Sulphur dust inhalation or inhalation of other ingredients such as Hydrogen Sulphide/Sulphur Dioxide.

The likelihood of toxic levels of Hydrogen Sulphide/Sulphur Dioxide being encountered during the handling of *Bio-Sul Premium Plus* is minimal. If, however, the concern is over exposure levels of the toxic gas remove yourself immediately from the area to an area where there is an abundance of fresh air. Contact emergency personnel and remain upwind at all times.

Short term effects of inhalation of minor amounts of Sulphur dust are not likely to be major but post event monitoring is advisable.

Ingestion:

Solid Sulphur ingested in small doses is not toxic (traditional "Sulphur and Molasses"). More massive doses may require first aid followed by medical attention.

Wash hands before eating, drinking and/or smoking.

Skin:

Extensive skin exposure to Sulphur particulate may require thorough washing of the skin with mild soap and water. Dust laden clothing should be thoroughly cleaned before being worn again. In the event of irritation or if rashes develop, professional medical attention should be sought.

Section 1: PRODUCT AND COMPANY IDENTIFICATION

Product Name: Bio-Sul Premium Plus 70% S
 Synonyms: Sulfur; Brimstone
 Product Use: Fertilizer Production. Soil Amendment
 Manufacturer/Supplier: Bio-Cycle Solutions Ltd
 PO Box 1052 Okotoks, AB T1S 1B1
 Phone Number: 403-803-2549
 Emergency Phone: 403-803-2549
 Date of Revision: February 29, 2016

Section 2: HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER
 FLAMMABLE SOLID. MAY IRRITATE EYES AND SKIN.

WHMIS	Personal Protection Equipment	TDG (Ground)
		

Potential Health Effects: See Section 11 for more information.

Likely Routes of Exposure: Eye contact. Skin contact. Inhalation. Ingestion.

Eye: May be irritating to eyes. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision. This product (particularly when fresh) may release Hydrogen Sulphide (H₂S) gas. Hydrogen Sulphide may cause eye irritation at 1-20 ppm and acute conjunctivitis at higher concentrations. Above 50 ppm H₂S, eye irritation may include symptoms of redness, severe swelling, tearing, sensitivity to light and the appearance of 'Halos' around lights.

Skin: May be irritating to skin. Signs/symptoms may include localized redness, swelling, and itching.

Ingestion: May cause gastrointestinal irritation. Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea. Sulphur may be converted into Hydrogen Sulphide in the intestine.

Inhalation: May cause respiratory tract irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain. This product (particularly when fresh) may release Hydrogen Sulphide (H₂S) gas. Hydrogen Sulphide may cause Symptoms such as digestive upset and loss of appetite, loss of sense of smell and pulmonary edema. At 500-1000 ppm Hydrogen sulphide may cause respiratory paralysis, collapse and death without rescue.

Chronic Effects: See Section 11 for more information.

Medical Conditions Aggravated By Exposure: Not available.

Target Organs: Skin. Eyes. Gastrointestinal Tract. Respiratory System. Lungs. Blood. Cardiovascular System. Nervous System.

Potential Environmental Effects: See Section 12 for more information.

This material is considered hazardous by the OSHA Hazard Communication Standard, (29 CFR 1910.1200).

Section 3: COMPOSITION INFORMATION ON INGREDIENTS

Component	Wt. %
Sulfur	70%
Compost	30%

Section 4: FIRST AID MEASURES

Eye Contact:	Flush eyes with plenty of water for at least 15 minutes. If signs/symptoms persist, get medical attention.
Skin Contact:	Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. If signs/symptoms develop, get medical attention.
Ingestion:	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Inhalation:	Remove person to fresh air. If breathing has stopped apply artificial respiration, if signs/symptoms develop, get medical attention.
General Advice:	In case of accident or if you feel unwell, seek medical advice immediately (show the label or MSDS where possible).
Note to Physicians:	Symptoms may not appear immediately. For inhalation of Hydrogen Sulphide, consider oxygen.

Section 5: FIRE FIGHTING MEASURES

Flammability:	Flammable solid by WHMIS criteria. Flammable solid by OSHA criteria.
Means of Extinction	
Suitable Extinguishing Media:	Dry chemical, foam, or carbon dioxide.
Unsuitable Extinguishing Media:	Water may not be an effective medium to extinguish fire.
Products of Combustion:	Oxides of Sulphur. Hydrogen Sulphide.
Protection of Firefighters:	Keep upwind of fire. Wear full firefighting turn-out gear (full Bunker gear) and respiratory protection (SCBA). Hydrogen Sulphide is heavier than air and may collect in low lying areas and confined spaces.

Explosion Data
 Sensitivity to Mechanical Impact: This material is not sensitive to mechanical impact.
 Sensitivity to Static Discharge: In the form of dust, this material is sensitive to static discharge and may form explosive mixtures with air.

Section 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions: Evacuate all unnecessary personnel. Stay upwind. Eliminate all ignition Sources. Use personal protection recommended in Section 8. Isolate the hazard area and deny entry to unnecessary and unprotected personnel. Don full-face, positive pressure, self-contained breathing apparatus.

Environmental Precautions: Keep out of drains, sewers, ditches, and waterways.

Methods for Containment: Donotflush to sewer or allow to enter waterways.

Methods for Clean-Up: Use explosion-proof equipment. Dust can be a fire or explosion hazard. Sweep up and shovel into suitable containers for disposal.

Other Information: Dispose of in accordance with all federal, provincial and local Regulations. Comply with federal, provincial, and local requirements for spill and/or release notification.

Section 7: HANDLING AND STORAGE

Handling:

Do not breathe dusts. Do not swallow. Avoid contact with skin and eyes. All equipment used when Handling the product must be grounded. Handle and open container with care. When using do not eat or drink. Wash hands before eating, drinking, or smoking. See Section 8 for information on Personal Protective Equipment.

Storage:

Store in cool, dry, well-ventilated area away from incompatible materials, heat, and sources of ignition. All storage containers and pumping equipment should be grounded. Keep out of the reach of children. Head spaces in storage containers may contain toxic Hydrogen Sulphide gas. Structural materials and lighting and ventilation systems should be corrosion resistant.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines
 Component

Sulfur

(7704-34-9) ACGIH: 10 mg/m³ (TWA); inhalable. 3 mg/m³ (Respirable.) (); For Particles Not Otherwise Specified

(7704-34-9) OSHA: 15 mg/m³ (Total dust) (TWA), 5 mg/m³ (Respirable fraction) (TWA); for Particulates Not Otherwise Regulated (PNOR)

Hydrogen sulfide (H₂S)

(7783-06-4) ACGIH: 1 ppm (TWA); 5 ppm (STEL); (2009)

(7783-06-4) OSHA: 20 ppm (C); 50 ppm (Peak) (Maximum duration: 10 mins. once only if no other meas. exp. occurs.)

10 ppm (TWA); 15 ppm (STEL) [Vacated]



PEL: Permissible Exposure Limit TLV: Threshold Limit Value TWA: Time-Weighted Average
STEL: Short-Term Exposure Limit
C: Ceiling

- Engineering Controls: Use ventilation adequate to keep exposures (airborne levels of dust, fume, vapor, gas, etc.) Below recommended exposure limits. Use explosion-proof ventilation equipment.
- Personal Protective Equipment
- Eye/Face Protection: Safety glasses are required. Indirect vented, dust-tight Goggles are recommended if dust is generated when handling this product.
- Hand Protection: Wear impervious gloves. Consult manufacturer specifications for further information.
- Skin and Body Protection: Wear suitable protective clothing. Flame resistant clothing such as Nomex ® is recommended in areas where material is stored or handled.
- Respiratory Protection: If engineering controls and ventilation are not sufficient to control Exposure to below the allowable limits then an appropriate NIOSH/MSHA approved air-purifying respirator or self-contained breathing apparatus (SCBA) should be used. Supplied air breathing apparatus must be used when oxygen concentrations are low or if airborne concentrations exceed the limits of the air- purifying respirators.
- General Hygiene Considerations: Handle according to established industrial hygiene and safety practices.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Yellow solid.
Colour:	Yellowish
Odour:	Slight Rotten egg
Odour Threshold:	Not available.
Physical State:	Solid.
PH (1% solution in water):	3 to 6
Viscosity:	Not available.
Melting Point:	112to 119 °C
Boiling Point:	444 °C
Flash Point:	207 °C (COC)
Evaporation Rate:	Not available.
Lower Flammability Limit:	35 g/m ³
Upper Flammability Limit:	1400 g/m ³
Vapor Pressure:	0.11 mmHg (140 °C)
Vapor Density:	Not available.
Specific Gravity:	2.07 (Water= 1)
Density:	1.96 g/ml
Solubility in Water:	Insoluble.
Coefficient of Water/Oil Distribution:	Not available.
Auto-ignition Temperature:	232 °C
Percent Volatile, wt. %:	Not available.
VOC content, wt. %:	Not available.

Section 10: STABILITY AND REACTIVITY

Stability: Stable under normal storage conditions.

Conditions of Reactivity: Contact with incompatible materials. Sources of ignition. Exposure to heat.

Incompatible Materials: Oxidizers. Metals. Halogens.

Hazardous Decomposition Products: Hydrogen Sulphide, hazardous Sulphur dioxide, and related Oxides of Sulphur may be generated upon combustion. Combined with moisture, Sulphur may form acidic / corrosive solutions. In the presence of moisture, iron and oxygen, Sulphur has the capacity to form spontaneously combustible pyrophoric iron.

Possibility of Hazardous Reactions: None known.

Section 11: TOXICOLOGICAL INFORMATION

EFFECTS OF ACUTE EXPOSURE

Component Toxicity Component	CAS No.	LD ₅₀ oral	LD ₅₀ dermal	LC ₅₀
Sulfur	7704-34-9	>8437 mg/kg, (rat)	Not available.	Not available.
Hydrogen sulfide (H ₂ S)	7783-06-4	Not available.	Not available.	444 ppm, (rat),

Eye: May be irritating to eyes. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision. This product (particularly when fresh) may release Hydrogen Sulphide (H₂S) gas. Hydrogen Sulphide may cause eye irritation at 1-20 ppm and acute conjunctivitis at higher concentrations. Above 50 ppm H₂S, eye irritation may include symptoms of redness, severe swelling, tearing, sensitivity to light and the appearance of 'Halos' around lights.

Skin: May be irritating to skin. Signs/symptoms may include localized redness, swelling, and itching.

Ingestion: May cause gastrointestinal irritation. Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea. Sulphur may be converted into Hydrogen sulphide in the intestine.

Inhalation: May cause respiratory tract irritation. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain. This product (particularly when fresh) may release Hydrogen sulphide (H₂S) gas. Hydrogen sulphide may cause symptoms such as digestive upset and loss of appetite, loss of sense of smell and pulmonary edema. At 500-1000 ppm Hydrogen sulphide may cause respiratory paralysis, collapse and death without rescue.

Skin Sensitization: Not hazardous by OSHA/WHMIS criteria.

Respiratory Sensitization: Not hazardous by OSHA/WHMIS criteria.

EFFECTS OF CHRONIC EXPOSURE

Target Organs: Skin. Eyes. Gastrointestinal tract. Respiratory system. Lungs. Blood. Cardiovascular system. Nervous system.

Chronic Effects: Prolonged or repeated contact may dry skin and cause irritation. Prolonged overexposure to Sulphur dust can produce possible skin sensitization and permanent eye damage (clouding of the lens and chronic irritation). Prolonged inhalation can cause irritation of mucous membranes. Hydrogen sulphide may reduce lung function; cause neurological effects such as headaches, nausea, depression and personality changes; eye and mucous membrane irritation: damage to cardiovascular system.

Carcinogenicity: Not hazardous by OSHA/WHMIS criteria. This product does not contain any carcinogens or potential carcinogens as listed by ACGIH, IARC, OSHA, or NTP.

Component	ACGIH	IARC	NTP	OSHA	Prop 65
Sulfur	Not listed.				
Hydrogen sulfide (H2S)	Not listed.				

Component Carcinogenicity

Mutagenicity: Not hazardous by OSHA/WHMIS criteria.

Reproductive Effects: Not hazardous by OSHA/WHMIS criteria.

Developmental Effects

Teratogenicity: Not hazardous by OSHA/WHMIS criteria.

Embryotoxicity: Not hazardous by OSHA/WHMIS criteria.

Toxicologically Synergistic Materials: Not available.

Section 12: ECOLOGICAL INFORMATION

Eco Toxicity: Not available.

Persistence/Degradability: Not available.

Bioaccumulation Accumulation: Not available.

Mobility in Environment: Not available.

Section 13: OTHER INFORMATION

Disclaimer:

The information contained in this document applies to this specific material as supplied. It may not be valid for this material if it is used in combination with any other materials. It is the user's responsibility to satisfy oneself as to the suitability and completeness of this information for his own particular use.

Expiry Date: December 31, 2016

Version: 2.0

MSDS Prepared by: Bio-Cycle Solutions Ltd

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