Safety Data Sheet

Bottom Ash (All Types)

Date Prepared: 04/12/2024

SECTION 1: IDENTIFICATION

1.1 Product Identifier

Product Names: Bottom Ash, Coal Bottom Ash, Ground Bottom Ash, Boiler Slag, Combustion Ash

1.2 Intended Use of the Product

Component of wallboard, concrete, asphalt, roofing material, bricks, cement kiln feed functional filler and construction material for various civil engineering applications

1.3 Name, Address, and Telephone Number of the Responsible Party

Company

Eco Material Technologies Inc., and its subsidiary and affiliate companies
10701 S. River Front Parkway, Suite 300 South Jordan, UT 84095

(801) 984-9400

1.4 Emergency Telephone Number

(502) 525-3561

SECTION 2: HAZARD(S) IDENTIFICATION

2.1 Classification of the Substance or Mixture (GHS-US)

Skin Irritation 2
Eye Irritation2A
STOT-SE (Single Exposure) 2 (Respiratory)
Carcinogenicity 1A
STOT-RE (Repeated Exposure) 1 (Respiratory)

2.2 Label Elements

Hazard Pictograms:

Signal Word:

- Danger

Hazard Statements:

- Causes skin irritation. (H315)
- Causes serious eye irritation. (H319)
- Harmful if inhaled. (H332)
- May cause respiratory irritation. (H335)
- May cause cancer (H350)
- Causes respiratory harm through prolonged or repeated exposure. (H372)

Precautionary and Response Statements:

- Do not handle until all safety precautions have been read and understood. (P202)
- Avoid breathing dust. (P261)
- Wash hands, forearms, and other exposed areas thoroughly after handling. (P264)
- Wear protective gloves, protective clothing, and eye protection. (P280)
- IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. (P301) (P330) (P331)
- IF ON SKIN (OR HAIR): Remove all contaminated clothing immediately. Rinse skin with water/shower. (P303) (P353) (P361)
- IF INHALED: Remove person to fresh air and keep at rest in a position comfortable for breathing. (P304) (P340)
- IF IN EYES: Rinse cautiously with water for at least 15 minutes. Remove contact lenses if present and easy to do. Continue rinsing until pain or irritation subsides. (P305) (P338) (P351)
- If symptoms persist: Get medical advice/attention. (P308) (P313)
- Remove contaminated clothing and wash before re-use. (P362) (P364)

2.3 Other Hazards

Exposure may aggravate those with pre-existing eye, skin, or respiratory conditions. Repeat inhalation exposure may cause obstructive pulmonary disease, chronic bronchitis, silicosis, and cancer.

2.4 California Proposition 65:

WARNING: CANCER—www.P65Warnings.ca.gov

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Description of Product

Bottom Ash[1]

3.2 Mixture Ingredients and Hazard Classification

Ingredient	Product Identifier (CAS No.)	% (w/w)	Hazard Classification (GHS-US)
Aluminosilicates[1]	Various[2]	60 – 70	• STOT-SE (Single Exposure) 3 (Respiratory), H373
Calcium oxide	1305-78-8	< 25	• Skin Irritation 2, H315 • Eye Irritation 2A, H319
Crystalline silica[3]	14808-60-7	< 16	• Carcinogenicity 1, H350 • STOT-RE (Repeated Exposure) 1, (Respiratory), H373
Iron oxide	1309-37-1	< 7	• Not classified
Magnesium oxide	1309-48-4	< 5	• Not classified
Manganese dioxide	1313-13-9	< 2	• Skin Irritation 2, H315 • Eye Irritation 2B, H320
Phosphorus pentoxide	1314-56-3	< 2	• Skin Corrosivity 1A, H314 • Eye Irritation 2A, H319
Titanium dioxide	13463-67-7	0 – 100	• STOT 2 Repeated Exposure (Respiratory), H373 • Carcinogenicity 2, H351
Potassium oxide	12136-45-7	< 1	• Skin Irritation 2, H315 • Eye Irritation 2A, H319

fn[1] Aluminosilicates (CAS No. 1327-36-2) may be in the form of mullite (CAS No. 1302-93-8); aluminosilicate glass; pozzolans (CAS# 71243-67-9); or calcium aluminosilicates such as tricalcium aluminate (C3A), or calcium sulfoaluminate (C4A3S). The form is dependent on the source of the coal and or the process used to create the CCP. Pulverized coal combustion would be more likely to create high levels of pozzolans. Aluminosilicates may have inclusions of calcium, titanium, iron, potassium, phosphorus, magnesium and other metal oxides.

fn[2] Bottom ash and other coal combustion products(CCPs) are UVCB substances (substance of unknown or variable composition or biological). Bottom ash is defined by the U.S. EPA as: "The residuum from the burning of a combination of carbonaceous materials. The following elements may be present as oxides: aluminum, calcium, iron, magnesium, nickel, phosphorus, potassium, silicon, sulfur, titanium, and vanadium." The exact composition of bottom ash is dependent on the fuel source and flue additives composed of many constituents. The classification of the final substance is dependent on the presence of specific identified oxides as well as other trace elements.

fn[3] Respirable fraction not determined.

SECTION 4: FIRST AID MEASURES

4.1 Description of First Aid Measures

General: Never give anything by mouth to an unconscious person. Any person who is experiencing symptoms of injury or illness should be moved to a comfortable area with fresh air, and the label or SDS of this material reviewed. If feeling unwell, seek medical advice.

Inhalation: Move person to fresh air. Provide drinking water, if conscious, to flush mouth and irrigate upper respiratory tract. Seek medical attention if pain, coughing or other symptoms do not subside.

Eye Contact: If the exposed person experiences burning eye irritation due to dust exposure, careful flushing with clean water should continue for at least 15 minutes. If contact lenses are present, they should be removed after flushing if easy to do. Continue flushing. Obtain medical attention if irritation persists.

Skin: Flush skin with plenty of water until irritation subsides. If irritation persists, obtain medical assistance. Wash contaminated clothing before re-use.

Ingestion: Ingestion of this material is not an expected route of exposure. Rinsing mouth with water is appropriate.

4.2 Most Important Symptoms and Effects—Both Acute and Delayed

General: The most important symptoms and effects from exposure to this material after contact with dust are eye and skin irritation. Breathing dust can cause respiratory irritation and respiratory system chronic illness if significant exposures occur repeatedly.

Inhalation: The immediate acute response to dust inhalation is respiratory system irritation. Upon repeated dust exposure at levels exceeding regulatory limits, crystalline silica content of the dust may cause delayed or chronic respiratory illnesses, including silicosis and cancer.

Eye Contact: Exposures of the eyes to dust may result in irritation, which must be treated immediately with first aid (Section 4.1) followed by medical attention if irritation persists.

Skin Contact: Skin contact can cause irritation.

4.3 Indication of Immediate Medical Attention and Special Treatment

Any time symptoms of eye or respiratory irritation occur, immediate first aid should be provided as described in Section 4.1, and medical attention should be obtained if irritation persists.

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing Media

Suitable Extinguishing Media: Use extinguishing media appropriate for surrounding fire. Material is not combustible.

5.2 Special Hazards Arising from the Substance or Mixture

Fire Hazard: Not combustible.

Explosion Hazard: Material is not explosive.

Reactivity: Material is not reactive.

5.3 Advice for Firefighters

Not applicable.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions, Protective Equipment, and Emergency Procedures

General Measures: Do not breathe dust. Do not get dust in eyes or on skin.

6.1.1. For Non-Emergency Personnel

Protective Equipment: Use appropriate personal protective equipment (PPE).

Emergency Procedures: Evacuate unnecessary personnel.

6.1.2. For Emergency Personnel

Protective Equipment: Equip responders and clean-up personnel with proper protection, including appropriate clothing, eye and face protection. Respiratory protection should be used as necessary to prevent dust exposure.

Emergency Procedures: Ventilate area if dust is generated.

6.2 Environmental Precautions

Reuse material as appropriate to avoid disposal.

6.3 Methods and Material for Containment and Clean-Up

Containment: Contain and collect as any solid. Avoid actions that cause dust to become airborne. Do not breathe dust, and do not allow large quantities of dust or wetted material to contact skin or eyes.

6.4 Reference to Other Sections

See Section 8. Exposure Controls and Personal Protection. For waste management information, refer to Section 13.

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for Safe Handling

Additional Hazards when Processed: Dust will be generated when transferring this material. Use engineered controls and other practices to control dust. Personal Protective Equipment (PPE) described in Section 8 should be used as necessary.

Hygiene Measures: Handle in accordance with good industrial hygiene and safety procedures. Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking, and again when leaving work.

7.2 Conditions for Safe Storage, Including any Incompatibilities

Not applicable.

7.3 Specific End-Use(s)

Not applicable.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Exposure Limits

The following exposure limits are based on a time-weighted full-shift exposure, unless otherwise noted.

Ingredient	OSHA PEL[1] (mg/m³)	ACGIH-TLV[2] (mg/m³)	Other[3] (mg/m³)
Bottom ash combustion residues[3] (amorphous calcium-aluminum silicates)	15 (total) 5 (respirable)	10 (total) 3 (respirable)	None Established
Crystalline silica[4] (respirable fraction)	50 µg/m³ (respirable)	0.025 (respirable)	0.05 (respirable)[4]
Calcium oxide	5 (total)	2 (total)	2 (total)[4]
Iron oxide	10 (total)	5 (total)	None Established
Magnesium oxide	None Established	None Established	None Established
Manganese dioxide (as manganese compounds)	5 (total, ceiling)	0.02 mg/m³	1 mg/m³
Phosphorus pentoxide	None Established	None Established	None Established
Potassium oxide	2 (total, ceiling)	2 (total)	2 (total, ceiling)[4]

fn[1] OSHA PEL (Permissible Exposure Level) at 29 CFR 1910.1000)
fn[2] ACGIH-TLV (American Conference of Governmental Industrial Hygienists-Threshold Limit Values 2018)
fn[3] NIOSH REL (National Institute for Occupational Safety & Health Recommended Exposure Limit)
fn[4] Crystalline silica is regulated by OSHA as Respirable Crystalline Silica (RCS) [29 CFR 1910.1053]. The amount of RCS in bottom ash has not been determined.

8.2 Exposure Controls

Appropriate Engineering Controls: Emergency eyewash equipment should be available in the immediate vicinity of any potential exposure. Use local exhaust or other suppression methods to maintain dust levels below exposure limits.

Personal Protective Equipment: Protective goggles or safety glasses, gloves, protective clothing. Wear respiratory protection if dust is present when transferring or processing.

Hand Protection: Protective gloves as appropriate to prevent irritation and other hand injuries.
Eye and/or Face Protection: Approved safety glasses, goggles, and/or face-shield.
Skin and Body Protection: Appropriate work clothing and footwear should be worn.
Respiratory Protection: If exposure limits may be exceeded or irritation is experienced, approved respiratory protection should be worn in accordance with OSHA Respiratory Protection Standard [29 CFR 1910.134].

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on Basic Physical and Chemical Properties

Physical State: Granular solid.
Appearance: Flowable material—Various colors (gray to tan)
Odor: Essentially odorless.
Odor Threshold: Not applicable.
pH: > 7 – 11
Evaporation Rate: Not applicable.
Melting Point: Not applicable.
Freezing Point: Not applicable.
Boiling Point: Not applicable.
Flashpoint: Not applicable.
Auto-Ignition Temperature: Not applicable.
Decomposition Temperature: Not applicable.
Flammability (solid, gas): Not applicable.

Lower Flammable Limit: Not applicable.
Upper Flammable Limit: Not applicable.
Vapor Pressure: Not applicable.
Relative Vapor Density at 20° C: Not applicable.
Relative Density: Not applicable.
Specific Gravity: 2.2 – 2.8
Solubility: Slightly soluble in water.
Partition Coefficient—N-Octanol/Water: Not applicable.
Viscosity: Not applicable.
Explosion Data—Sensitivity to Mechanical Impact: Not applicable.
Explosion Data—Sensitivity to Static Discharge: Not applicable.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

Hazardous reactions are not expected to occur under normal conditions.

10.2 Chemical Stability

Stable.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization or other reactions are not expected. For gas generation, see 10.6.

10.4 Conditions to Avoid

Material can become airborne in moderate winds. Dry material should be stored in silos or other structures. Material stored outdoors should be covered or dampened to reduce dusting.

10.5 Incompatible Materials

Not applicable.

10.6 Hazardous Decomposition Products

Not expected under normal conditions. Wetted material, which contains ammonia, may release ammonia gas, which may result in nuisance odor or potential harmful exposure in a confined area.

SECTION 11: TOXCOLOGICAL INFORMATION

11.1 Likely Routes of Exposure

Skin Contact: Material may irritate unprotected skin.

Eye Contact: Material may cause serious irritation of unprotected eyes.

Inhalation: Respirable dust may be generated that if inhaled, can cause respiratory system irritation. Prolonged or repeated inhalation exposure may cause chronic respiratory illness, including silicosis and cancer.

Ingestion: Not expected to be an exposure route of concern.

11.2 Symptoms Related to Physical, Chemical, and Toxicological Characteristics

Immediate Effects: Irritation of skin, eyes, and respiratory tract due to dust inhalation or exposure of eyes and skin to material.

Delayed and Chronic Effects: Inhalation of dust on a prolonged or repeated basis may result in chronic lung disease or silicosis, and may also result in lung cancer.

11.3 Numerical Measures of Toxicity

The acute and chronic effects of exposure to this product's dust have not been quantified.

11.4 Carcinogenicity

The ingredient quartz, also known as crystalline silica, has been determined to be carcinogenic by the International Agency for Research on Cancer (IARC) and the National Toxicology Program (NTP). The potential cancer (H350) Hazard Class designation disclosed in Section 2 is conservative and based on the percentage of crystalline silica in this mixture product. Toxicological studies conducted on fly ash materials, including oral and inhalation repeated dose, as well as mutagenicity have shown no evidence of carcinogenic effects that, except for numerical percentage of crystalline silica and other potential carcinogenic substances included in OSHA GHHCS Guidance, classification as a carcinogen is not required. Reference: *American Coal Ash Association Safety Data Sheet Guidance Document*, May 2015.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

No additional information available.

12.2 Persistence and Degradability

Not available.

12.3 Bioaccumulative Potential

Not available.

12.4 Mobility in Soil

Not available.

12.5 Other Adverse Effects

Not available.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods

Waste Disposal Recommendations: Excess material should be re-used or recycled. Material as a waste is not a hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA) (40 CFR 261), but waste material should be prevented from entering sewer systems, surface waters or the environment. Dispose of waste material in accordance with all local, regional, national, provincial, territorial, and international regulations.

SECTION 14: TRANSPORT INFORMATION

14.1 DOT (U.S.)

Not regulated for transport.

14.2 IMDG (Maritime Code)

Not regulated for transport.

14.3 IATA

Not regulated for transport.

14.4 TDG (Canada)

Not regulated for transport.

SECTION 15: REGULATORY INFORMATION

15.1 U.S. Federal Regulations

SARA Section 311/312 Hazard Classes

Reporting of fly ash is required if reporting threshold (10,000 pounds) is exceeded

- Skin corrosion or irritation
- Serious eye damage or irritation
- Specific target organ toxicity (single or repeated exposure)—Respiratory

SARA Section 313 Emission Reporting

This material may contain the following constituent listed under SARA (Title III) Section 313, but not in amounts requiring supplier notification under 40 CFR Part 372:

- Manganese compounds (< 2%)

Note: Fly ash is not a chemical listed at Part 372.65

TSCA Inventory

All constituents are included on the Toxic Substances Control Act Chemical Inventory (40 CFR 720) and exempt from inventory update reporting (40 CFR 710).

15.2 U.S. State Regulations

State Right-to-Know Laws

Fly ash contains hazardous substances subject to inventory reporting and other requirements of the Massachusetts, New Jersey and Pennsylvania right-to-know laws.

Component	CAS No.	Component	CAS No.
Calcium oxide	1305-78-8	Phosphorus pentoxide (or phosphorus oxide)	1314-56-3
Iron oxide	1309-37-1		
Magnesium oxide	1309-48-4	Potassium oxide	12136-45-7
Manganese dioxide	1313-13-9	Silica – crystalline quartz	1309-37-1

References to Table:

Massachusetts: 301 CMR 41, *et seq.* (January 16, 2015)

New Jersey: New Jersey Revised Statutes 34:5A-5 (2016) and New Jersey Health Department List

Pennsylvania: Title 34 Pennsylvania Code, Chapter 323

Note: These and other state lists include specific chemicals and cross-references to other regulatory lists; for example, CERCLA § 102, EPCRA §§ 302 and 313, Clean Air Act § 112(r), OSHA PELs at 29 CFR § 1910.1000, and OSHA Hazard Communication (29 CFR § 1910.1200).

California Proposition 65—Warning Required [California Health and Safety Code § 25249.6]

Refer to Section 2.4.

15.3 Canadian WHMIS Regulations

Crystalline silica and other bottom ash constituents are hazardous materials and subject to WHMIS 2015.

15.4 Other: HMIS and NFPA

HMIS:

NFPA:

SECTION 16: OTHER INFORMATION

Party Responsible for Preparation of this Document

Eco Material Technologies Inc., and its subsidiary and affiliate companies.
(801) 984-9400

Limitations

The information and recommendations set forth herein are based on data we have in our possession, and we have reason to believe is accurate. It is, however, the user's responsibility to determine the safety, toxicity, or suitability for his/her own use of the herein described product. Because the actions by others is beyond our control, Eco Material Technologies makes no warranty expressed or implied regarding accuracy of the data or the results to be obtained from the use thereof.