BITUMINOUS COAL
SAFETY DATA SHEET

SECTION 1. IDENTIFICATION

Product Identity: Bituminous Coal.

Trade Names and Synonyms: None.

Date of Last Review: September 10, 2018.

Date of Last Edit: November 21, 2019.

Product Use: Metallurgical quality coal, used principally by the steel industry.

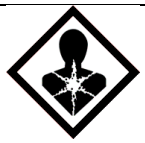
SECTION 2. HAZARDS IDENTIFICATION

CLASSIFICATION:

Health	Physical	Environmental
Acute Toxicity (Oral, Inhalation) – Does not meet criteria Skin Corrosion/Irritation – Does not meet criteria Eye Damage/Eye Irritation – Does not meet criteria Respiratory or Skin Sensitization – Does not meet criteria Mutagenicity – Does not meet criteria Carcinogenicity – Does not meet criteria Reproductive Toxicity – Does not meet criteria **Specific Target Organ Toxicity:** Acute Exposure – Does not meet criteria **Chronic Exposure – Category 2**	Does not meet criteria for any Physical Hazard	**Aquatic Toxicity – Long Term (Chronic) Category 3**

LABEL:

Symbols:



Signal Word:

WARNING

Hazard Statements	Precautionary Statements:
WARNING May cause damage to the respiratory system through prolonged or repeated inhalation of dust. Harmful to aquatic life with long lasting effects.	Do not breathe dust. Avoid release to the environment. Get medical advice/attention if you feel unwell.

Emergency Overview: A black-brown solid carbonaceous material with some metallic lustre. Airborne coal dust can be a significant explosion hazard under certain conditions. Solid coal would not be readily ignited in an emergency situation but could act as additional fuel to a fire of other flammable materials. Coal is relatively non-toxic and poses little immediate hazard to the health of emergency response personnel or to the environment in an emergency situation.

Potential Health Effects: Acute exposure to very dusty conditions may result in mild respiratory irritation and possible eye irritation due to abrasion of the granules on tissues. Chronic exposure to coal dust can cause chronic bronchitis, emphysema, coal workers' pneumoconiosis and massive pulmonary fibrosis. This coal contains approximately 8.5% silica. Respirable crystalline silica has been identified by various agencies as a cause of silicosis (lung fibrosis) and as carcinogen (see Toxicological Information, Section 11).

Potential Environmental Effects: While the solid form of bituminous coal is unlikely to be ecologically hazardous, upon thermal decomposition it is known to liberate hydrocarbon compounds including 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 (% wt./wt.)
Coal	None assigned	90.30 – 90.75%
Ash *(average content - 89.5% silica plus alumina)*	14808-60-7	9.25 – 9.70%

Note: See Section 8 for Occupational Exposure Guidelines.

SECTION 4. FIRST AID MEASURES

Eye Contact: *Symptoms:* Grittiness, irritation, redness. Gently brush product off face. Do not rub eye(s). Let the eye(s) water naturally for a few minutes. Look right and left, then up and down. If particle/dust does not come out, cautiously rinse eye(s) with lukewarm, gently flowing water for 5 minutes or until particle/dust is removed, while holding eyelid(s) open. If eye irritation persists, get medical advice/attention. DO NOT attempt to manually remove anything from the eye.

Skin Contact: *Symptoms:* Skin soiling, dustiness. Wash with lukewarm, gently flowing water and mild soap for 5 minutes or until the product is removed. If skin irritation occurs or you feel unwell, get medical advice/attention.

Inhalation: *Symptoms:* Coughing, respiratory irritation. Remove source of exposure or move person to fresh air and keep comfortable for breathing. Get medical advice/attention if you feel unwell or are concerned.

Ingestion: *Symptoms:* Stomach upset. If you feel unwell or are concerned, get medical advice/attention.

SECTION 5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Solid coal is not readily combustible but can be ignited through sustained contact with an open flame. Finely-divided coal dust is a moderate fire and explosion hazard, particularly when dispersed in the air at high concentrations in an enclosed space and exposed to flame or other ignition sources. Settled dust on horizontal surfaces may also be dispersed into the air by an initial explosion, resulting in a much more serious secondary explosion.

Extinguishing Media: Remove ignition source and “fuel supply” from fire if possible to do so safely. For small fires use dry chemical, sand, earth, water spray, or regular foam. For a massive fire use unmanned hose holders or monitor nozzles. If this is impossible, withdraw from the area and let the fire burn, concentrating on protecting the surrounding assets from the fire.

Fire Fighting: Toxic fumes will result from combustion. 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. Caution must be taken when using water to put out a large coal fire as the coal may erupt violently.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup: Control source of release if possible to do so safely. Clean up spilled material immediately observing precautions in Section 8, Personal Protection. Material should be cleaned up using methods that will minimize dust generation (water spray may be used cautiously to wet down the coal before removal). Return uncontaminated spilled material to the process if possible. Place contaminated material in suitable containers for later recovery or disposal. Treat or dispose of waste material in accordance with all local, state/provincial, and national requirements.

Personal Precautions: Protective clothing, gloves, and a respirator are recommended for persons responding to an accidental release (see also Section 8). Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact.

Environmental Precautions: Avoid any accumulation of dust, and/or the release of thermally-decomposed material. If the material is released to the environment, it should be thoroughly cleaned up using excavation, collection using vacuum and/or wash down.

SECTION 7. HANDLING AND STORAGE

Precautions for Safe Handling: Avoid generating dust and the release of dust into the workplace as this creates a potential explosion hazard. Good housekeeping is important to prevent accumulations of dust, which would be a source of fuel for a secondary explosion. See NFPA Standard 654 – Standard for the Prevention of Fire and Dust Explosions Combustible Particulate Solids for specific guidance on dust explosion prevention. Also see NFPA Standards 120 and/or 8503.

Conditions for Safe Storage: Store in a dry, cool, well-ventilated area, away from all ignition sources.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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

Component	ACGIH TLV	OSHA PEL	NIOSH REL
Coal	0.9 mg/m^3 Respirable coal dust	0.93 mg/m^3 Respirable coal dust*	1 mg/m^3 Respirable coal dust†
Ash	0.025 mg/m^3 Respirable SiO_2	0.93 mg/m^3 Respirable coal dust*	0.05 mg/m^3 Respirable SiO_2

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.

* - The OSHA PEL for coal dust with ≥5% silica is based on the quartz (crystalline silica) content. It dictates the total airborne dust concentration and has been calculated based on the maximum percent SiO_2 in the sample using the formula:
Respirable Dust PEL = 10 mg/m^3 / (%SiO_2 + 2). See Table Z-3 of 29 CFR 1910.1000.

† - As measured according to MSHA method or 0.9 mg/m^3 when measured according to ACGIH® criteria

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 concentration of coal dust in the working environment well below recommended occupational exposure limits. Refer to appropriate NFPA Standards 654, 120 and/or 8503 for specific guidance.

Protective Clothing: The hazard potential of this material is low. Where there is large scale use of this material and significant potential for worker contact, gloves and long sleeved work clothes or disposable coveralls may be necessary. Eye protection should be worn where dust is generated and there is a potential that eye contact may occur.

Respirators: Where coal dust is generated and cannot be controlled to within acceptable levels by engineering means, use an appropriate NIOSH and/or MSHA-approved air purifying half face piece or full face piece respirator with 42 CFR 84 Class N, R or P-95 particulate filter cartridges as a minimum.

General Hygiene Considerations: Always practice good personal hygiene. Refrain from eating and drinking in work areas. Thoroughly wash hands after handling and before eating or drinking in appropriate, designated areas.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Black-brown carbonaceous solid	**Odour:** Odourless	**Odour Threshold:** Not Applicable	**pH:** Not Applicable
Vapour Pressure: Negligible at 25°C	**Vapour Density:** Not Applicable	**Melting Point/Range:** Not Available	**Boiling Point/Range:** Not Available
Relative Density (Water = 1)**:** 1.3 to 1.6	**Evaporation Rate:** Not Applicable	**Coefficient of Water/Oil Distribution:** Not Available	**Solubility:** Insoluble in water
Flammability: Non-flammable solid.	**Auto-ignition Temperature:** 390 – 425°C	**Decomposition Temperature:** >400°C	**Percent Volatile by Weight:** 20 to 28% by weight moisture

Flammable Limits (LEL/UEL): Lower flammable limit of finely- dispersed bituminous coal dust is approximately 130 grams/cubic metre (g/M^3) in air containing no coexisting methane gas (≈0.13 oz/ft^3). Upper flammable limit not established.

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.

Incompatibilities: None have been identified.

Hazardous Decomposition Products: Thermal decomposition starts above approximately 400°C (750°F) with the release of flammable and toxic gases. Coal combustion will produce lots of carbon dioxide and water vapour as well as small amounts of sulphur dioxide, nitrogen oxides and fly ash. Carbon monoxide may also be formed under poor combustion conditions.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute:
Skin/Eye: Contact with the eyes may cause local irritation due to direct abrasive action of the particles but would not cause tissue damage. Direct contact with the skin will cause heavy soiling but is not generally irritating to the skin.

Inhalation: Acute inhalation of dusts may result in irritation of the nose, throat and upper respiratory passages. Symptoms may include discomfort, coughing, tingling sensation, sneezing and/or shortness of breath and wheezing. A large part of the airborne coal dust is typically trapped by the nasal hairs and subsequently eliminated by blowing the nose.

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 irritation or discomfort occurs, obtain medical advice.

Chronic:
Chronic exposure to coal dust may result in respiratory impairments including chronic bronchitis and emphysema, coal workers' pneumoconiosis (CWP) and progressive massive fibrosis (PMF). Simple CWP is a benign condition that is not associated with shortened life span. PMF is a progressive condition associated with reduced breathing capacity and function as well as premature death. The International Agency for Research on Cancer (IARC) lists coal dust as unclassifiable as to carcinogenicity in humans (Group 3). The American Conference of Governmental Industrial Hygienists (ACGIH) classification is A4 (not classifiable as a human carcinogen). The National Toxicology Program (NTP), OSHA and the EU do not currently list coal dust as a carcinogen. IARC has classified crystalline silica of respirable particle size as a Group 1 carcinogen (carcinogenic to humans) while ACGIH classifies it as a suspected human carcinogen (A2). The NTP recently reclassified silica as a known human carcinogen. OSHA and the EU do not list silica as a carcinogen.

Animal Toxicity:

Hazardous Ingredient:	Acute Oral Toxicity:	Acute Dermal Toxicity:	Acute Inhalation Toxicity:
Coal	No data	No data	No data
Ash	No data	No data	No data

SECTION 12. ECOLOGICAL INFORMATION

While the solid form of bituminous coal is unlikely to be ecologically hazardous, upon thermal decomposition it is known to liberate hydrocarbon compounds, including 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.

SECTION 13. DISPOSAL CONSIDERATIONS

If material cannot be returned to process or salvage, dispose of in accordance with applicable regulations.

SECTION 14. TRANSPORT INFORMATION

TRANSPORT CANADA CLASSIFICATION	Not regulated
U.S. DOT HAZARD CLASSIFICATION	Not regulated
MARINE POLLUTANT	No
IMO IMSBC Code CLASSIFICATION	MHB - Materials Hazardous Only in Bulk Group A and B
IMO MARPOL V Classification	Not Harmful to the Marine Environment.

SECTION 15. REGULATORY INFORMATION

U.S.

Ingredients Listed on TSCA Inventory	Coal – Naturally occurring substance Ash (Crystalline Silica) – Yes
Hazardous Under Hazard Communication Standard	Yes
CERCLA Section 103 Hazardous Substances	No ingredients on list.
EPCRA Section 302 Extremely Hazardous Substance	No ingredients on list.
EPCRA Section 311/312 Hazard Categories	Delayed (chronic) Health Hazard – Target Organ: Lungs
EPCRA Section 313 Toxic Release Inventory (Supplier Notification)	No ingredients on list.

SECTION 16. OTHER INFORMATION

Date of Original Issue: August 18, 2009 **Version:** 01 *(First edition)*

Date of Latest Revision: November 21, 2019 **Version:** 04

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

- American Conference of Governmental Industrial Hygienists, 2004, Documentation of the Threshold Limit Values and Biological Exposure Indices, Seventh Edition plus updates.
- American Conference of Governmental Industrial Hygienists, 2018, Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.
- American Conference of Governmental Industrial Hygienists, 2018, Guide to Occupational Exposure Values.
- Chemical Hazards of the Workplace, First Edition, 1978: Nick H Porter & James P Hughes, Ed.
- Coal Combustion and Gasification by Leon Douglas Smoot & Philip J Smith, Springer Publications, 1985.
- Commission de la santé et la sécurité du travail, Service du Répertoire toxicologique, Coal(Anthracite).
- European Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH).
- Health Canada, SOR/2015-17, Hazardous Products Regulations, 11 February 2015.
- International Agency for Research on Cancer (IARC), Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Vol. 68 (1997) (pg. 337) Coal Dust, World Health Organization, Geneva.
- Merck & Co., Inc., 2001, The Merck Index, An Encyclopedia of Chemicals, Drugs, and Biologicals, Thirteenth Edition.
- National Library of Medicine, Haz-Map: Occupational Exposure to Hazardous Agents: Coal Dusts.
- Patty's Toxicology, Fifth Edition, 2001: E. Bingham, B. Cohrssen & C. H. Powell, Ed.
- Sax, N. Irving & Lewis, Richard J. Sr., 1987, Hawley's Condensed Chemical Dictionary, Eleventh Edition.

- Symposium on Industrial Dust Explosions, Pittsburgh, PA 10-13 June 1986 published by ASTM International 1987, Kenneth L Cashdollar & Martin Hertzberg, editors.
- U.S. Dept. of Health and Human Services, National Institute of Environmental Health Sciences, National Toxicology Program (NTP), 14th Report on Carcinogens, November 2016.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Criteria for a Recommended Standard: Occupational exposure to Respirable Coal Mine Dust. NIOSH Publication No 95-106 September 1995.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards.
- U.S. Dept. of Health and Human Services, National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances (RTECS).
- U.S. Occupational Safety and Health Administration, Occupational Safety and Health Guideline for Coal Dust (greater than or equal to 5% SiO_2).
- U.S. Occupational Safety and Health Administration, 1989, Code of Federal Regulations, Title 29, Part 1910.1000 and Part 1910.1200.

Acronyms not spelled out elsewhere in the SDS:

CAS: Chemical Abstract 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%
MSHA: Mine Safety and Health Administration, U.S. Department of Labour
TSCA: Toxic Substances Control Act
Wt.: Weight

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